



VideoCAD

Program for professional CCTV system design

version 8.2 Lite

User manual

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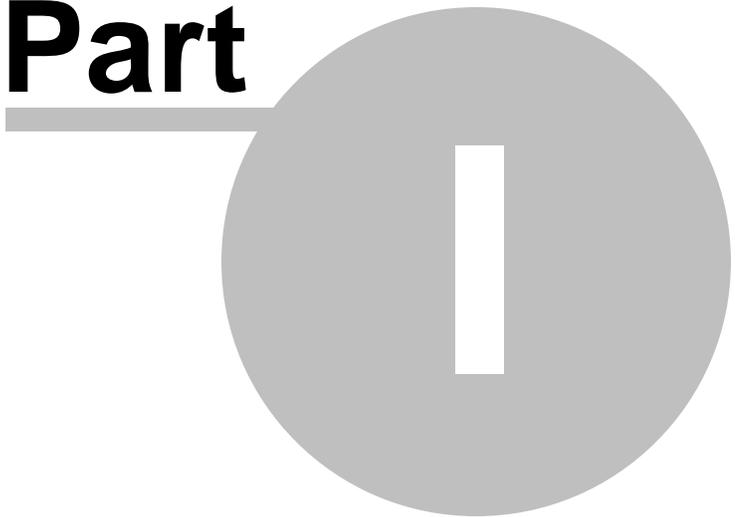
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Part



General information on VideoCAD 8 Professional

1 General information on VideoCAD 8 Professional

VideoCAD is a multifunctional tool for professional video surveillance system design, modeling parameters of video image and video equipment.

VideoCAD allows even the beginners to use the new opportunities appearing to be hard to obtain without it due to the complexity of calculations and therefore not being used even by the skilled engineers of CCTV.

VideoCAD practically boosts the quality of CCTV design to a new level which appears to be beyond any competition with those lacking the program.

Four VideoCAD versions are offered:

- **VideoCAD 8 Professional** - the most powerful, professional version with many unique tools.
- [VideoCAD 8 Lite](#)^[31] - basic version offers the most useful and easy-to-master tools for CCTV design;
- [VideoCAD 7 Starter](#)^[45] - easiest, low cost version;
- [VideoCAD 7 Starter II Kit](#)^[45] - is like the Starter version but with [several valuable features](#)^[45] in addition. Starter II version is offered only in a kit with [IP Camera CCTV Calculator](#) and [VideoCAD Plugin for SketchUp](#);

VideoCAD 8 Professional is registered with USB dongle. All other VideoCAD versions are registered only by personal registration code. This code doesn't depend on computer hardware or a dongle. This code is valid on any computer.

VideoCAD Starter, VideoCAD Starter II Kit and VideoCAD Lite can be upgraded to VideoCAD 8 Professional at discount price.

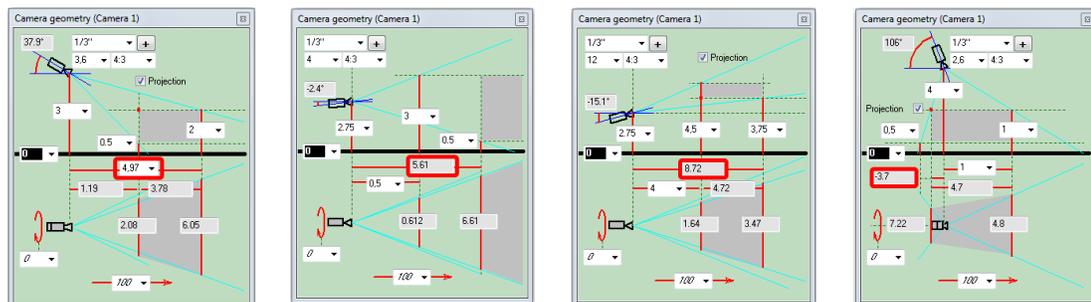
Licenses of **VideoCAD 8 Professional** and **VideoCAD 8 Lite** allows free use of the **demo versions** for educational purposes, for research, theses, writing articles, etc. non-profit activities.

Information in the Help file can be outdated. Please see actual information on the [cctvcad.com web site](http://www.cctvcad.com)

The main features of VideoCAD 8 Professional:

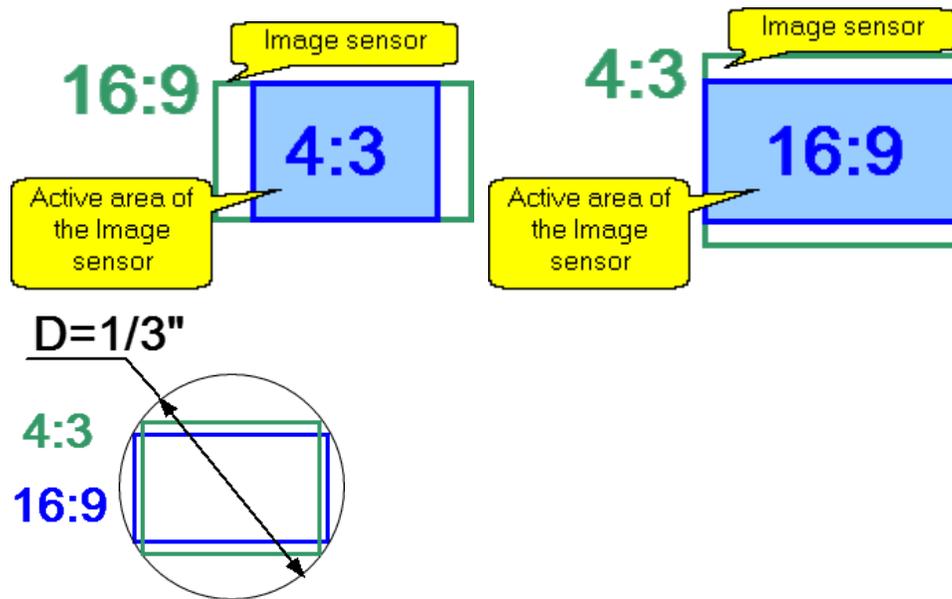
▼ Calculations

Calculating [geometric parameters](#)^[25] of camera view area in any camera position.

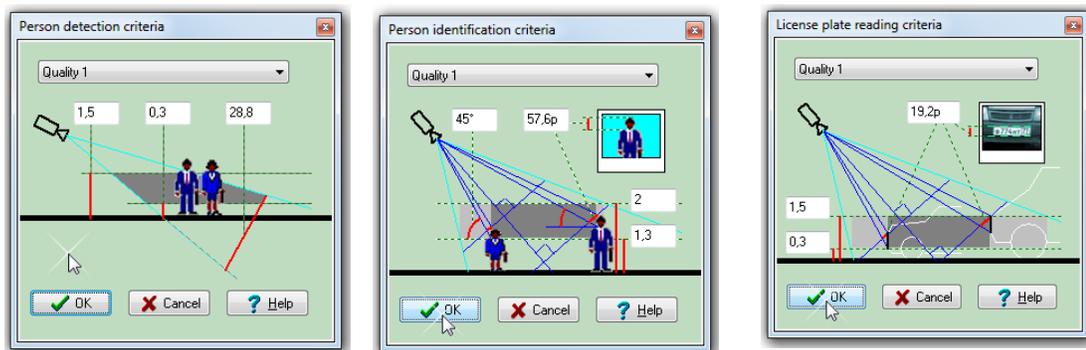


Calculating size of the active area of the image sensor in dependence of the aspect ratio of the

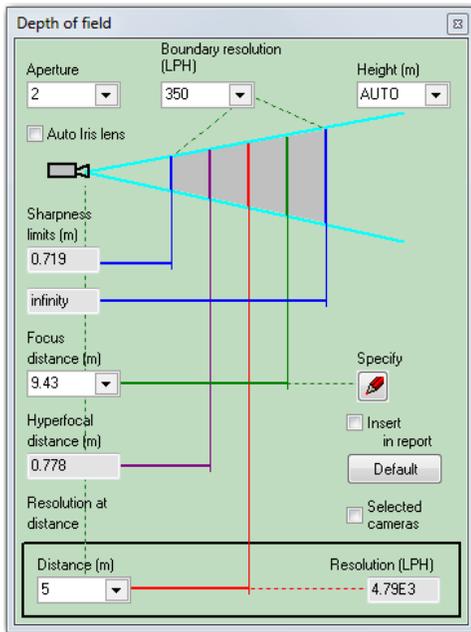
image sensor and the aspect ratio of the output image of the camera.



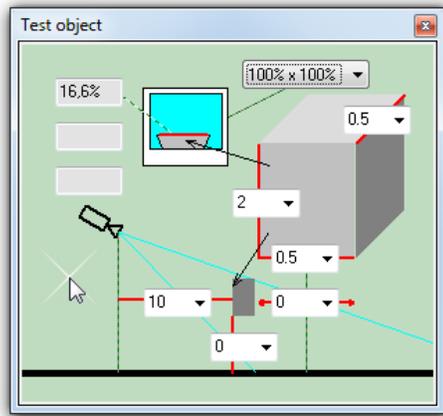
Calculating horizontal projection sizes of person detection, identification and license plate reading areas.



Calculating Depth of Field of each camera of the project.



Calculating the image size on display of any object in camera view area in percentage of display size, pixels and millimetres (inches in case of Imperial format).



Calculate [length](#)^[388] and electric parameters of [cables](#)^[342].

Power cable (Camera 2)

Cable brand	Line 26	Conductor cross-section area (mm ²)	0,75
Total length of all segments in layouts (m)	0	Conductor diameter (mm)	0,98
Reserve for cable laying (%)	10	AWG	-
Reserve for camera connection (m)	2	Cable resistance (Ohm (both directions))	0,209
Reserve for source connection (m)	2	Voltage at cable start (V)	12
Cable length including reserves (m)	4	Consumption current (A)	0,117
Cable coil size (m)	250	Quantity of cameras	1
Cable coil number	1	Voltage at cable end (V)	12
Cable surplus (m)	246		

OK Cancel Help

Calculate light power and illumination produced by illuminators.

Illuminator calculation

LAMP

Lamp type: Incandescent (Tc=2850K)

Light efficiency (lm/watt): 12

Spectral efficiency of radiation:

IT CCD	ExView	
Black/white	Black/white	Color
1,08	1,1	1
Day/night	Day/night	
1,1	1,12	

Edit

Lamp power (watt): 100

Light flux emitted by lamp (lm): 1000

LUMINAIRE

Lamp quantity: 1

Efficiency factor: 0,5

Light flux emitted by illuminator (lm): 500

Omnidirectional light source

Projector

Angle of radiation: 120

Concentration: 0,5

Axial light intensity (cd): 212

Light intensity (cd):

Illumination at distance

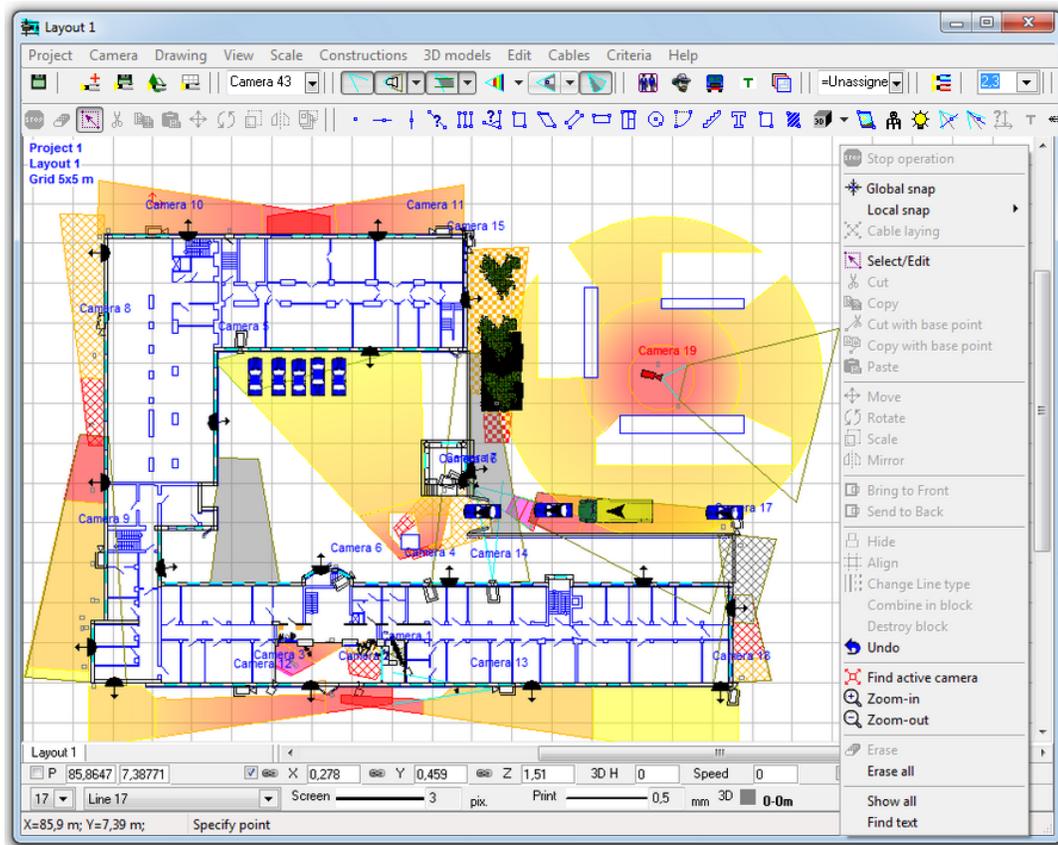
Distance (m): 10

Illumination (lux): 2,12

OK Help

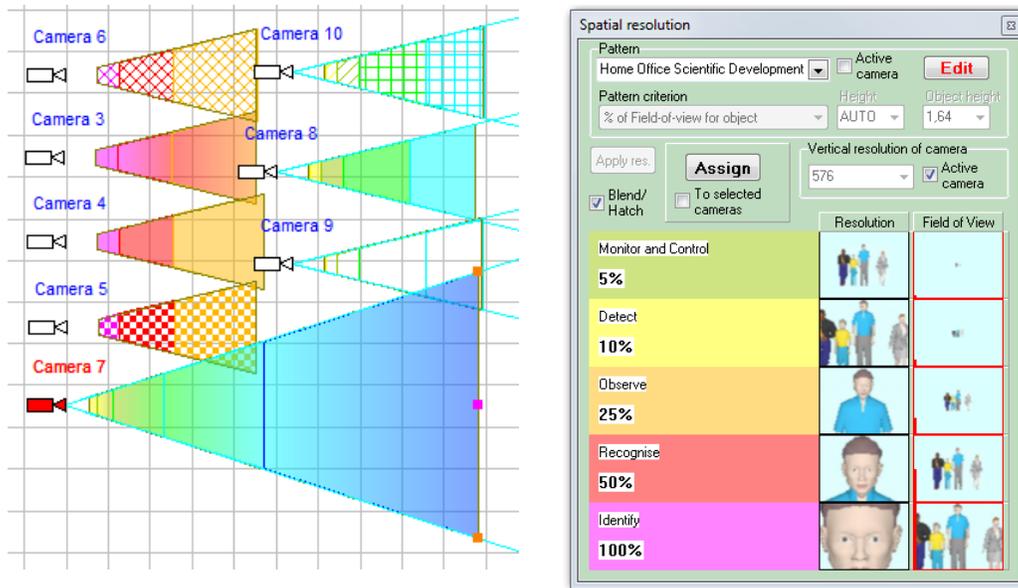
▼ Working with 2D projections

Use 2D [Graphics window with CAD interface](#)^[158]. Use a lot of 2D/3D constructions and CAD tools, line types, font types, [snaps](#)^[194], horizontal and vertical projections, up to 10 layouts in each project, unlimited number of layers.

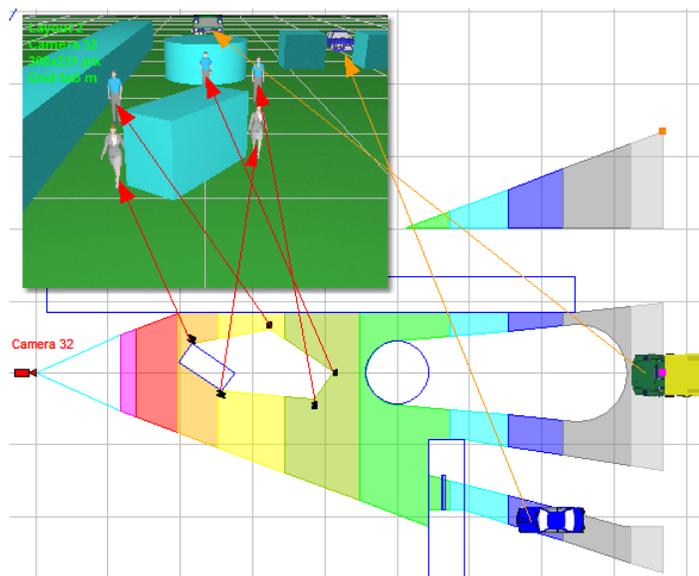


Display on the 2D layout results of [calculations](#)^[3]: view area projections, person detection and identification areas, depth of field limits, test object, cables and luminaries.

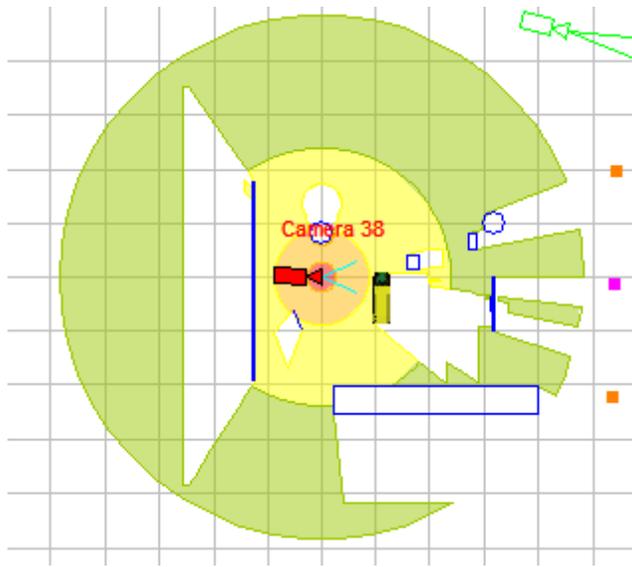
Display by separate colors and hatch styles different regions of [spatial resolution](#)^[170] and field-of-view size. There are prepared spatial resolution patterns according to the following criteria: Home Office Scientific Development Branch; Home Office Guidelines for identification; P 78.36.008-99, Australian Standard AS4806: Closed Circuit Television, European Standard EN50132-7, ISO/IEC 19794 Biometric data interchange formats.



Construct the horizontal projection of camera control areas including [shadows](#)^[172] from obstacles on the scene.



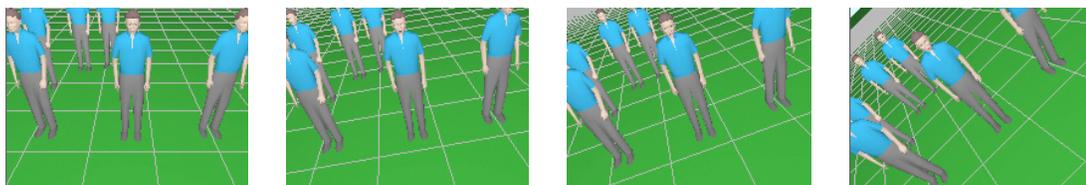
Choose the best positions and calculate control areas of [PTZ cameras](#)^[384], Dome cameras and 360 degree cameras.

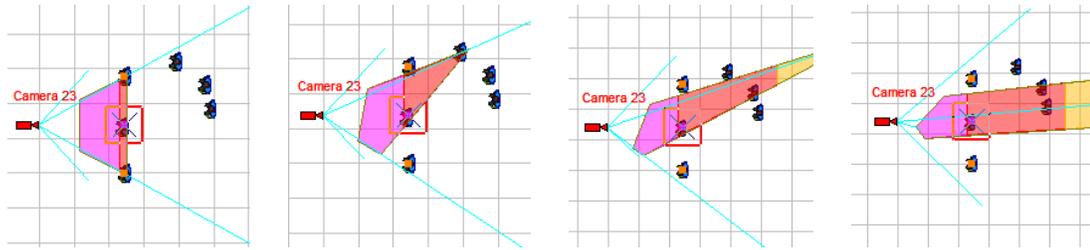


Simulation of the horizontal projection of the view area and visualization of the spatial resolution distribution of [panoramic cameras](#)^[409] (fisheye, 360°/180°).

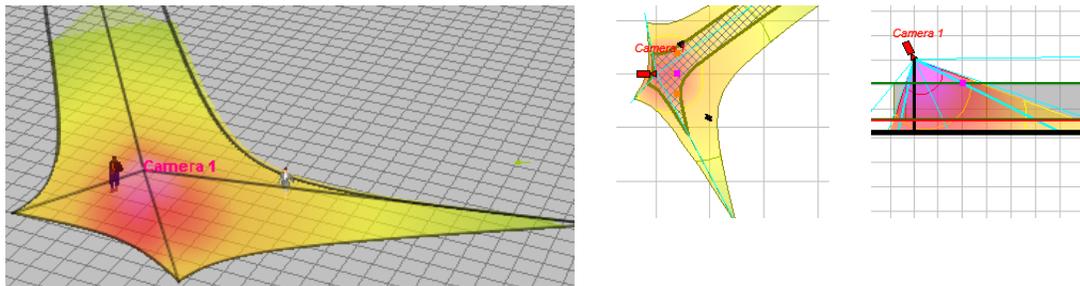


Modeling [camera rotation](#)^[255] around the main optical axis.



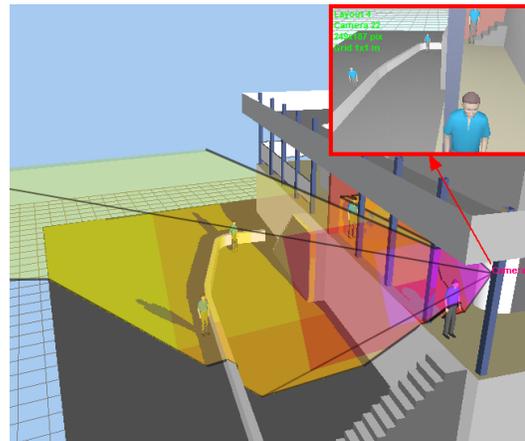
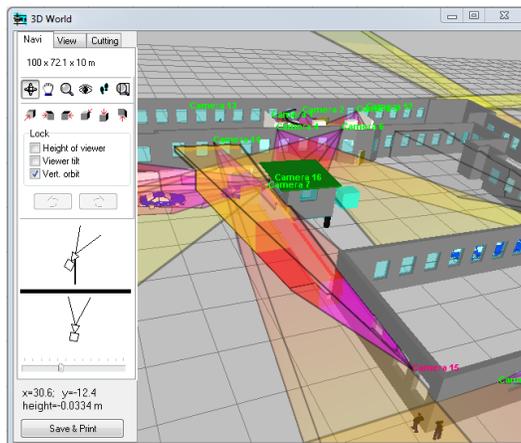


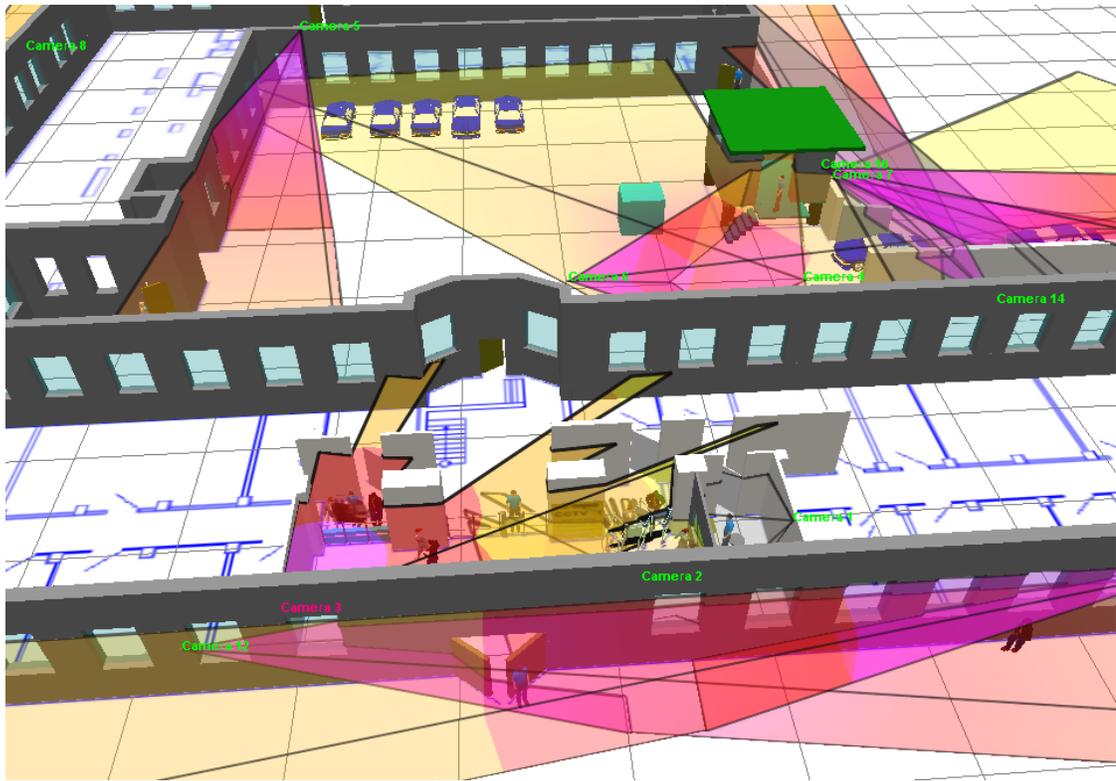
Modeling [lens distortion](#)^[429]. Modeling influence of the lens distortion on view area shape, on view area projection shape and spatial resolution distribution. Correct modeling wide-angle lenses with strong distortion.



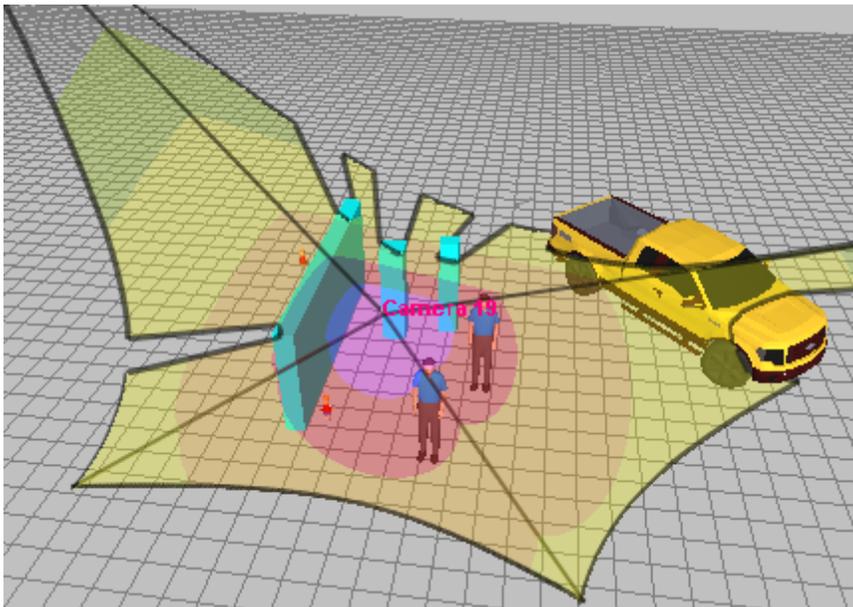
▼ 3D modeling layout and camera view areas

VideoCAD has special 3D World window with standard tools for 3D navigation (**Orbit, Move, ZOOM, Walk, Look around, Zoom frame**). With the help of the window you can observe the layout in 3D representation. You can work on the project in usual 2D projections and watch it in 3D. You can "walk" on the floors of 3D models of buildings and study every detail.

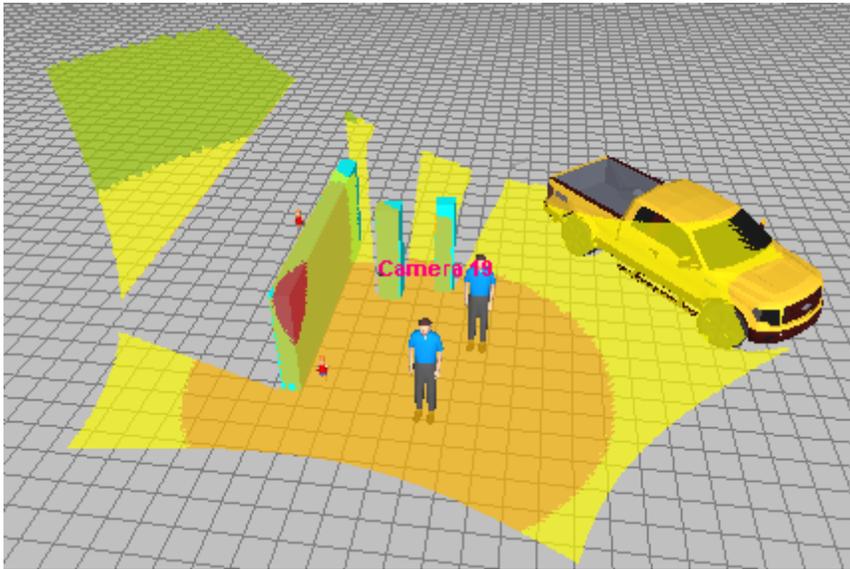




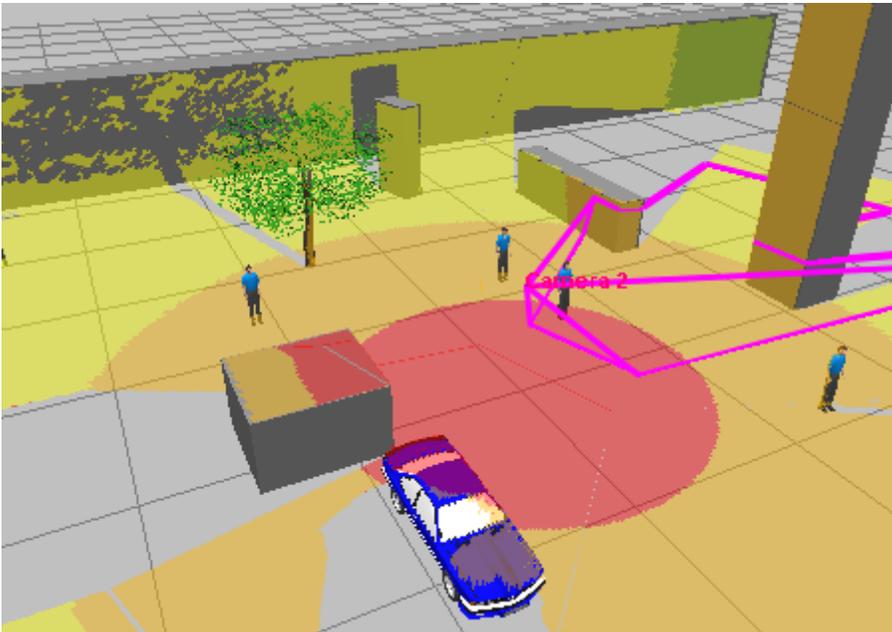
3D visualization of the camera view area surface taking into account spatial resolution, shadows, lens distortion.



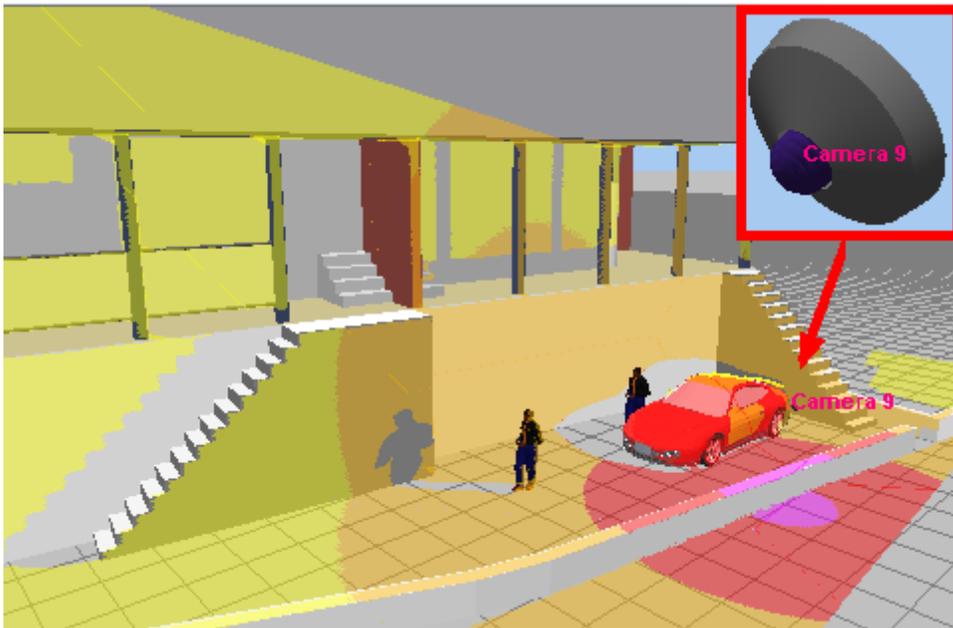
3D visualization of the active camera coverage on the environment taking into account spatial resolution, shadows, lens distortion.



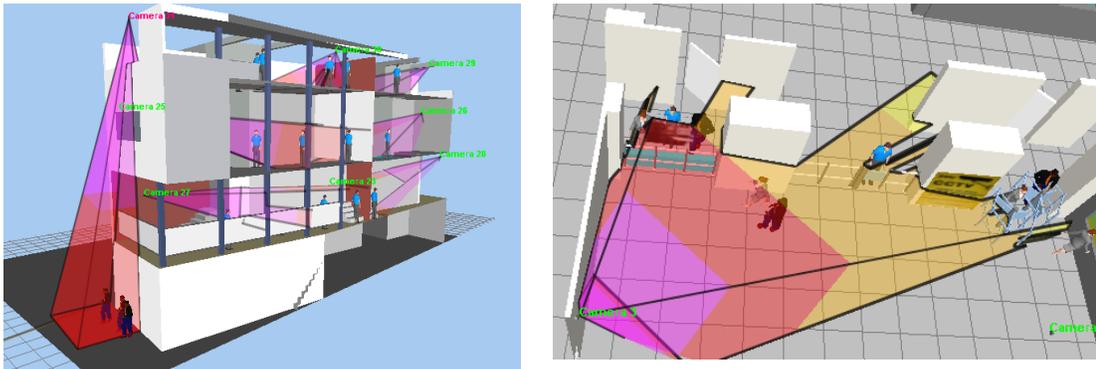
3D visualization of control areas of [PTZ cameras](#)^[384], Dome cameras and 360 degree cameras.



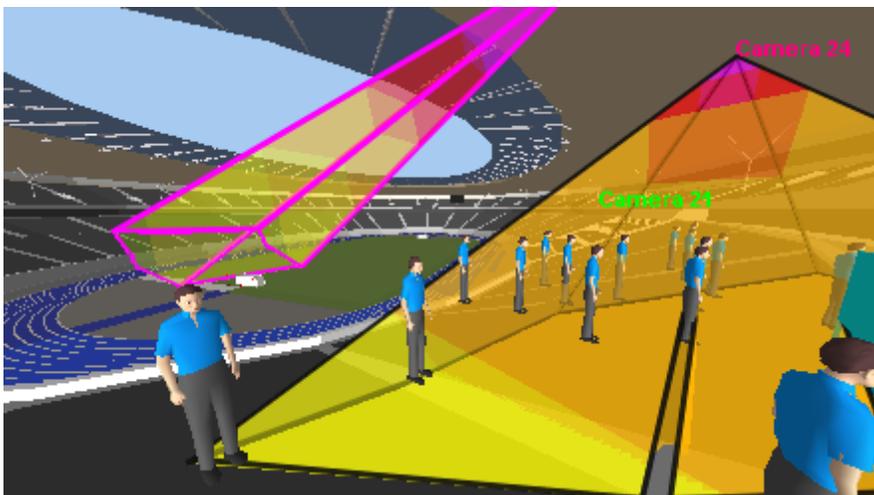
Visualization of camera coverage area and spatial resolution distribution on the surrounding objects of [panoramic cameras](#)^[409] (fisheye, 360°/180°).



Free cutting 3D layout by six planes to provide access to any point of complex 3D buildings.



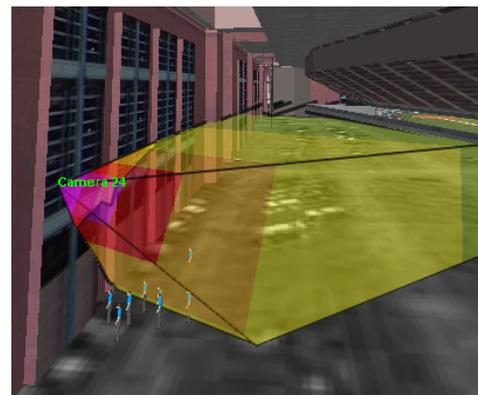
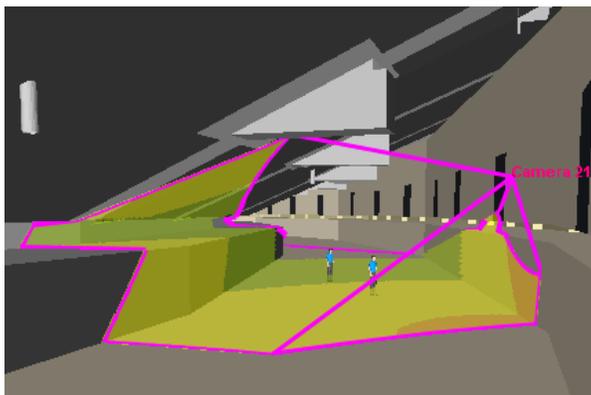
Working with [multilevel](#) 3D layouts and terrains with complicated vertical structure.



Possibility of loading prepared [3D models](#)^[229] (a person, a car, etc.,). You can add your own 3D models from **3ds max** and [Sketchup](#)^[397].



Possibility of using [3D models-territories](#)^[398], to place inside them cameras, constructions and other 3D models.

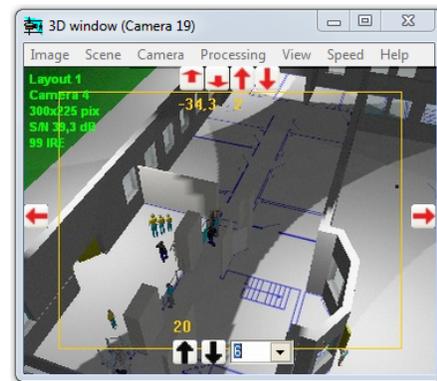
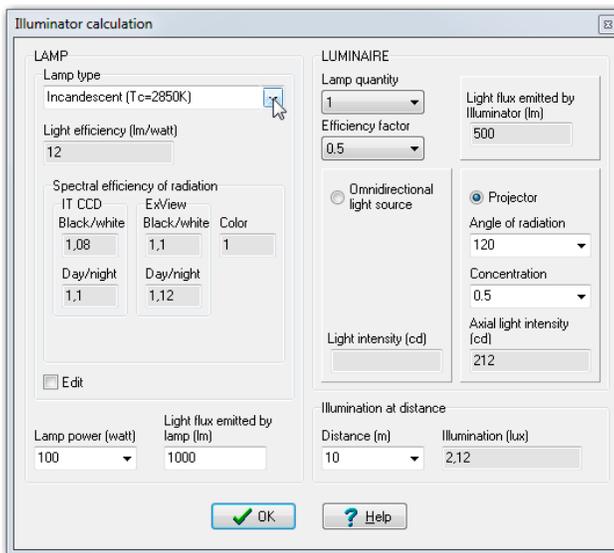


▼ Modeling images from cameras based on camera parameters and scene conditions

Modeling observed scene parameters (illumination, visibility limitations).



Model luminaires considering spectrum of radiation and spectral sensitivity of image sensors, including discharge lamps with complex spectrum and infrared LED illuminators.



Model camera parameters (spectral response, number of pixels, resolution, minimum illumination at known signal/noise ratio, IRE and aperture, maximum signal/noise ratio, electronic shutter, AGC, BLC, gamma, day/night cameras, frame rate, interlace scan, global shutter and rolling shutter).

Model
 =Unassigned=   Help

CAMERA

Color Number of pixels Resolution

ExView Horiz. only

Min. Illum. (lx) Aperture S/N max.

On sensor AT: S/N (dB) S/N current

IRE exposure (ms)

AESC Exposure time limits - S

Current S

AGC Current Maximum Set

BLC Gamma Auto Iris DC

Model lens parameters (focal length, aperture, auto iris DC and Video Drive, resolution).

LENS

Fixed Iris Aperture limits -

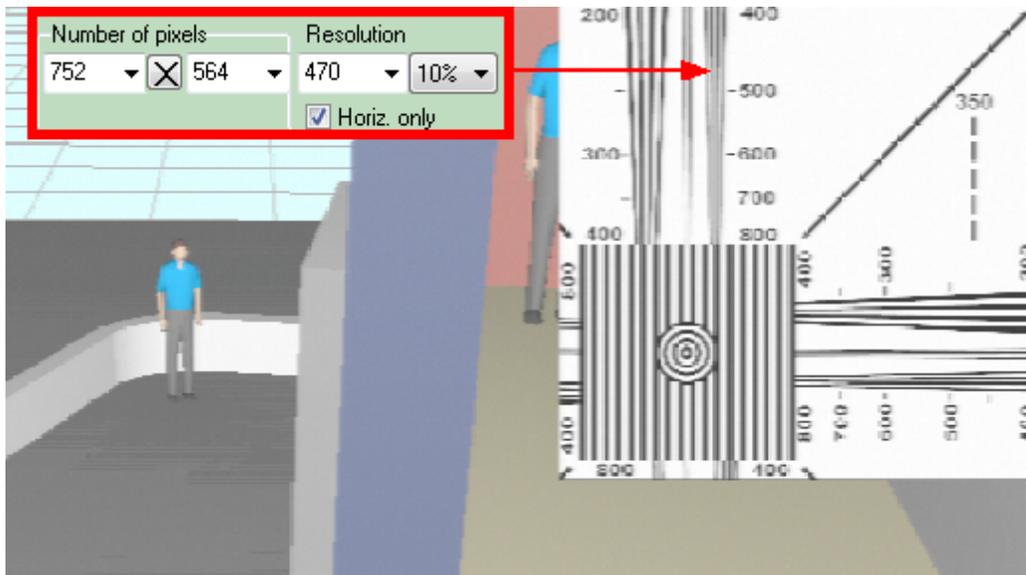
Manual Iris Curr. aperture Min. Illum.

Auto Iris

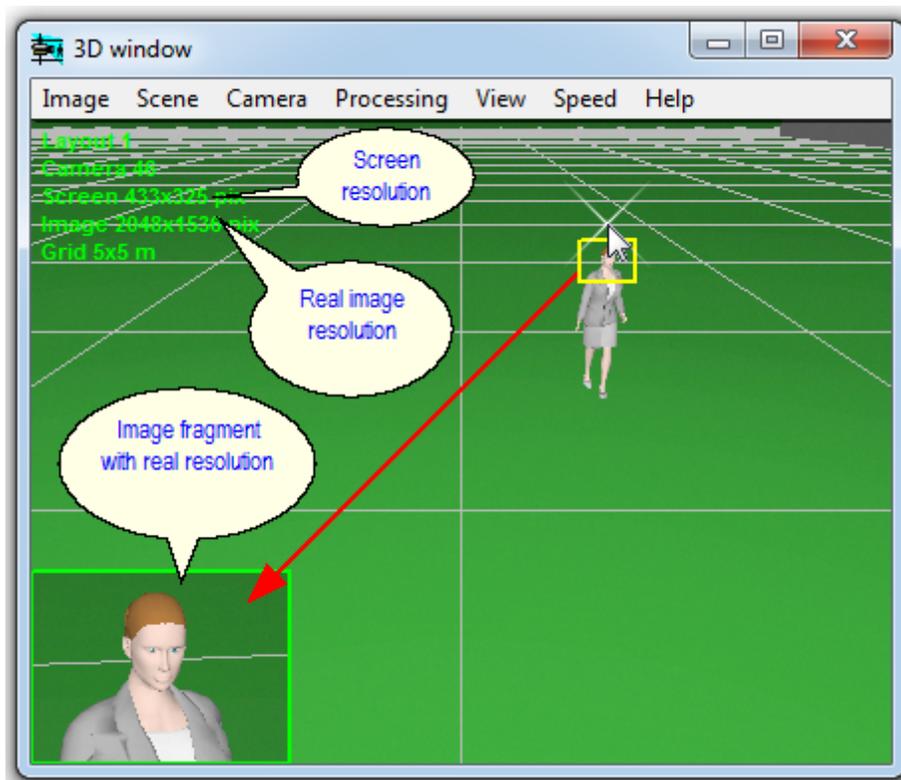
DC Video Drive

Resol.(lp/mm) Contrast

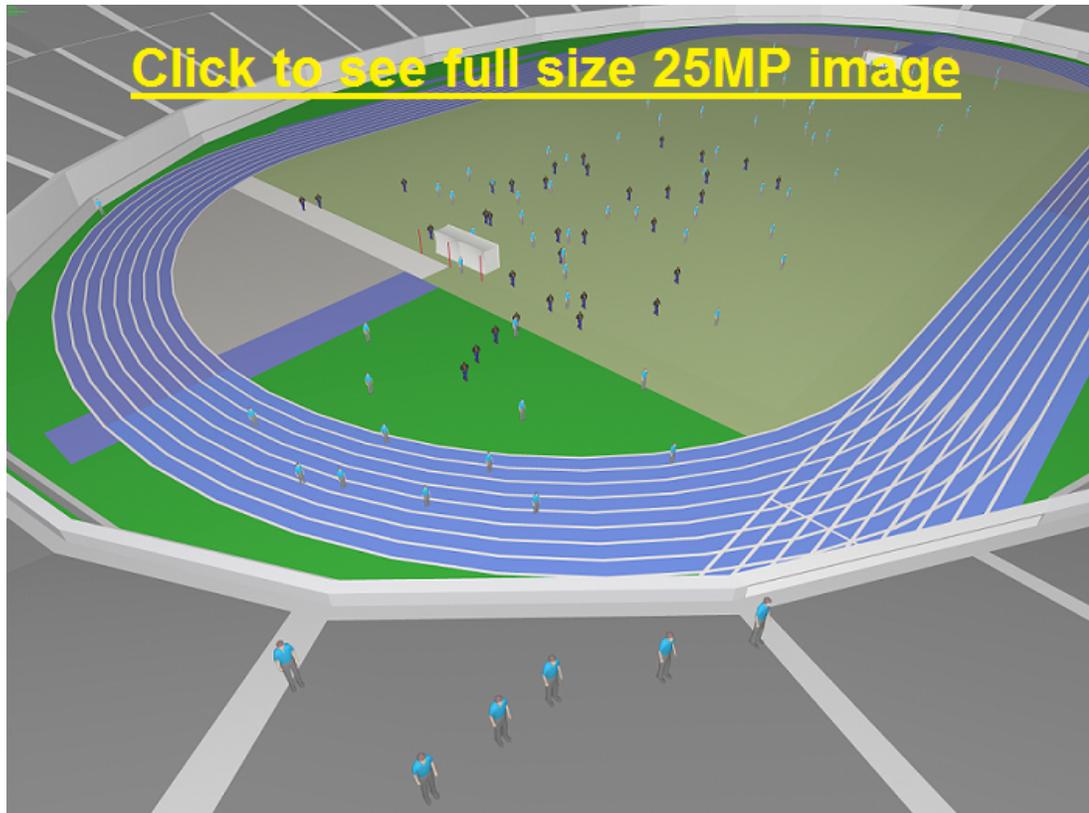
Visually control modeled resolution with the help of the Test chart



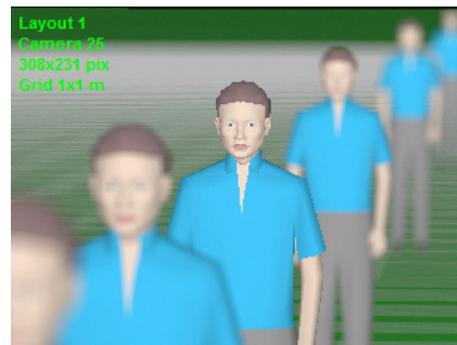
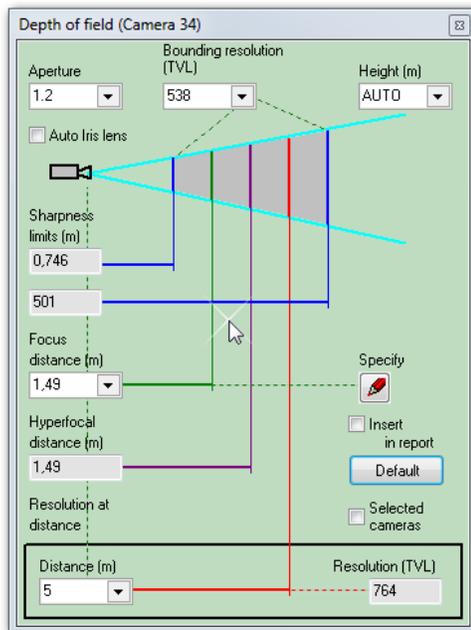
Model images from [megapixel cameras](#) ^[378] with number of pixels exceeds Windows screen number of pixels (Up to 100 megapixel and more!) with PiP (Picture in Picture) and without PiP.



See examples: [5 megapixels](#), [10 megapixels](#), [25 megapixels](#).



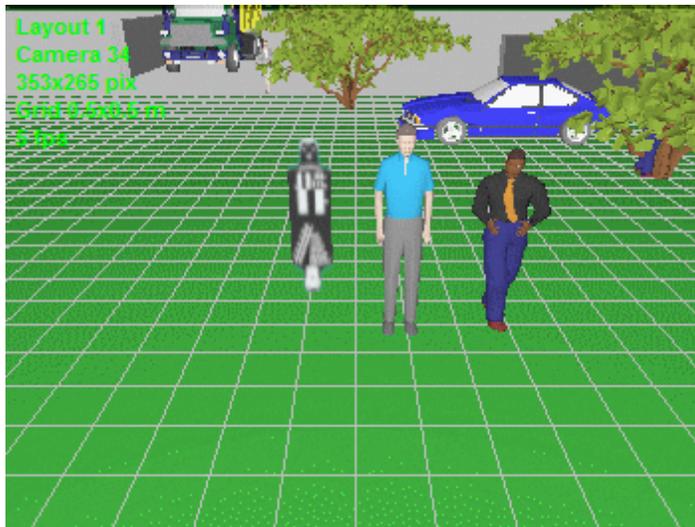
Calculate and model depth of field of each camera in project.



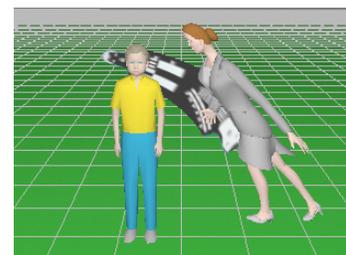
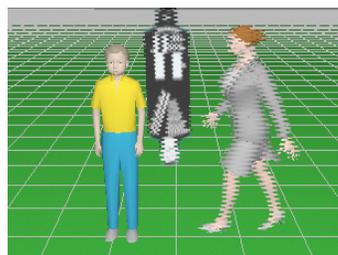
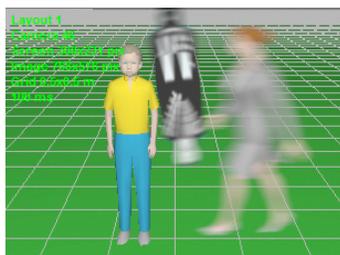
Model brightness, contrast, compression, horizontal and vertical sharpness.



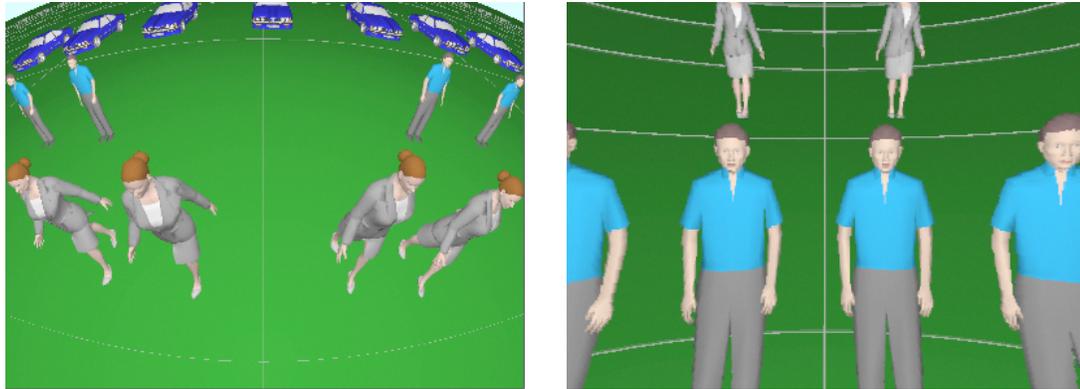
Model [moving_objects](#)^[166], camera [frame_rate](#)^[379], create animated images with moving 3D models.



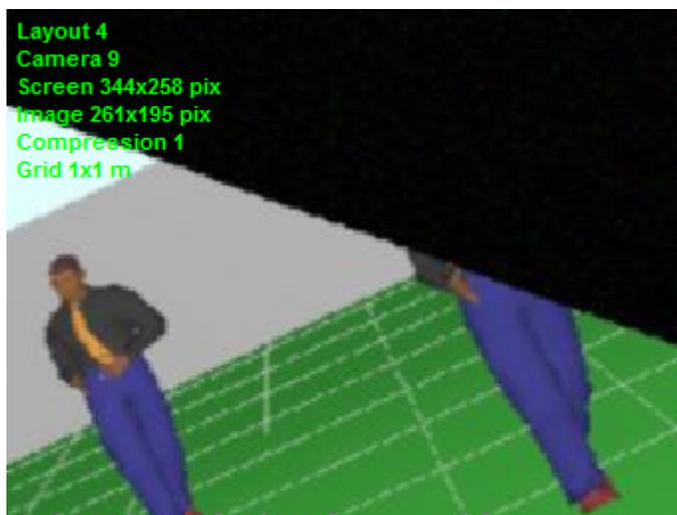
Model [blur_and_distortion](#)^[385] of moving 3D models depending on camera parameters (exposure time, interlacing, rolling shutter).



Modeling images taking into account [lens distortion](#)^[429] (barrel and pincushion). Correct modeling wide-angle lenses with strong distortion.



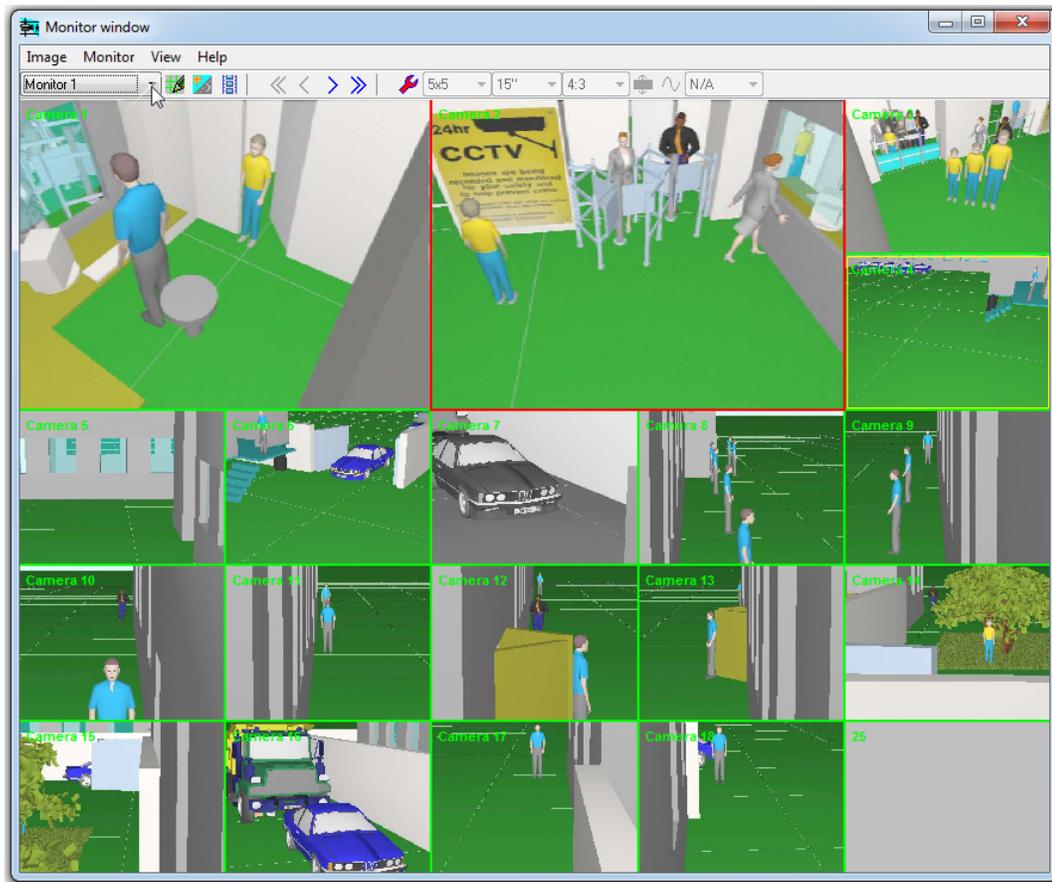
Simulation of image resolution and view area limits of [panoramic cameras](#)^[269] (fisheye, 360°/180°).



Obtain [Image Model](#)^[284] for each camera in the project based on models of scene and equipment.

▼ Design operator interface

Design operator interface using the [Monitor window](#)^[294].



Modeling size and [resolution](#)^[297] of monitors.

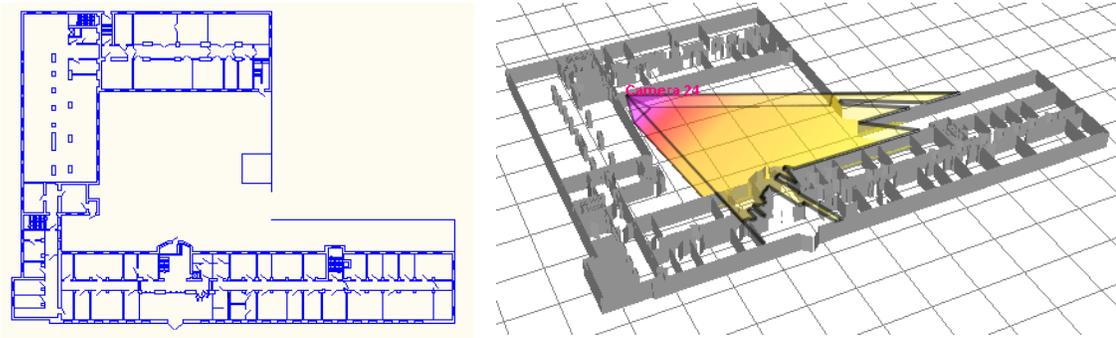
Create [animated monitor models](#)^[380] as html files with moving 3D models and different frame rates of each camera. [See an example of animated monitor \(file size about 4 Mb\)](#).

▼ Import from other CAD programs

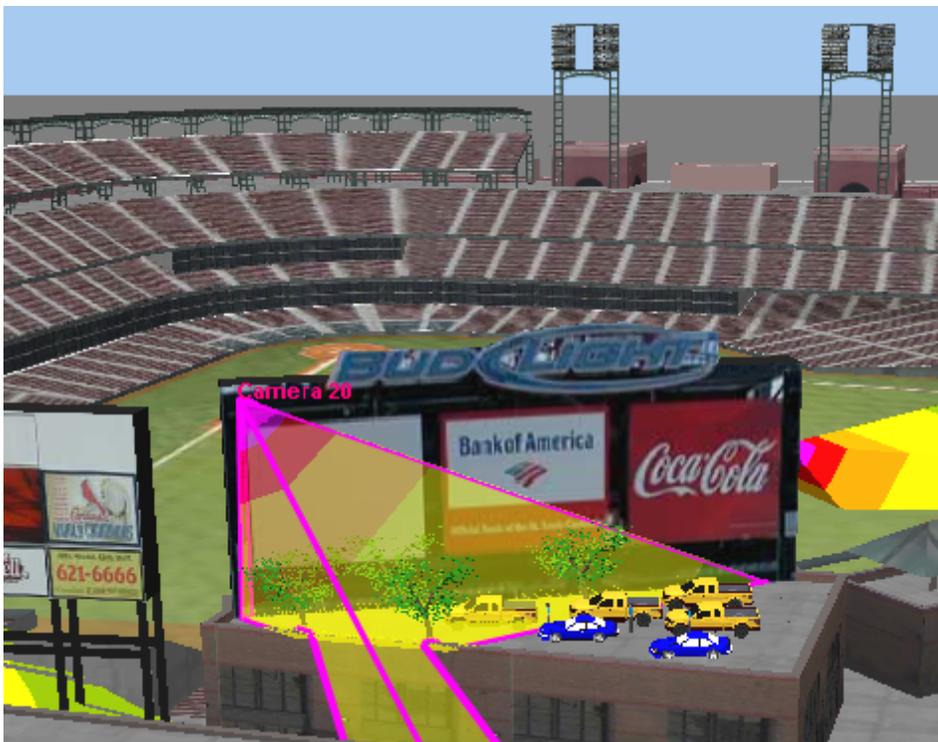
Locate cameras and cables on the [prepared layouts](#)^[204] in *.bmp, *.jpg, *.emf, *.wmf, *.png, *.gif, *.tif, *.pdf. **AutoCAD *.dxf *.dwg** formats.

For backgrounds in **AutoCAD *.dxf *.dwg** formats you can choose Layout in the background, control visibility of layers, hide texts. For backgrounds in PDF format you can choose page and resolution of the background.

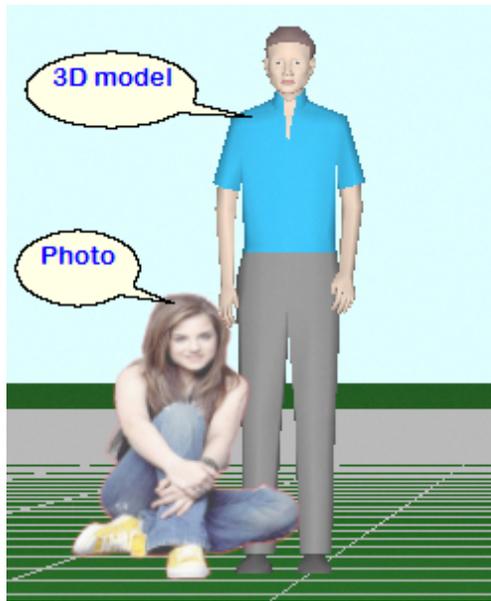
[Import constructions](#)^[199] from a 2D background in AutoCAD formats to 3D VideoCAD constructions automatically. Use of this tool allows to reduce efforts of outlining background to convert it to 3D constructions.



Import 3D models of objects and 3D models of [territory](#)^[399] using [VideoCAD plugin for SketchUP](#)^[397]



Import [raster images](#)^[191] to display them in 3D.



Import camera model parameters to the **Table of camera models** via copying and [pasting](#)^[313] from Excel.

▼ Export

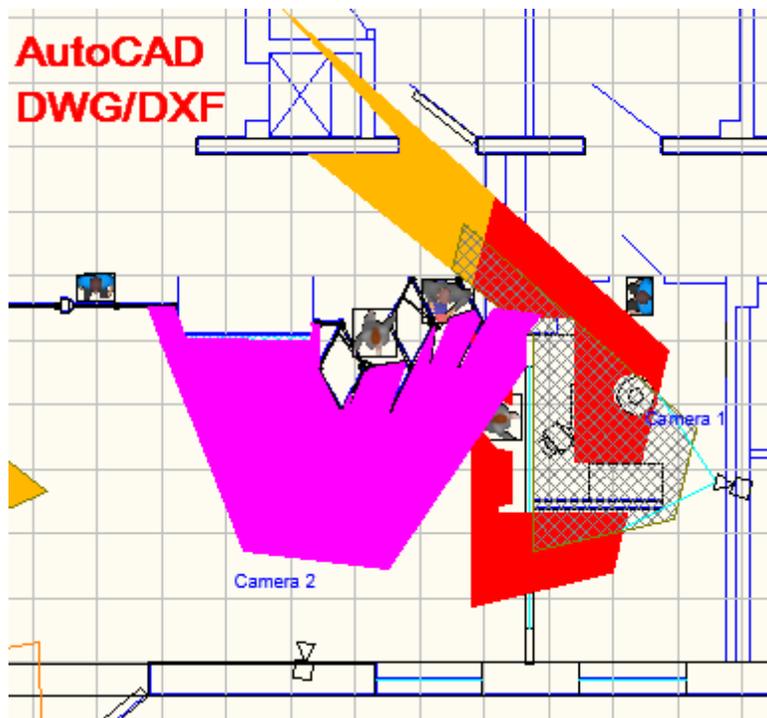
[Export](#)^[202] the 2D drawing into any of the following formats: *.bmp, *.jpg, *.emf, *.wmf, *.png, *.gif, *.tif, *.pdf (raster and vector), **AutoCAD *.dxf**, **AutoCAD *.dwg**, PLT (HPGL/2), CGM (Computer Graphic Metafile), SWF (Adobe Flash).

Advanced export to AutoCAD formats. At exporting to AutoCAD DWG and DXF formats, cameras and illuminators are exported as blocks. The most important parameters of cameras and illuminators are recorded to the block attributes. VideoCAD layers, fonts and line types are exported.

When you export a drawing with a background in AutoCAD DWG/DXF format, VideoCAD constructions can be [added to the background on separate layers](#)^[329] or the background can be added as an external links to the file of the background. In both cases the structure of the background is saved.

Possible scheme of the combining AutoCAD + VideoCAD:

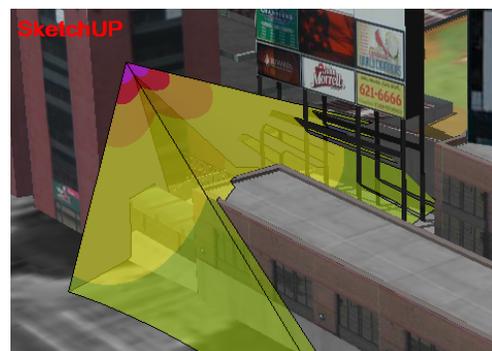
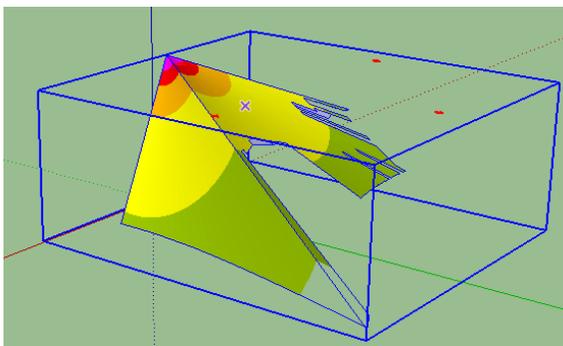
1. [Load drawing](#)^[204] in AutoCAD format as a background;
2. [Import](#)^[199] AutoCAD lines to VideoCAD 3D constructions automatically;
3. Adding cameras and constructions on special layers.
4. [Export](#)^[202] the obtained drawing to AutoCAD format to work with it in AutoCAD.



Export to DXF file 3D view areas and camera coverage taking into account lens distortion, spatial resolution, and shading.

This feature allows the convenient scheme of work with combination of 3D BIM Software (SketchUP) + VideoCAD.

1. Export layout as a 3D model-territory through SketchUP and loading it into VideoCAD.
2. Adding cameras with 3D view areas in VideoCAD.
3. Export 3D view areas in DXF format, loading them into 3D BIM Software and combining with the original layout in 3D.



Export images from the 3D World window to any of the following formats: *.bmp, *.jpg, *.gif, *.tif, *.png. Size in pixels of the exported file can exceed the Windows screen size.

Export [3D images](#)^[286] from cameras to any of the following formats: *.bmp, *.jpg, *.gif, *.tif, *.png. Size in pixels of the exported file can [exceed](#)^[878] the Windows screen size.

Export [animated image models](#)^[286] with moving 3D models to **animated gif**. [See an example of animated monitor \(file size about 4 Mb\)](#).

Export [images from monitors](#)^[298] to *.bmp, *.jpg, *.gif, *.tif, *.png.

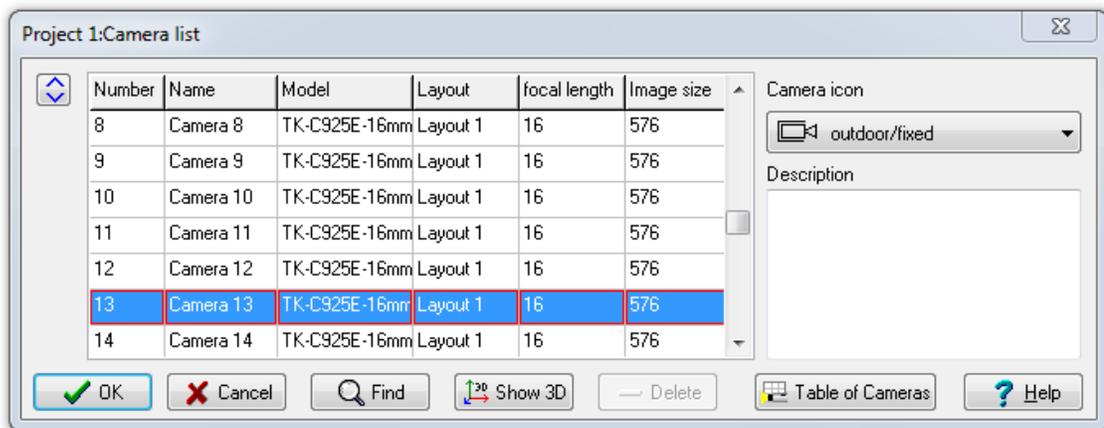
Export images from monitors to [animated monitor models](#)^[380] as html files, with moving 3D models, taking into account frame rate of each camera.

Obtain the [text report](#)^[200] with full description of all cameras in the project, view areas and cables to be pasted into a project explanatory note or used as instruction for installation.

Get a [report in PDF format](#)^[200], with full description of all cameras in the project, view areas and cables. The **PDF Report** can include images from the cameras, fragments of layouts with camera placed, a cover with logo. Report parameters and the structure of information in the report is configurable. See [example of PDF report](#).

Obtain the [cable report](#)^[240].

Copy [the Camera list with most important parameters](#)^[336] to MS Excel, MS Word and other software.



Get detailed adjustable table of all initial and calculated parameters of cameras in project. Print the table or export it to *.txt, *.csv, *.rtf, *.xls, *.htm formats.

Table of cameras

Number	Name	Layout	Description	Name	Producer	Key Feature	Type				Model	Forme
							TV system	Fixed, PTZ, Dome, Mini	Output	Color		
1	Camera 1	Layout 1		KPC-S230C	KT&C		CCIR/PAL	mini	VHS	color	HAD*** CCD	1/3"
2	Camera 2	Layout 1		KPC-S230C	KT&C		CCIR/PAL	mini	VHS	color	HAD*** CCD	1/3"
3	Camera 3	Layout 1		KPC-S230C	KT&C		CCIR/PAL	mini	VHS	color	HAD*** CCD	1/3"
4	Camera 4	Layout 1		TK-C925E-4mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
5	Camera 5	Layout 1		TK-C925E-12mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
6	Camera 6	Layout 1		TK-C925E-8mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
7	Camera 7	Layout 1		WAT-137HL	Watec Co., Ltd	HIGH AGC	CCIR/PAL	fixed	VHS	b/w	Exview HAD*	1/3"
8	Camera 8	Layout 1		TK-C925E-16mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
9	Camera 9	Layout 1		TK-C925E-16mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
10	Camera 10	Layout 1		TK-C925E-16mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
11	Camera 11	Layout 1		TK-C925E-16mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
12	Camera 12	Layout 1		TK-C925E-16mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
13	Camera 13	Layout 1		TK-C925E-16mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
14	Camera 14	Layout 1		TK-C925E-16mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
15	Camera 15	Layout 1		TK-C925E-16mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
16	Camera 16	Layout 1		TK-C925E-12mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
17	Camera 17	Layout 1		TK-C925E-12mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
18	Camera 18	Layout 1		TK-C925E-12mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"

18

Close Refresh Export Print >K Hide Column Show all Save view Delete view Help

▼ Printing

[Printing](#)^[207] the obtained 2D drawing in raster or vector mode on one or several pages for pasting together. You can use prepared frames with standard title-block and logo. Sizes, colors styles of fonts and lines, weights of lines can be adjusted.

Printing image models from [cameras](#)^[286] and [monitors](#)^[298].

Printing 3D images from the 3D World window.

Printing the Table of cameras and the [Table of camera models](#)^[314] as a whole or by selected fragments.

▼ Database of camera models

Maintain [database of camera models](#)^[304], assign different models to cameras in project, compare models with each other.

Table of Camera Models																	
All models Used models																	
Number	Model Name	Producer	Key Feature	Type				Image sensor						Hor. resolution (TVL)	Max frame rate (fps)	Signal/ (dB) / (weigh)	
				TV system	Fixed, PTZ, Dome, Mini	Output	Color	Model	Format	Number of pixels		Scan	Aspect ratio				Row read time (mcs)
										Horiz.	Vert.						
1	indoor standa			fixed					1/1.7"	352	512		4:3				
2	indoor mini			mini													84
3	indoor PTZ			PTZ					1/3"				4:3				
4	outdoor standa			fixed					4.8"3.6	352	512		4:3				
5	outdoor mini	JVC		mini									interleaved				84
6	outdoor PTZ	JVC	1231231231231	PTZ					Exview HAD ¹	1/3"			4:3				
7	TK-WD310E	JVC	Wide Dynamic F	CCIR/PAL	fixed	VHS	easy day/ni	unknown	1/3"	720	540		interleaved	4:3		480	50
8	STC-3010/0	Smartec	full day/night	CCIR/PAL	fixed	VHS	day/night	Exview HAD ¹	1/3"	752	582		interleaved	4:3		500	50
9	STC-1000/0	Smartec		CCIR/PAL	fixed	VHS	b/w	Super HAD ¹	1/3"	752	582		interleaved	4:3		550	50
10	TK-C921EG	JVC		CCIR/PAL	fixed	VHS	easy day/ni	IT CCD	1/3"	752	582		interleaved	4:3		540	50
11	QN-B309	QWONN	HIGH AGC	CCIR/PAL	fixed	VHS	b/w	Exview HAD ¹	1/3"	752	582		interleaved	4:3	25	564	3 51
12	QN-196	QWONN	Color-8 Av	CCIR/PAL	fixed	VHS	color	HAD CCD	1/3"	752	582		interleaved	4:3		480	48
13	WAT-137HL	Watec Co., Ltd	HIGH AGC	CCIR/PAL	fixed	VHS	b/w	Exview HAD ¹	1/3"	752	582		interleaved	4:3		500	51
14	KPC-1905B1	KT&C		CCIR/PAL	mini	VHS	b/w	HAD CCD	1/3"	500	582		interleaved	4:3		375	50
15	KPC-1905B1	KT&C		CCIR/PAL	mini	VHS	b/w	HAD CCD	1/3"	752	582		interleaved	4:3		550	50
16	KPC-400P	KT&C		CCIR/PAL	mini	VHS	b/w	IT CCD	1/3"	500	582		interleaved	4:3		330	50
17	ACE-E560C	KT&C		CCIR/PAL	mini	VHS	b/w	Exview HAD ¹	1/3"	752	582		interleaved	4:3		550	50
18	KPC-S230C	KT&C		CCIR/PAL	mini	VHS	color	HAD CCD	1/3"	500	582		interleaved	4:3		375	45
19	KPC-HD220C	KT&C		CCIR/PAL	mini	VHS	color	Super HAD ¹	1/3"	752	582		interleaved	4:3		500	50
20	MC3710H-7X	PELCO	twisted pair, gen	CCIR/PAL	fixed	VHS	twisted b/w	Super HAD ¹	1/3"	752	582		interleaved	4:3		564	50
21	TK-C925E	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"	752	582		interleaved	4:3		540	50
22	STC-IP2070/	Smartec	IP	N/A	fixed	Ethernet	color	Super HAD ¹	1/3"	795			progressive	4:3	0	480	50

VideoCAD will help you: spare the means and win tenders due to optimization of cameras' quantity in projects and increase of their efficiency, reduce time expended and boost design quality, cut down the amount of controversial situations with customers and accelerate their solution.

VideoCAD can be used for the prompt, but exact calculations of view area projections to draw on a location plan when performing a graphical part of CCTV project. It can be also used to perform scrupulous analysis complicated cases to choose the most suitable camera location and lens parameters.

VideoCAD is employed by security firms, army, police, universities and security department of [many companies worldwide](#).

VideoCAD is effective for CCTV designer [training](#)^[42].

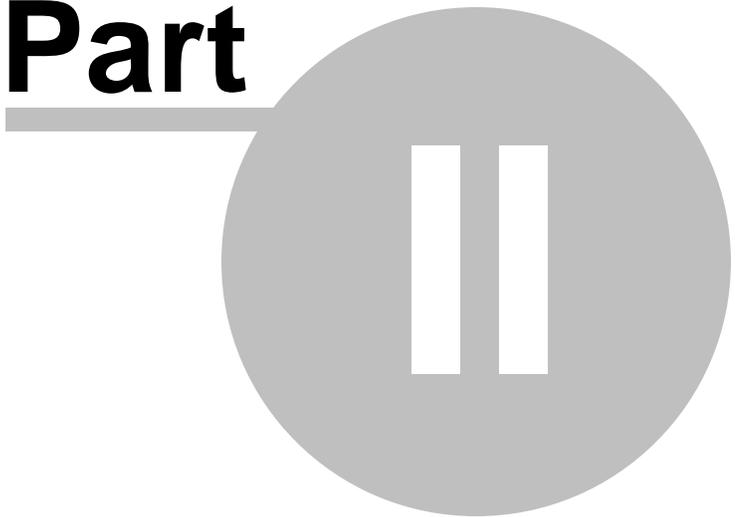
It is more than you need? See:

- [VideoCAD Lite](#)^[31], [Differences between VideoCAD 8 Professional and VideoCAD 8 Lite](#)^[53]
- [VideoCAD Starter II](#)^[45], [Differences between VideoCAD 8 Lite and VideoCAD 7 Starter II](#)^[74]
- [VideoCAD Starter](#)^[49], [Differences between VideoCAD 7 Starter II and VideoCAD 7 Starter](#)^[85]

[Differences between versions of VideoCAD](#)^[53]

[What is new in VideoCAD](#)^[89]

Part



General information on VideoCAD 8 Lite

2 General information on VideoCAD 8 Lite

VideoCAD Lite is a basic version offers the most useful and easy-to-master tools for CCTV design.

If [VideoCAD Professional](#) version seems too complicated or slow, try the Lite version! It does not contain complex tools. At the same time VideoCAD Lite is a powerful tool, not a very restricted version.

VideoCAD Lite is less demanding of computer resources because of absence of resource-intensive tools. However, these tools when they are not needed, can be [disabled](#) in version Professional too.

VideoCAD 8 Lite is registered only by personal registration code. This code doesn't depend on computer hardware (HID) or a dongle. This code is valid on any computer.

VideoCAD Lite purchased separately can be upgraded to more powerful Professional version.

VideoCAD Starter, VideoCAD Starter II Kit can be upgraded to VideoCAD Lite at discount price.

One license of VideoCAD 8 Lite purchased separately allows to use the program on two workplaces nonsimultaneously (work and home computers) if both workplaces belong to one person.

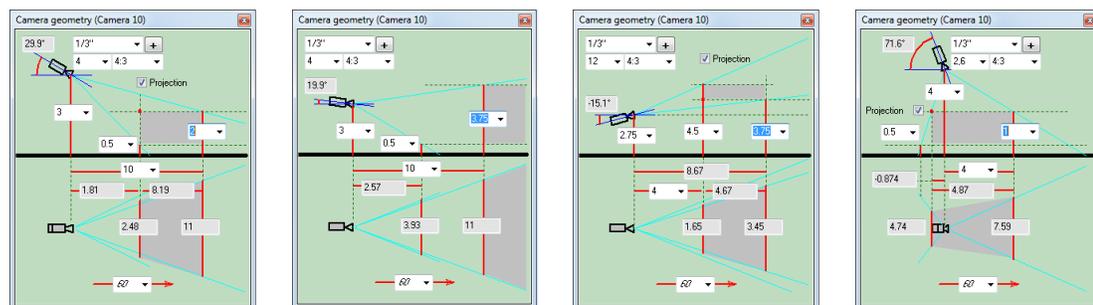
VideoCAD 8 Lite demo allows to change lens focal length of cameras. Licenses of **VideoCAD 8 Professional** and **VideoCAD 8 Lite** allows free use of the **demo versions** for educational purposes, for research, theses, writing articles, etc. non-profit activities.

Information in the Help file can be outdated. Please see actual information on the [cctvcad.com web site](http://www.cctvcad.com)

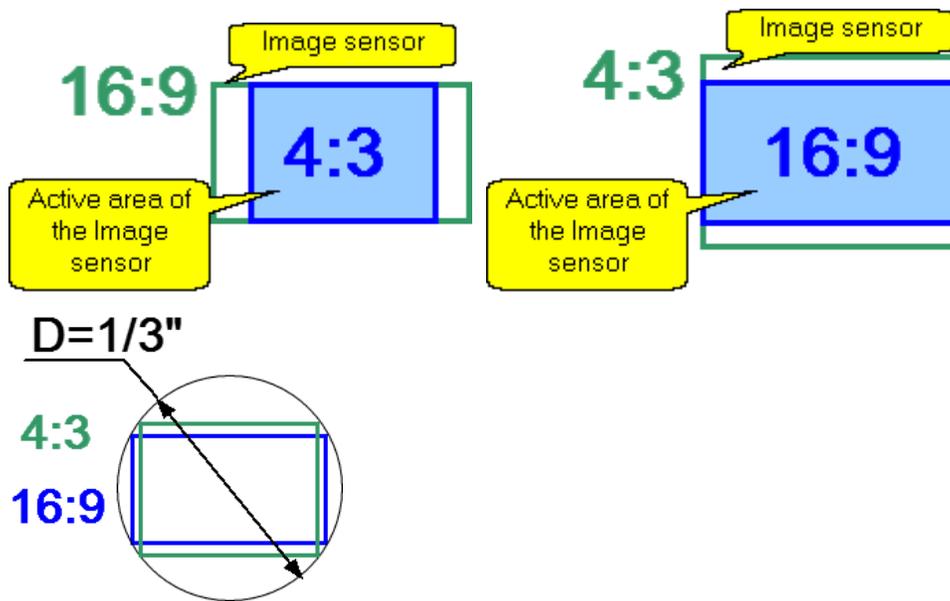
The main features of VideoCAD 8 Lite:

▼ Calculations

Calculating [geometric parameters](#) of camera view area in any camera position.



More accurate modeling cameras taking into account the size of active area of the image sensor in dependence of the aspect ratio of the image sensor and the aspect ratio of the output image of the camera.

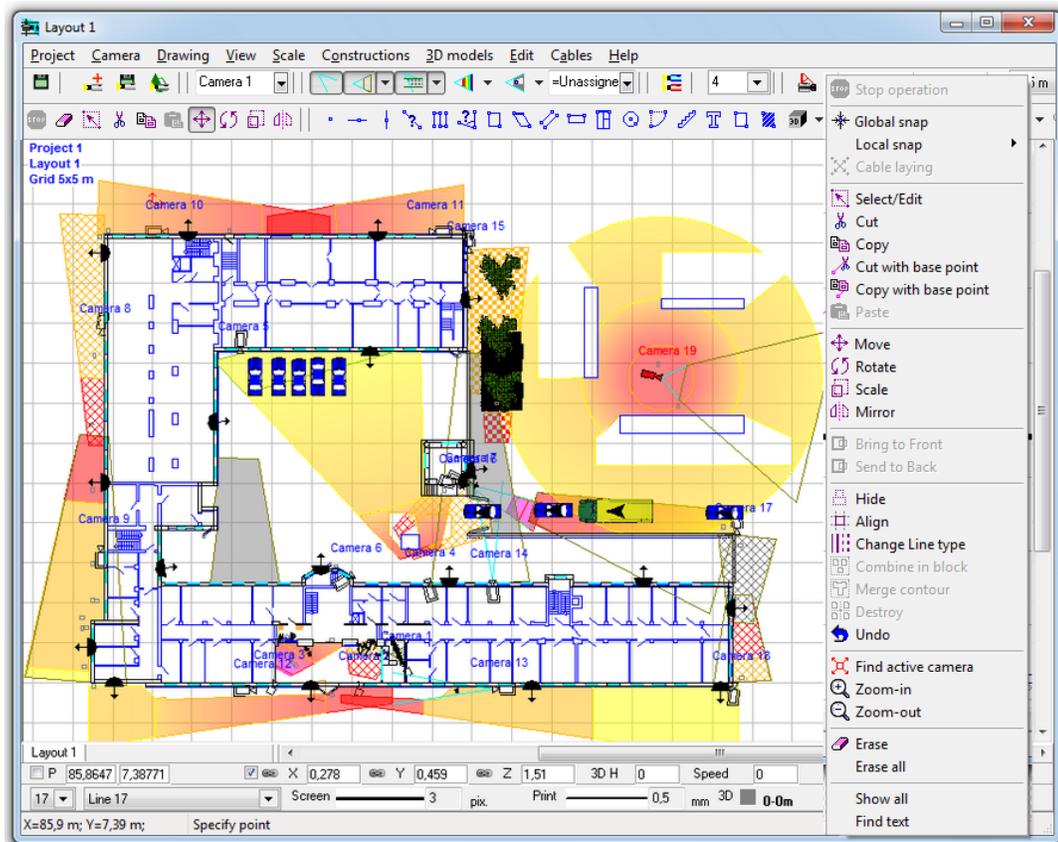


Calculate [length](#)^[388] and electric parameters of [cables](#)^[342].

Power cable (Camera 2)			
Cable brand	Line 26	Conductor cross-section area (mm ²)	0,75
Total length of all segments in layouts (m)	0	Conductor diameter (mm)	0,98
Reserve for cable laying (%)	10	AWG	-
Reserve for camera connection (m)	2	Cable resistance (Ohm) (both directions)	0,209
Reserve for source connection (m)	2	Voltage at cable start (V)	12
Cable length including reserves (m)	4	Consumption current (A)	0,117
Cable coil size (m)	250	Quantity of cameras	1
Cable coil number	1	Voltage at cable end (V)	12
Cable surplus (m)	246		
<input type="button" value="OK"/> <input type="button" value="Cancel"/> <input type="button" value="Help"/>			

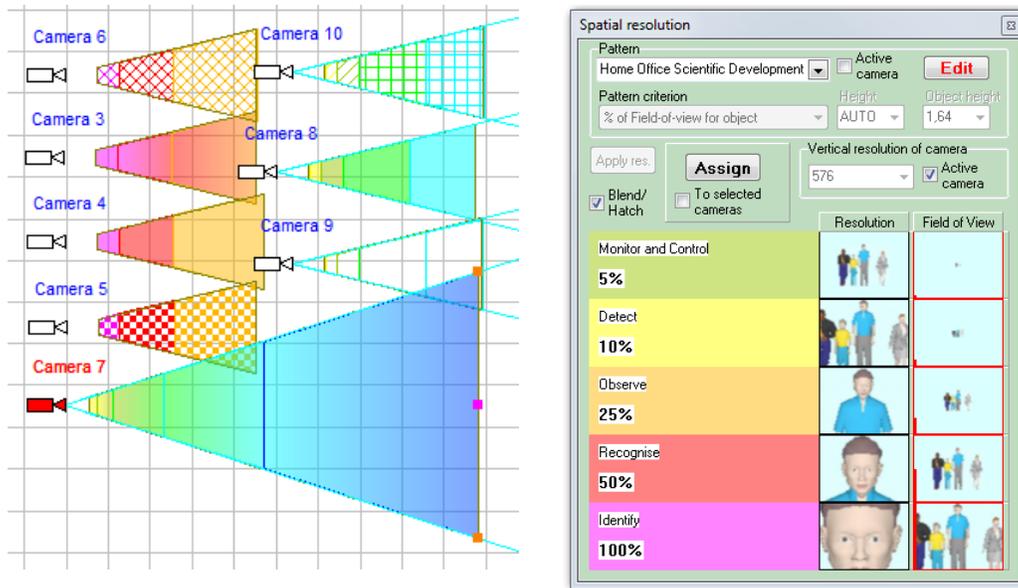
▼ Working with 2D projections

Use 2D [Graphics window with CAD interface](#)^[158]. Use a lot of 2D/3D constructions and CAD tools, line types, font types, [snaps](#)^[194], horizontal and vertical projections, up to 10 layouts in each project.

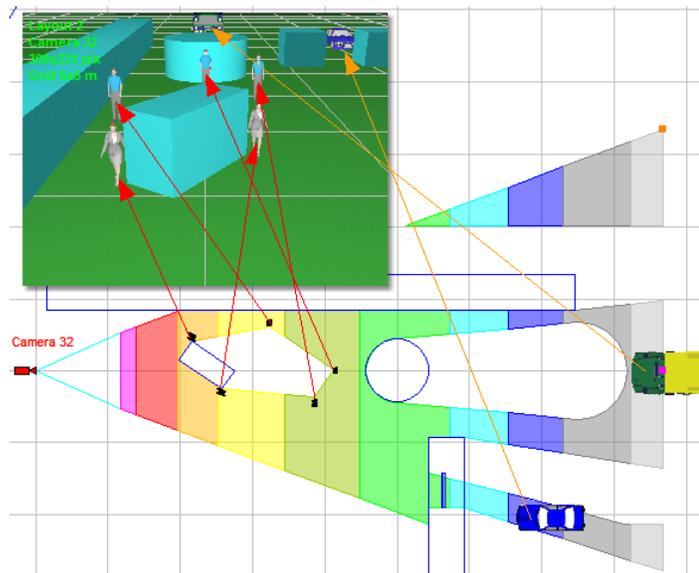


Display on the 2D layout results of calculations of view area projections.

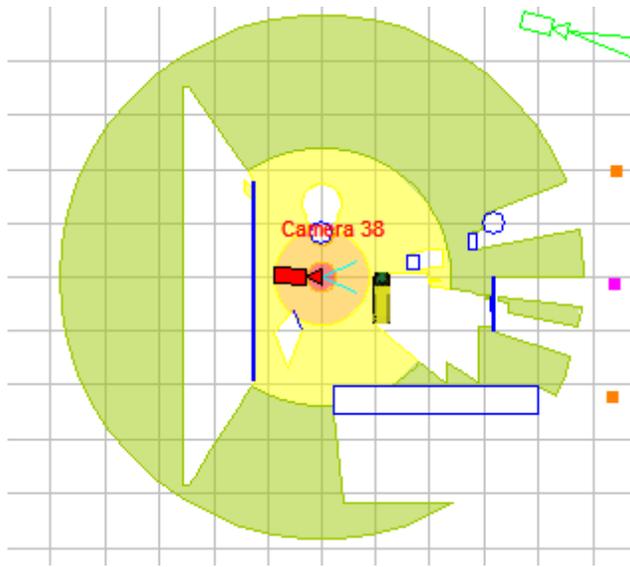
Display by separate colors and hatch styles different regions of [spatial resolution](#)^[170] and field-of-view size. There are prepared spatial resolution patterns according to the following criteria: Home Office Scientific Development Branch; Home Office Guidelines for identification; P 78.36.008-99, Australian Standard AS4806: Closed Circuit Television, European Standard EN50132-7, ISO/IEC 19794 Biometric data interchange formats.



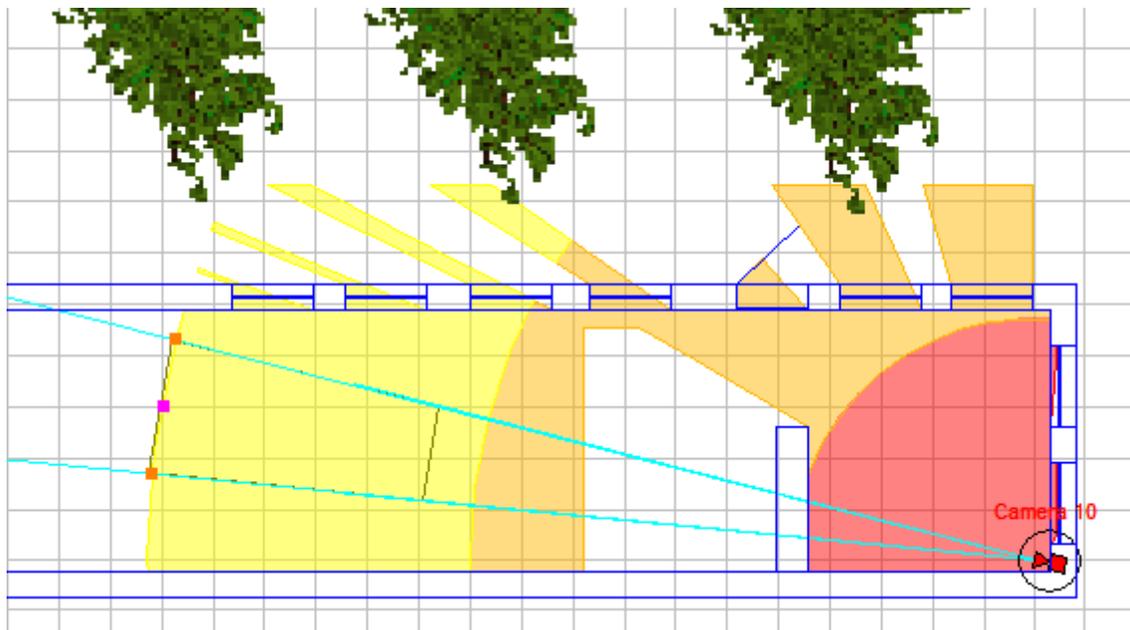
Construct the horizontal projection of camera control areas including [shadows](#)^[172] from obstacles on the scene. In VideoCAD Lite obstacles can be constructions only. In [VideoCAD Professional](#)^[3] 3D models also can be obstacles.



Choose the best positions and calculate control areas of [PTZ cameras](#)^[384], Dome cameras and 360 degree cameras.

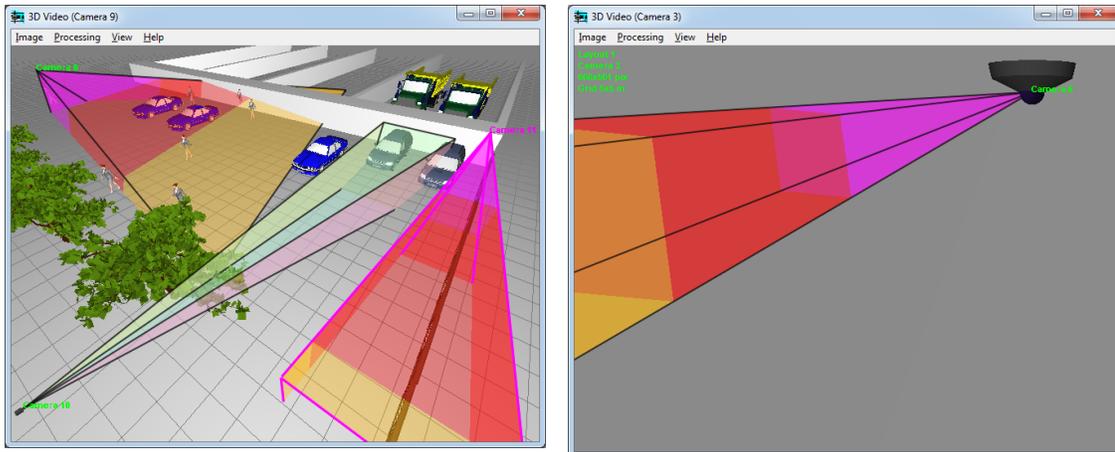


Simulation of the horizontal projection of the view area and visualization of the spatial resolution distribution of [panoramic cameras](#)^[409] (fisheye, 360°/180°).



▼ 3D modeling layout and camera view areas

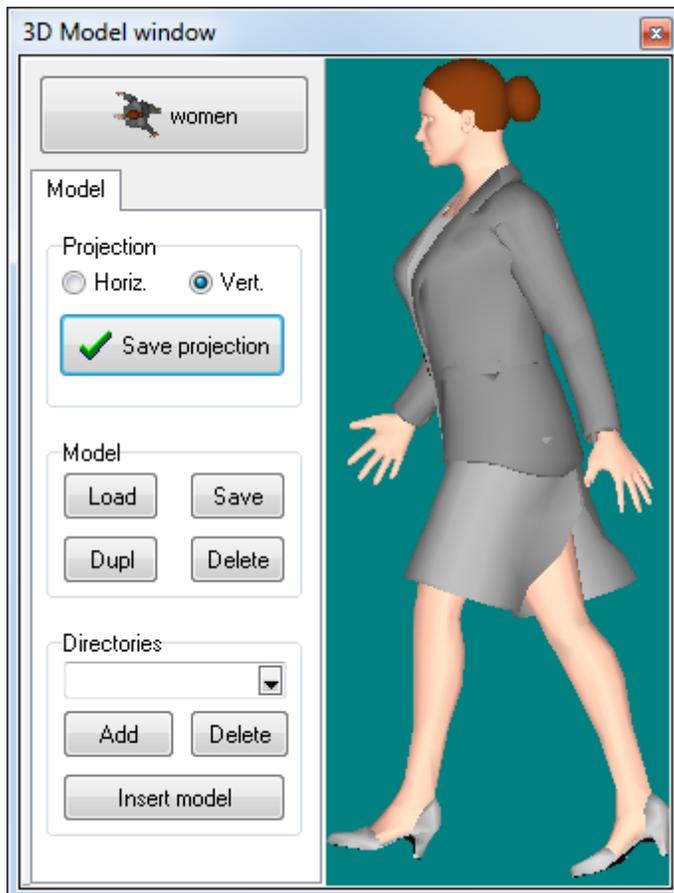
3D visualization of the location plan and camera view areas in the [3D Video](#)^[284] window by other cameras. Visualization of the spatial resolution. Flexible adjustment of displaying view areas from the side.



Possibility of loading prepared [3D models](#)^[229] (a person, a car, etc.,). You can add your own 3D models from [3ds max](#) and [Sketchup](#)^[397].



In special [3D models](#)^[291] window you can create 3D model projections with specified resolution. You can load 3D models from files, save 3D models to files, create copies of 3D models



▼ **Modeling images from cameras based on camera parameters and scene conditions**

Model camera parameters: number of pixels and compression.



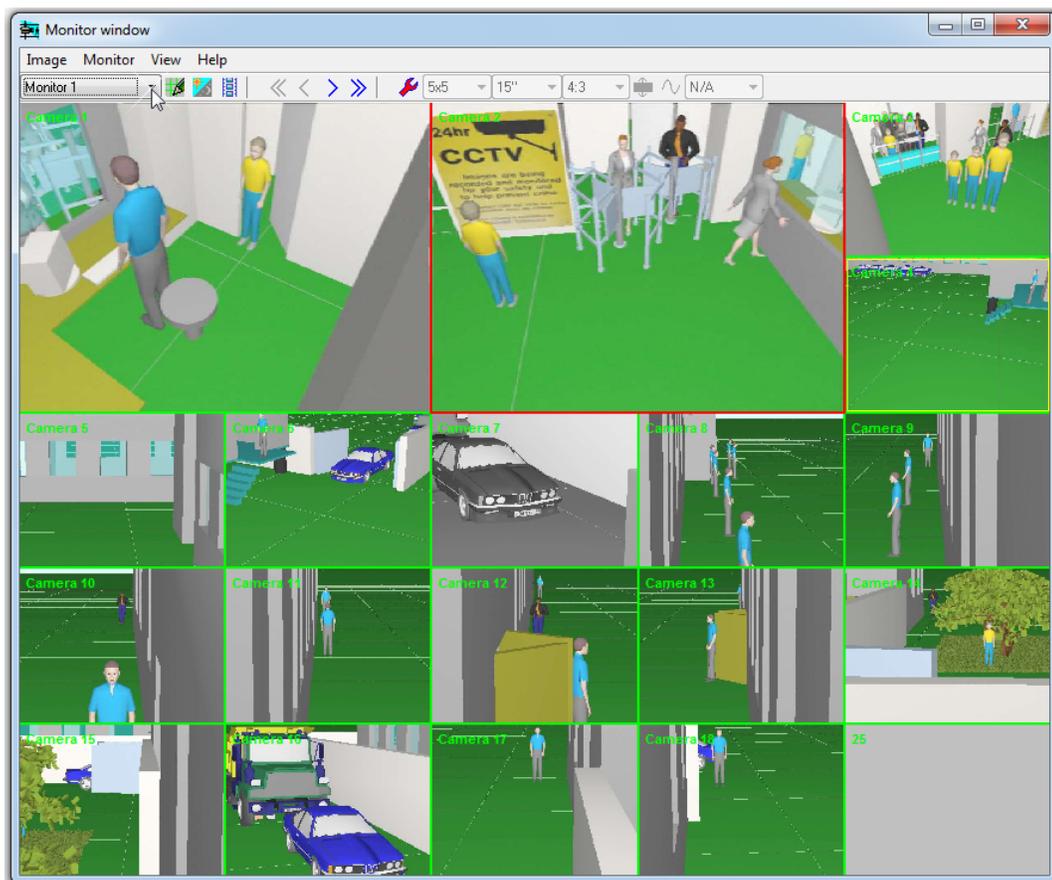
Simulation of image resolution and view area limits of [panoramic cameras](#) (fisheye, 360°/180°).



Obtain [Image Model](#)^[284] for each camera in the project based on models of scene and equipment.

▼ Design operator interface

Design operator interface using the [Monitor window](#)^[294].

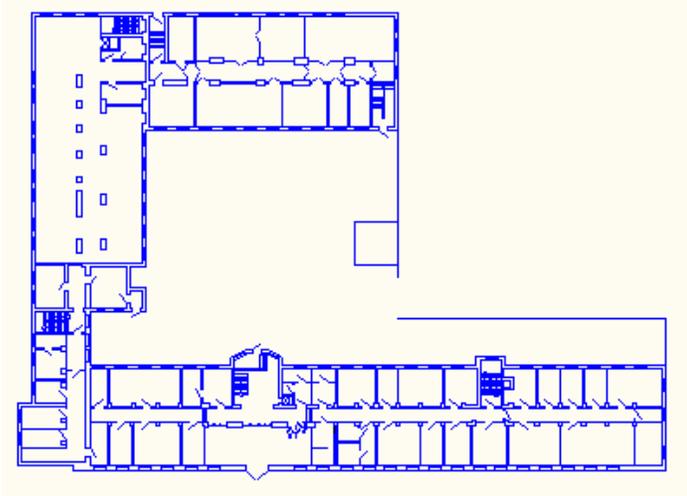


Modeling size and [resolution](#)^[297] of monitors.

▼ Import from other CAD programs

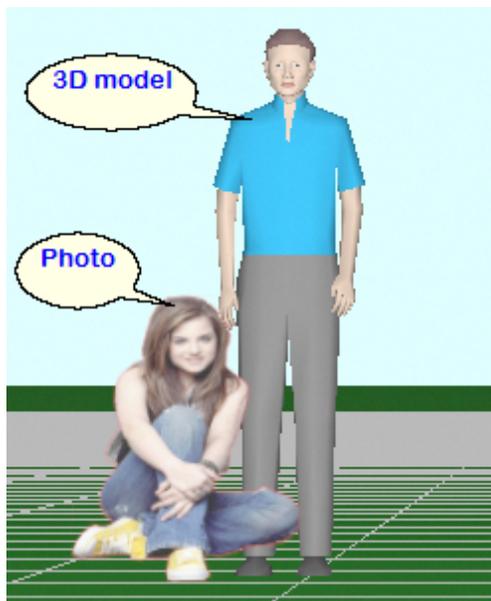
Locate cameras and cables on the [prepared layouts](#)^[204] in *.bmp, *.jpg, *.emf, *.wmf, *.png, *.gif, *.tif, *.pdf. **AutoCAD *.dxf *.dwg** formats.

For backgrounds in **AutoCAD *.dxf *.dwg** formats you can choose Layout in the background, control visibility of layers, hide texts. For backgrounds in PDF format you can choose page and resolution of the background.



Import 3D models of objects and 3D models of [territory](#)^[399] using [VideoCAD plugin for SketchUP](#)^[397].

Import [raster images](#)^[191] to display them in 3D.



Import camera model parameters to the **Table of camera models** via copying and [pasting](#)^[313] from Excel.

▼ Export

[Export](#)^[202] the 2D drawing into any of the following formats: *.bmp, *.jpg, *.emf, *.wmf, *.png, *.gif, *.tif, *.pdf (raster), **AutoCAD *.dxf**.

Export [3D images](#)^[286] from cameras to any of the following formats: *.bmp, *.jpg, *.gif, *.tif, *.png.

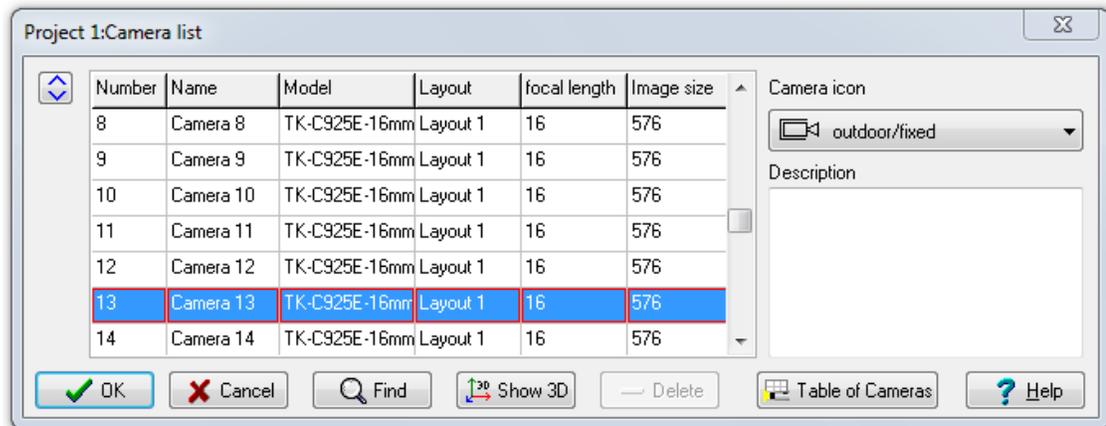
Export [images from monitors](#)^[298] to *.bmp, *.jpg, *.gif, *.tif, *.png.

Obtain the [text report](#)^[200] with full description of all cameras in the project, view areas and cables to be pasted into a project explanatory note or used as instruction for installation.

Get a [report in PDF format](#)^[200], with full description of all cameras in the project, view areas and cables. The **PDF Report** can include images from the cameras, fragments of layouts with camera placed, a cover with logo. Report parameters and the structure of information in the report is configurable. See [example of PDF report](#).

Obtain the [cable report](#)^[240].

Copy [the Camera list with most important parameters](#)^[336] to MS Excel, MS Word and other software.



▼ Printing

[Printing](#)^[207] the obtained 2D drawing in raster or vector mode on one or several pages for pasting together. You can use prepared frames with standard title-block and logo. Sizes, colors styles of fonts and lines, weights of lines can be adjusted.

Printing image models from [cameras](#)^[286] and [monitors](#)^[298].

Printing the [Table of camera models](#)^[314] as a whole or by selected fragments.

▼ Database of camera models

Maintain [database of camera models](#)^[304] with the most important parameters (22 fields for each camera model). You can add your models, assign different models to cameras in project, compare models with each other.

All models		Used models																		
Producer	Model Name	Key Feature	Type	Image sensor			Lens						Power supply			Provider	Cost			
				Fixed, PTZ, Dome, Mini	Size	Number of pixels		Aspect ratio	Type	Focal length		Angles of view (deg.)						Voltage (V)	Consumption	
						Horiz.	Vert.			Min. (mm)	Max. (mm)	Max.	Min.	Max.	Min.				Power (watt)	Current (A)
AVOS	M1033-W	mini	1/4"	800	800	4:3	standard	2.8	2.8	65.5	65.5	51.5	51.5	5	6.5	1.3				
AVOS	M1034-W	mini	1/4"	1280	800	16:10	standard	2.8	2.8	65.5	65.5	43.8	43.8	5	6.5	1.3				
AVOS	M1054	mini	1/4"	1280	800	16:10	standard	2.8	2.8	65.5	65.5	43.8	43.8	5	6.5	1.3				
AVOS	M1025	mini	1/2.7"	1920	1080	16:9	standard	3.6	3.6	73.4	73.4	45.5	45.5	5	2.4	0.48				
AVOS	M1004-W	mini	1/4"	1280	800	16:10	standard	2.8	2.8	65.5	65.5	43.8	43.8	5	6.5	1.3				
AVOS	M1013	mini	1/4"	800	600	4:3	standard	2.8	2.8	65.5	65.5	51.5	51.5	5	6.5	1.3				
AVOS	M1014	mini	1/4"	1280	800	16:10	standard	2.8	2.8	65.5	65.5	43.8	43.8	5	6.5	1.3				

[Download VideoCAD 8 Lite demo version](#)

Need more? See: [VideoCAD Professional](#)^[3], [Differences between VideoCAD 8 Professional and VideoCAD 8 Lite](#)^[53]

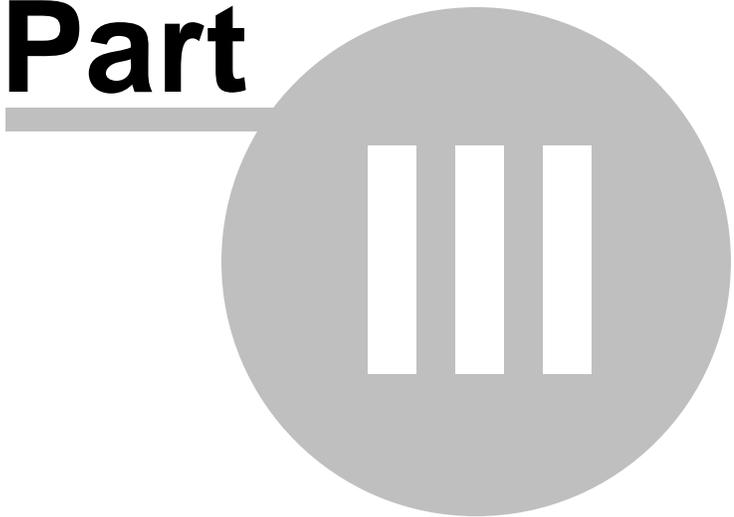
It is more than you need? See:

- [VideoCAD Starter II](#)^[45], [Differences between VideoCAD 8 Lite and VideoCAD 7 Starter II](#)^[74]
- [VideoCAD Starter](#)^[49], [Differences between VideoCAD 7 Starter II and VideoCAD 7 Starter](#)^[85]

[Differences between versions of VideoCAD](#)^[53]

[What is new in VideoCAD](#)^[89]

Part



General information on VideoCAD 7 Starter II

3 General information on VideoCAD 7 Starter II

VideoCAD Starter II - advanced version of [VideoCAD Starter](#)^[49].

VideoCAD Starter II differs from the Starter version by presence of [additional features](#)^[45] formerly available in the Lite and Professional versions only.

VideoCAD Starter II is registered only by personal registration code. This code doesn't depend on computer hardware (HID) or a dongle. This code is valid on any computer.

VideoCAD Starter II is offered only in a kit of three programs - VideoCAD Starter II Kit. This Kit includes:

- VideoCAD Starter II;
- [IP Camera CCTV Calculator](#);
- [VideoCAD Plugin for SketchUp](#).

VideoCAD Starter II can be upgraded to more powerful [Lite](#)^[31] and [Professional](#)^[3] versions. You can also upgrade from version [VideoCAD Starter](#)^[49] to VideoCAD Starter II Kit. To get this upgrade you should purchase [VideoCAD Plugin for SketchUp](#) and [IP Camera CCTV Calculator](#) if you have not purchased them yet.

Information in the Help file can be outdated. Please see actual information on the [cctvcad.com](http://www.cctvcad.com) web site

With VideoCAD 7 Starter II you can:

- Choose the most suitable **lenses, heights and locations** for camera installation to provide the required parameters of view areas.
- Calculate the horizontal projection sizes of view areas to draw them on the location plan.
- Display by separate colors different regions of [spatial resolution](#)^[170] and field-of-view size.
- Choose visually a relative location of cameras using the [graphics window](#)^[158] with CAD interface.
- Locate cameras on the [prepared layouts](#)^[204] in *.bmp, *.jpg, AutoCAD *.dxf *.dwg formats.
- Obtain a [drawing](#)^[202] containing horizontal projection of site layout with the camera images, calculated view areas, and with coordinate grid to be used in graphical path of the project.
- [Export](#)^[202] the obtained drawing into any of the following formats: *.bmp, *.jpg. [Saving the drawing](#)^[202] in the Graphics windows with **resolution exceeding Windows screen resolution**.
- Copy [the Camera list with most important parameters](#)^[336] to **MS Excel, MS Word** and other software.
- Construct [three dimensional models](#)^[284] of real scenes.
- Use many [3D models](#)^[190] (people, cars, bus, furniture, turnstile, tree, grass). You can add other 3D models from **3ds max** and [Sketchup](#)^[397].
- **Spare the means and win tenders due to the reduction of cameras' quantity in projects and increase of their efficiency.**
- **Reduce time expended and boost design quality.**
- **Cut down the amount of controversial situations with customers and accelerate their solution.**

[Download VideoCAD Starter II demo version](#)

Need more? See:

- [VideoCAD Lite](#)^[31], [Differences between VideoCAD 8 Lite and VideoCAD 7 Starter II](#)^[74]
- [VideoCAD Professional](#)^[3], [Differences between VideoCAD 8 Professional and VideoCAD 8 Lite](#)^[53]

It is more than you need? See: [VideoCAD Starter](#)^[49], [Differences between VideoCAD 7 Starter II and VideoCAD 7 Starter](#)^[85]

[Differences between versions of VideoCAD](#)^[53]

[What is new in VideoCAD](#)^[89]

Part



IV

**General information on
VideoCAD 7 Starter**

4 General information on VideoCAD 7 Starter

VideoCAD Starter - the easiest, low cost version of VideoCAD.

VideoCAD Starter is less demanding of computer resources because of absence of resource-intensive tools.

VideoCAD Starter is registered only by personal registration code. This code doesn't depend on computer hardware or a dongle. This code is valid on any computer.

VideoCAD Starter can be upgraded to more powerful [Lite](#)^[31] and [Professional](#)^[3] versions. You can also upgrade from version VideoCAD Starter to [VideoCAD Starter II Kit](#)^[45] To get this upgrade you should purchase [VideoCAD Plugin for SketchUp](#) and [IP Camera CCTV Calculator](#) if you have not purchased them yet.

Information in the Help file can be outdated. Please see actual information on the cctvcad.com web site

With VideoCAD 7 Starter you can:

- Choose the most suitable **lenses, heights and locations** for camera installation to provide the required parameters of view areas.
- Calculate the horizontal projection sizes of view areas to draw them on the location plan.
- Display by separate colors different regions of [spatial resolution](#)^[170] and field-of-view size.
- Choose visually a relative location of cameras using the [graphics window](#)^[158] with CAD interface.
- Locate cameras on the [prepared layouts](#)^[204] in *.bmp, *.jpg formats.
- Obtain a [drawing](#)^[202] containing horizontal projection of site layout with the camera images, calculated view areas, and with coordinate grid to be used in graphical path of the project.
- [Export](#)^[202] the obtained drawing into any of the following formats: *.bmp, *.jpg.
- Copy [the Camera list with most important parameters](#)^[336] to MS Excel, MS Word and other software.
- Construct [three dimensional models](#)^[284] of real scenes with the possibility of loading prepared [3D models](#)^[229] (a person, a car).
- **Spare the means and win tenders due to the reduction of cameras' quantity in projects and increase of their efficiency.**
- **Reduce time expended and boost design quality.**
- **Cut down the amount of controversial situations with customers and accelerate their solution.**

[Download VideoCAD7 Starter demo version](#)

Need more? See:

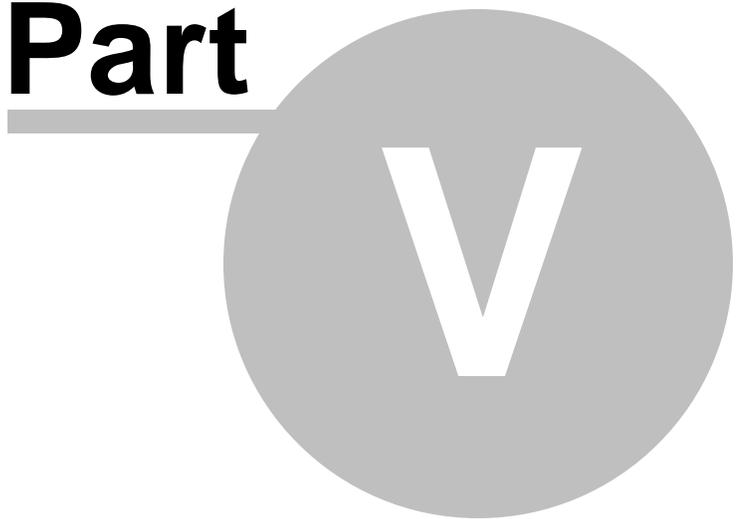
- [VideoCAD Starter II](#)^[45], [Differences between VideoCAD 7 Starter II and VideoCAD 7 Starter](#)^[85]
- [VideoCAD Lite](#)^[31], [Differences between VideoCAD 8 Lite and VideoCAD 7 Starter II](#)^[74]
- [VideoCAD Professional](#)^[3], [Differences between VideoCAD 8 Professional and VideoCAD 8 Lite](#)^[53]

[Differences between versions of VideoCAD](#) ⁵³

[What is new in VideoCAD](#) ⁸⁹

[What is new in VideoCAD](#) ⁸⁹

Part



**Differences between
versions of VideoCAD**

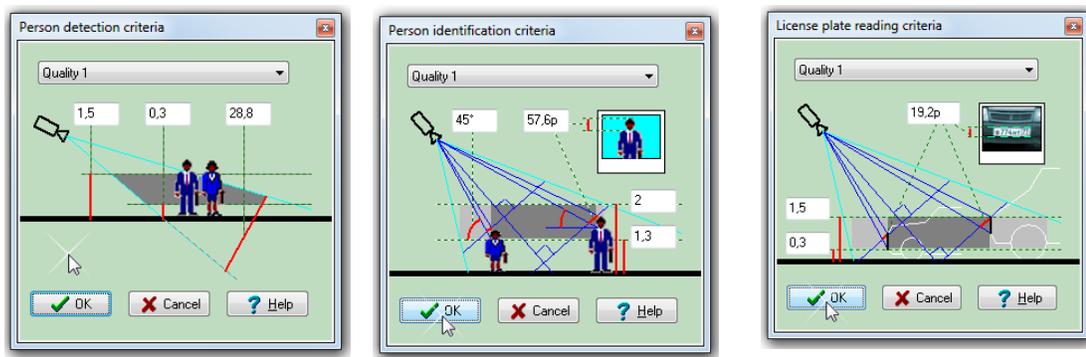
5 Differences between versions of VideoCAD

Information in the Help file can be outdated. Please see actual information on the [cctvcad.com web site](http://www.cctvcad.com)

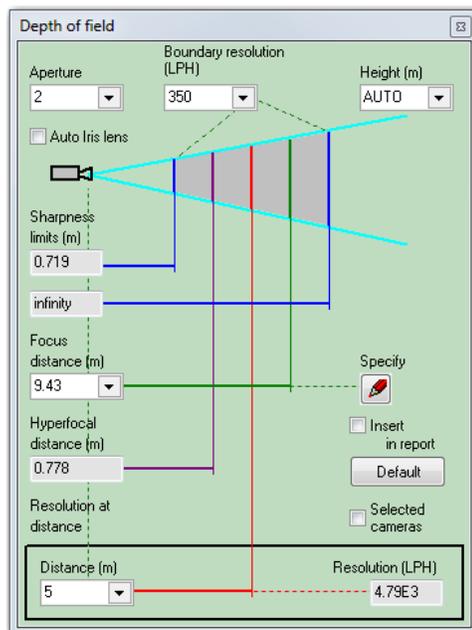
Differences between [VideoCAD 8 Professional](#)^[3] and [VideoCAD 8 Lite](#)^[31]

▼ Calculations

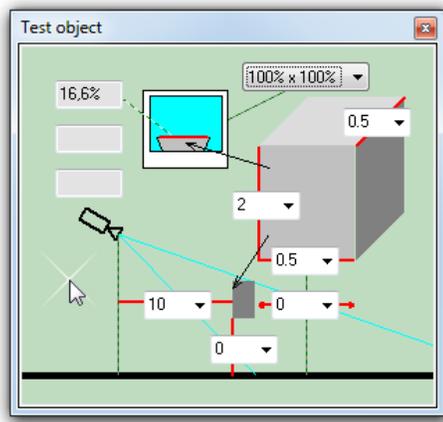
Calculating horizontal projection sizes of person detection, identification and license plate reading areas.



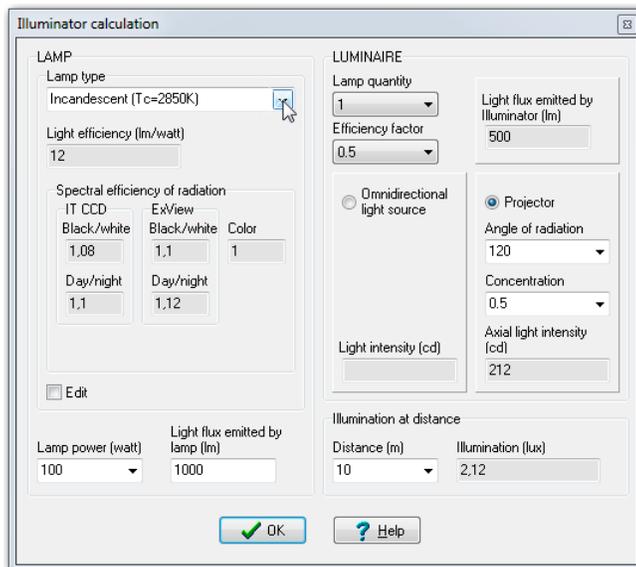
Calculating Depth of Field of each camera of the project.



Calculating the image size on display of any object in camera view area in percentage of display size, pixels and millimetres (inches in case of Imperial format).

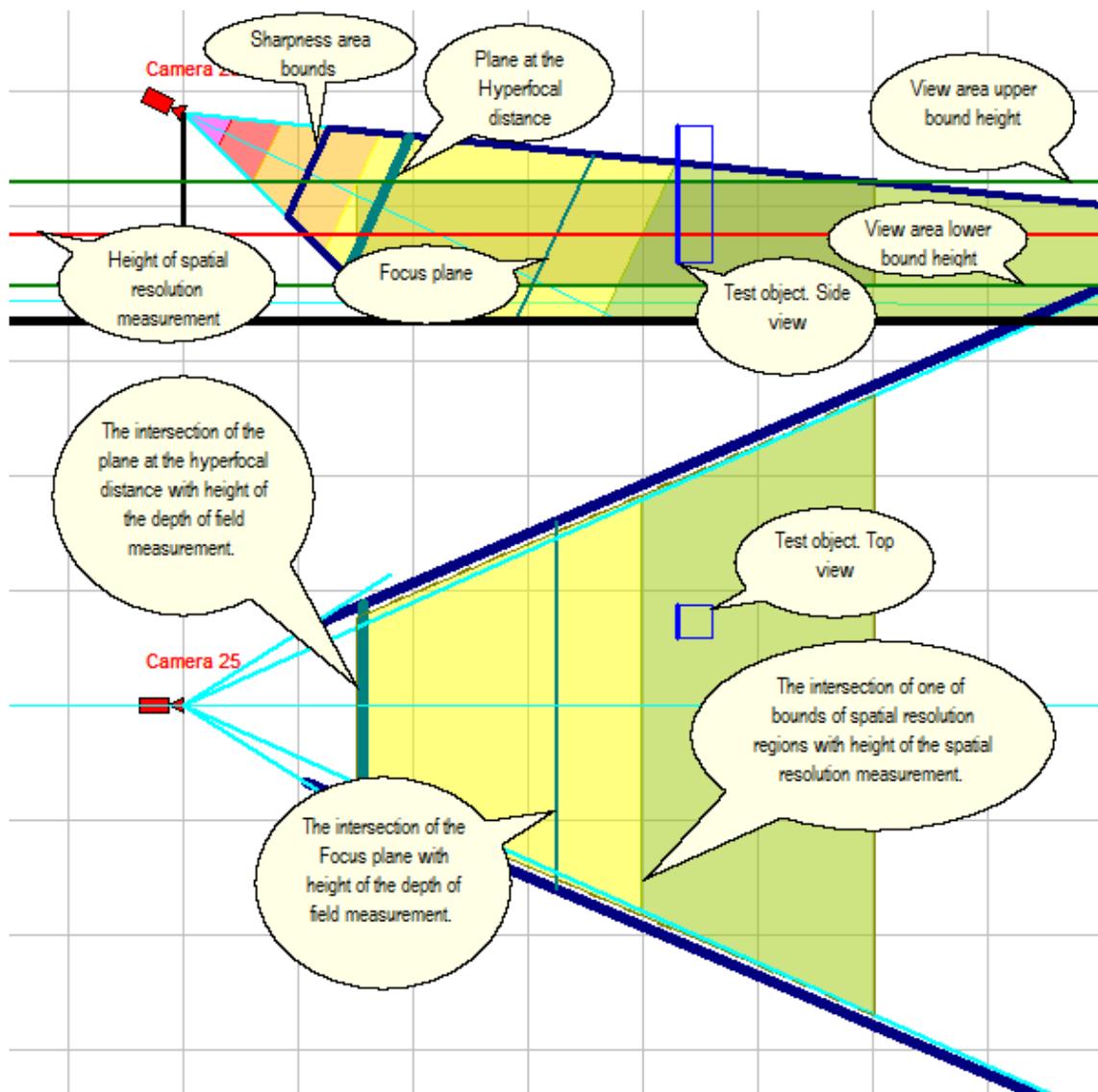


Calculate light power and illumination produced by illuminators.

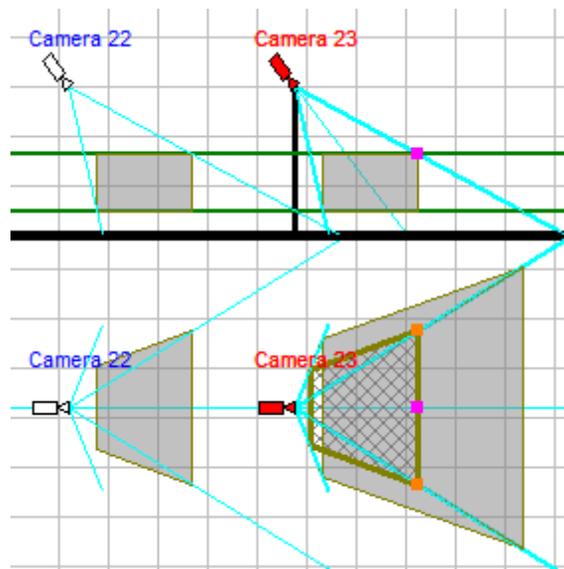


▼ Working with 2D projections

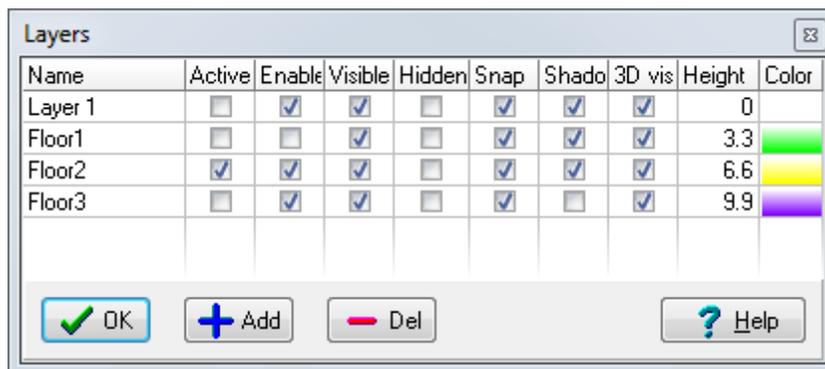
Graphical editing state of the [Active camera](#)^[162]. In this case the **objects** in the **horizontal projection** rotate so that the direction of the camera lens **main optical axis** becomes parallel to a screen plane, and the bounds of **active camera** view area are marked with lines of double thickness. The **graphical editing state** enables a detailed analysis of **view area** using the test object, in the **vertical projection** it becomes possible graphical calculation of depth of field, spatial resolution analysis and [field-of-view sizing](#)^[166] at any point of **view area**. In the graphical editing state the **Test object** is visible in the [3D Video](#)^[284].



Ability to display horizontal projection of the view area [as two sections](#)^[169] by planes on the minimum and maximum heights of the view area (Camera 23). One of the sections is drawn by a transparent filling, the other in the form of hatching. In many camera positions such representation is more informative than standard volume projection (Camera 22).

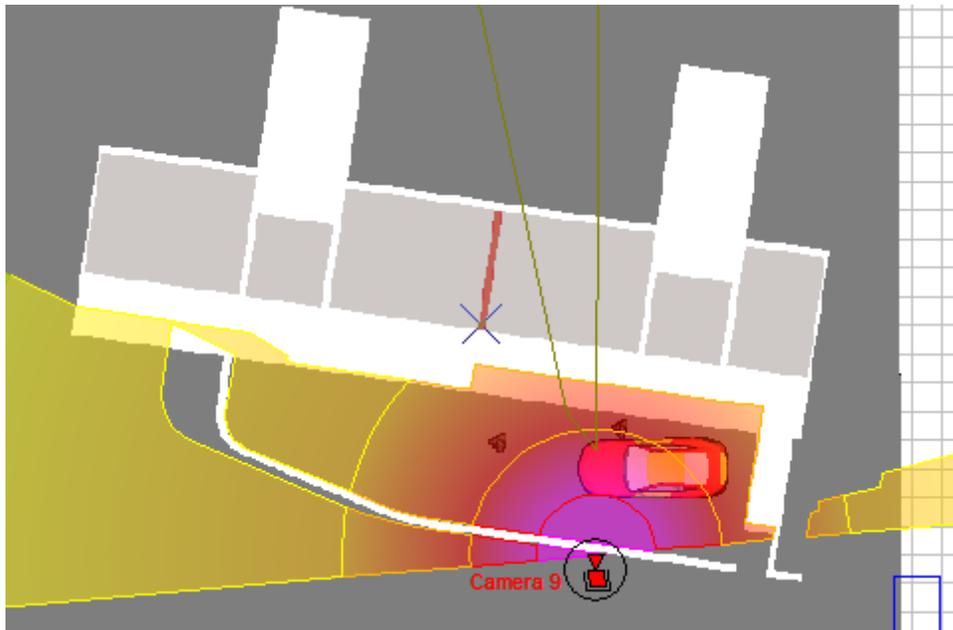


Constructions, 3D models and cameras can be distributed by layers. Each layer can have its own Base height. All constructions belong to the layer will be shifted in 3D by the Base height. This feature is useful in work with multilevel 3D constructions. In addition to the Base height, each layer has the following parameters: Active, Enabled, Visible, Hidden, Snap, Shadows, 3D Visible, Color.

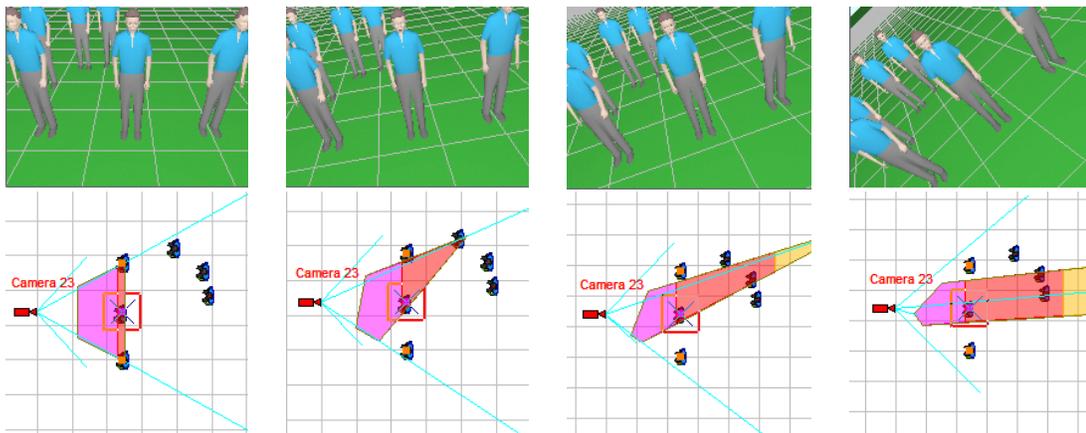


Display on the 2D layout results of [calculations](#)^[3]: person detection and identification areas, depth of field limits, test object, cables and luminaries.

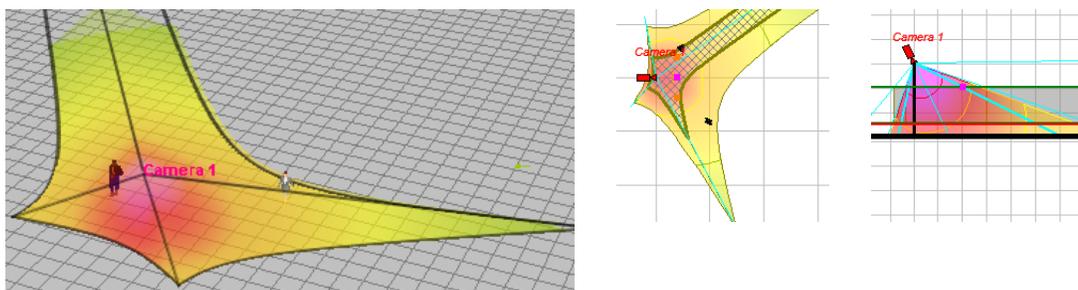
Construct the horizontal projection of camera control areas including [shadows](#)^[172] from obstacles on the scene. In VideoCAD Lite obstacles can be constructions only. In [VideoCAD Professional](#)^[3] 3D models also can be obstacles.



Modeling [camera rotation](#)^[259] around the main optical axis.

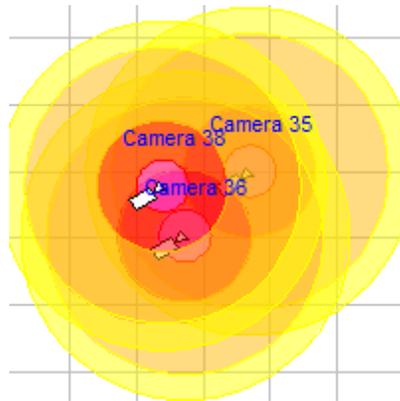


Modeling [lens distortion](#)^[429]. Modeling influence of the lens distortion on view area shape, on view area projection shape and spatial resolution distribution. Correct modeling wide-angle lenses with strong distortion.

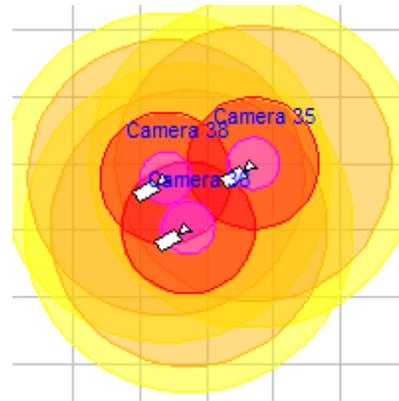


An option for drawing regions of spatial resolution in the Graphics windows in ascending resolution - [High resolution on top](#)^[199]. With this option enabled all cameras remain visible despite

the shading of projections of different cameras. While regions with higher spatial resolution are drawn on the top.



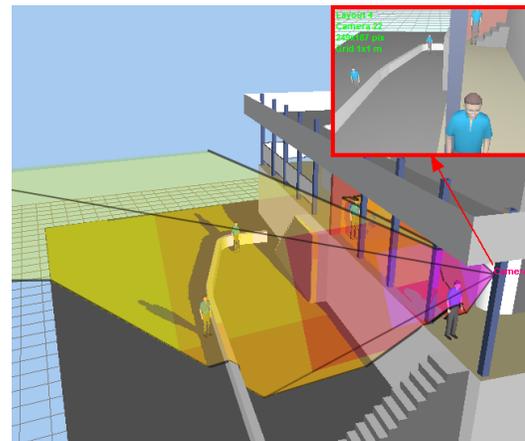
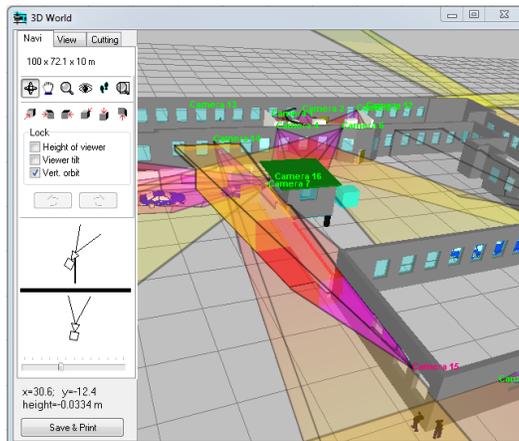
Usual drawing

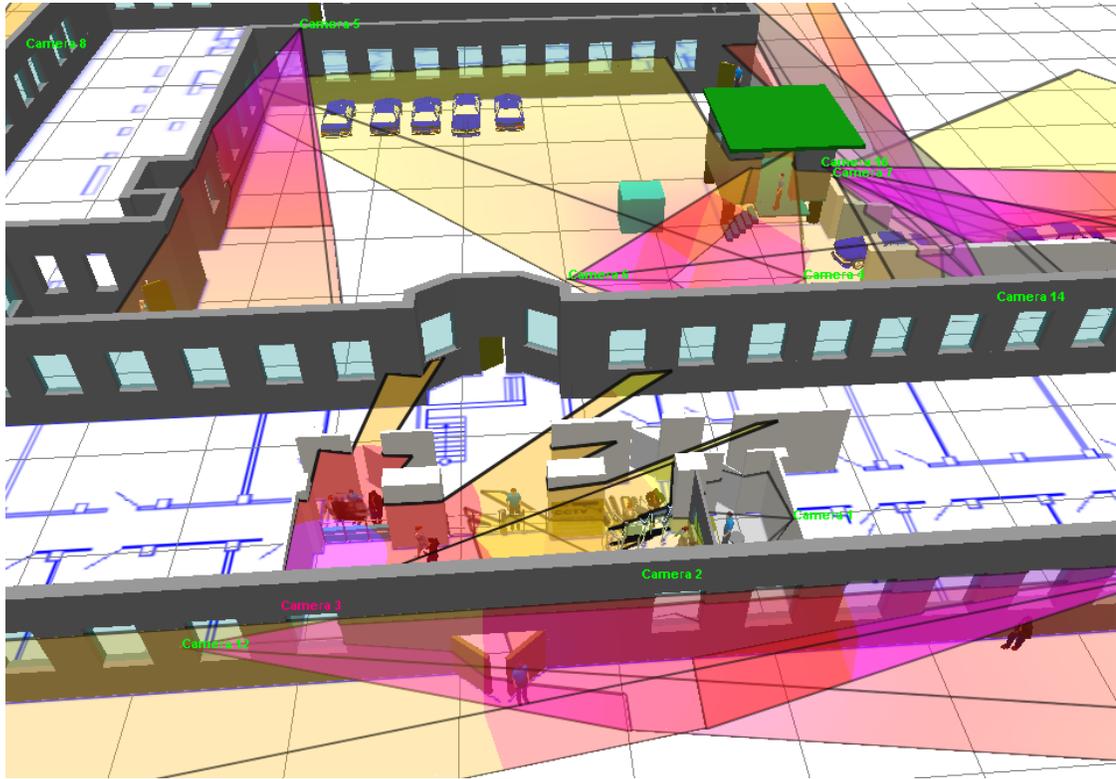


High resolution on top

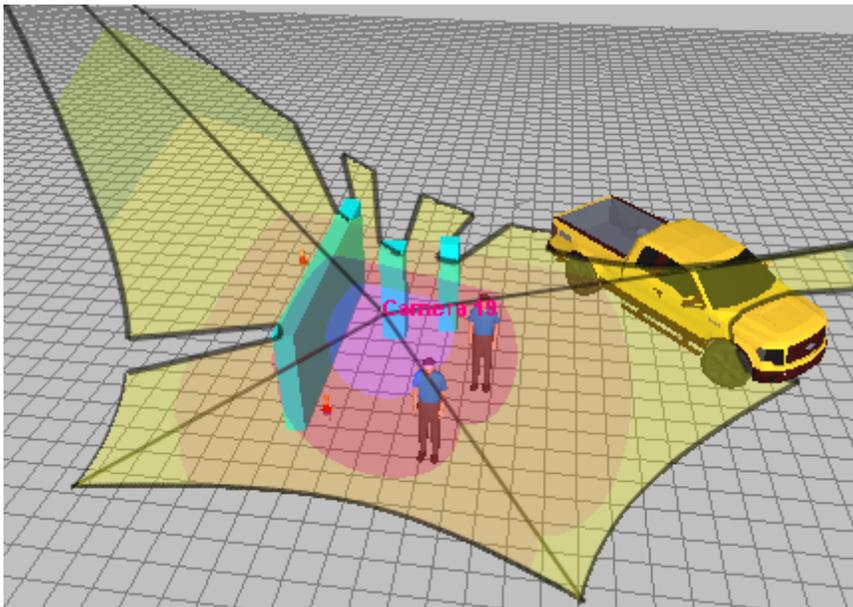
▼ 3D modeling layout and camera view areas

VideoCAD Professional has special 3D World window with standard tools for 3D navigation (**Orbit, Move, ZOOM, Walk, Look around, Zoom frame**). With the help of the window you can observe the layout in 3D representation. You can work on the project in usual 2D projections and watch it in 3D. You can "walk" on the floors of 3D models of buildings and study every detail.

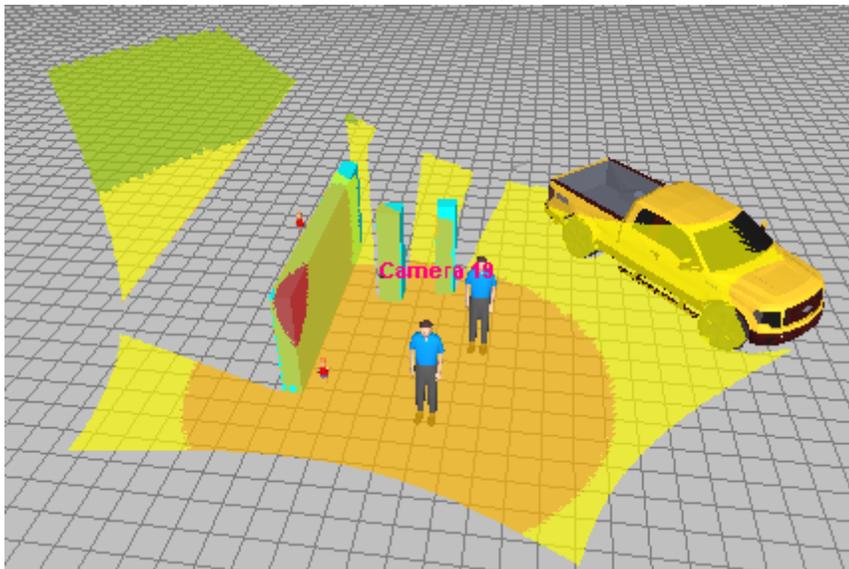




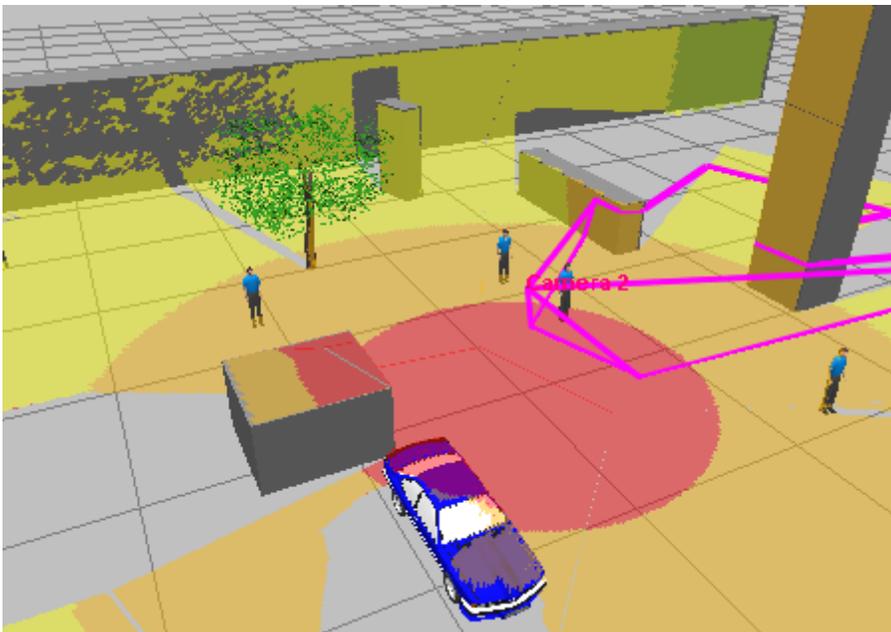
3D visualization of the camera view area surface taking into account spatial resolution, shadows, lens distortion.



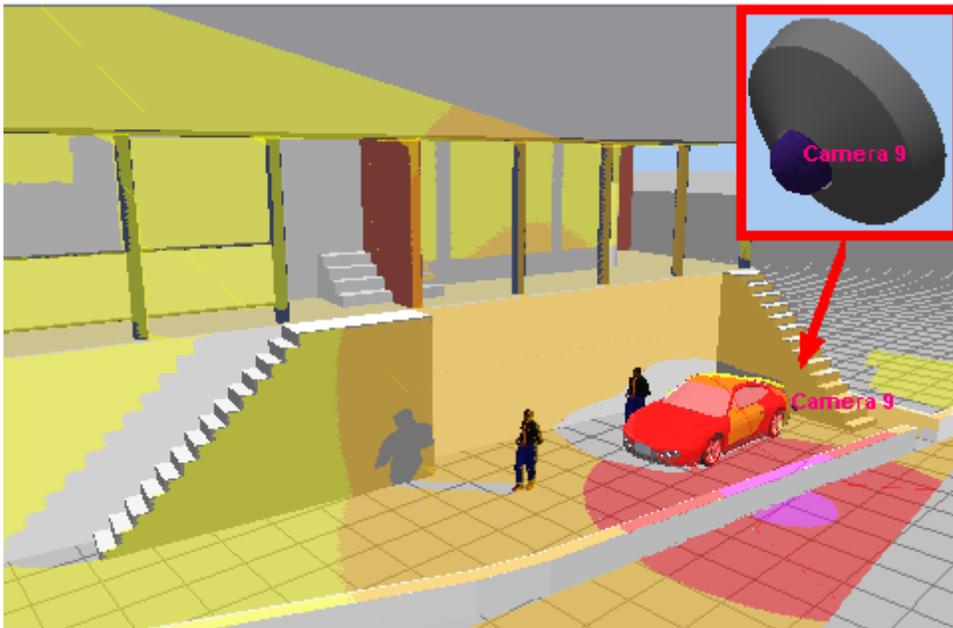
3D visualization of the active camera coverage on the environment taking into account spatial resolution, shadows, lens distortion.



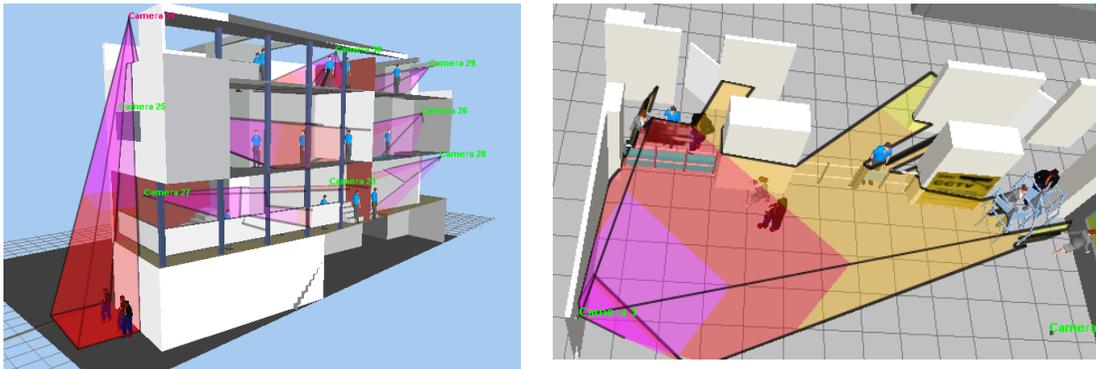
3D visualization of control areas of [PTZ cameras](#)^[384], Dome cameras and 360 degree cameras.



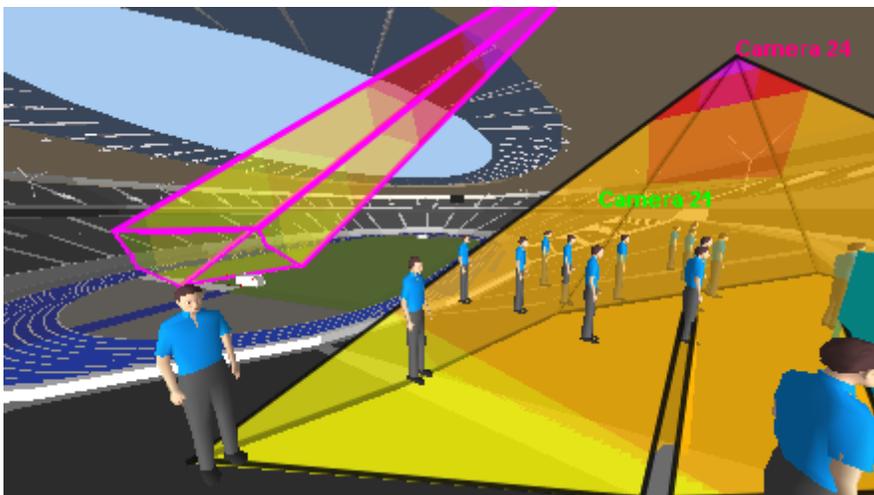
Visualization of camera coverage area and spatial resolution distribution on the surrounding objects of [panoramic cameras](#)^[409] (fisheye, 360°/180°).



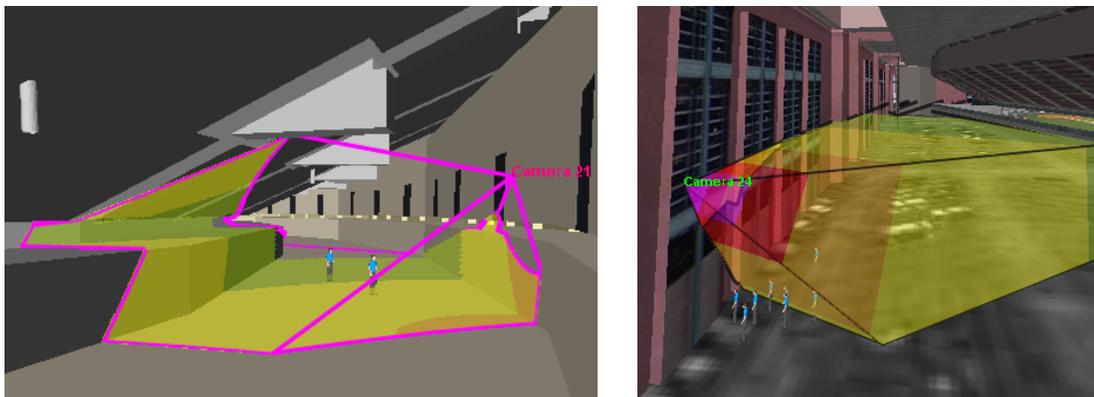
Free cutting 3D layout by six planes to provide access to any point of complex 3D buildings.



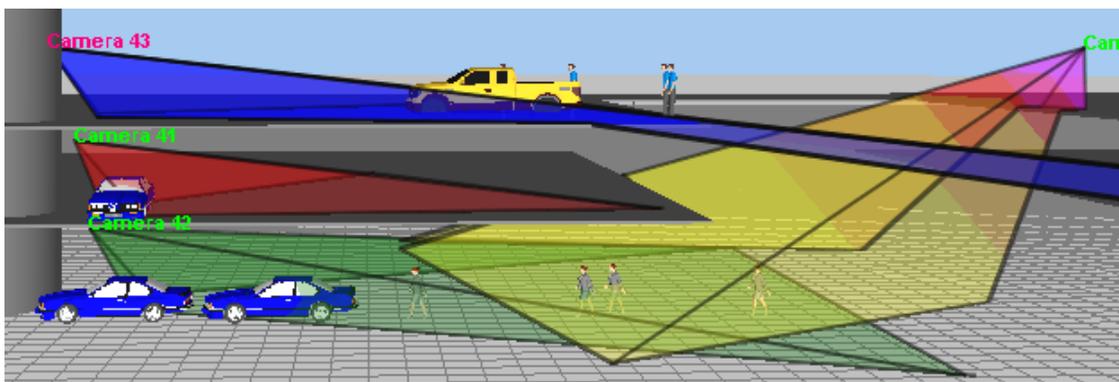
Working with [multilevel](#) 3D layouts and terrains with complicated vertical structure.



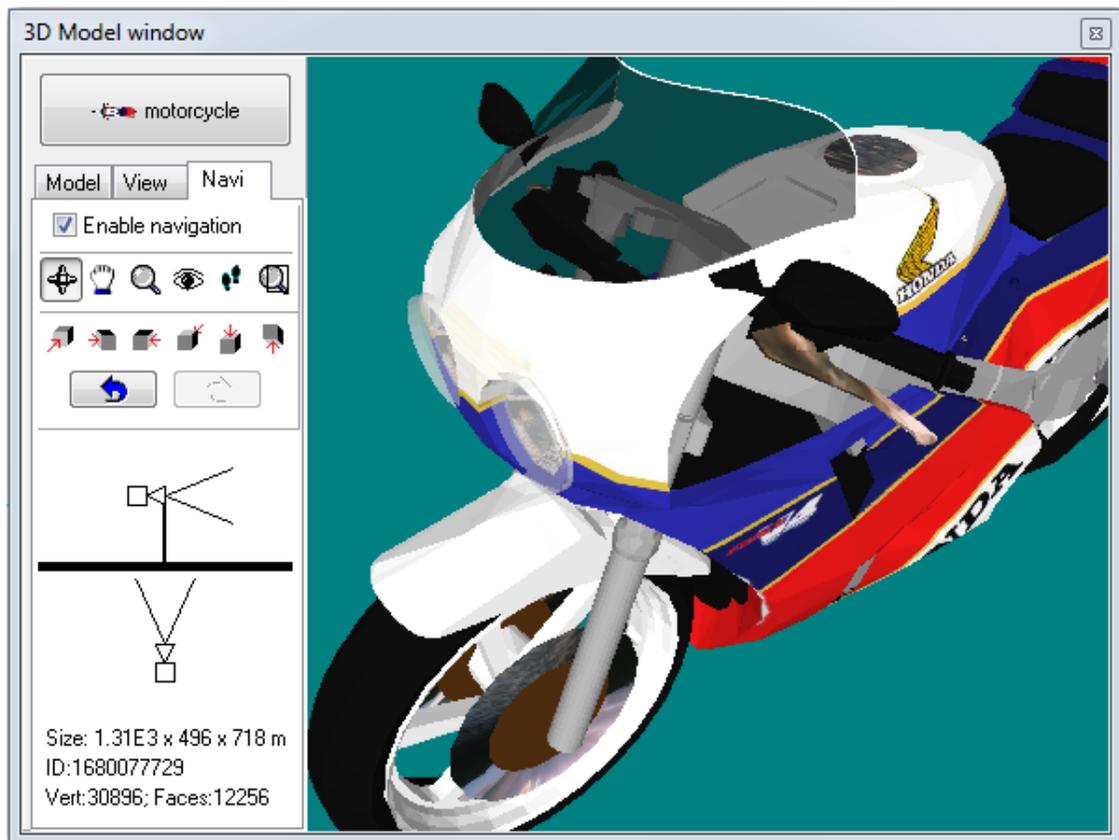
Possibility of using [3D models-territories](#)^[398], to place inside them cameras, constructions and other 3D models.



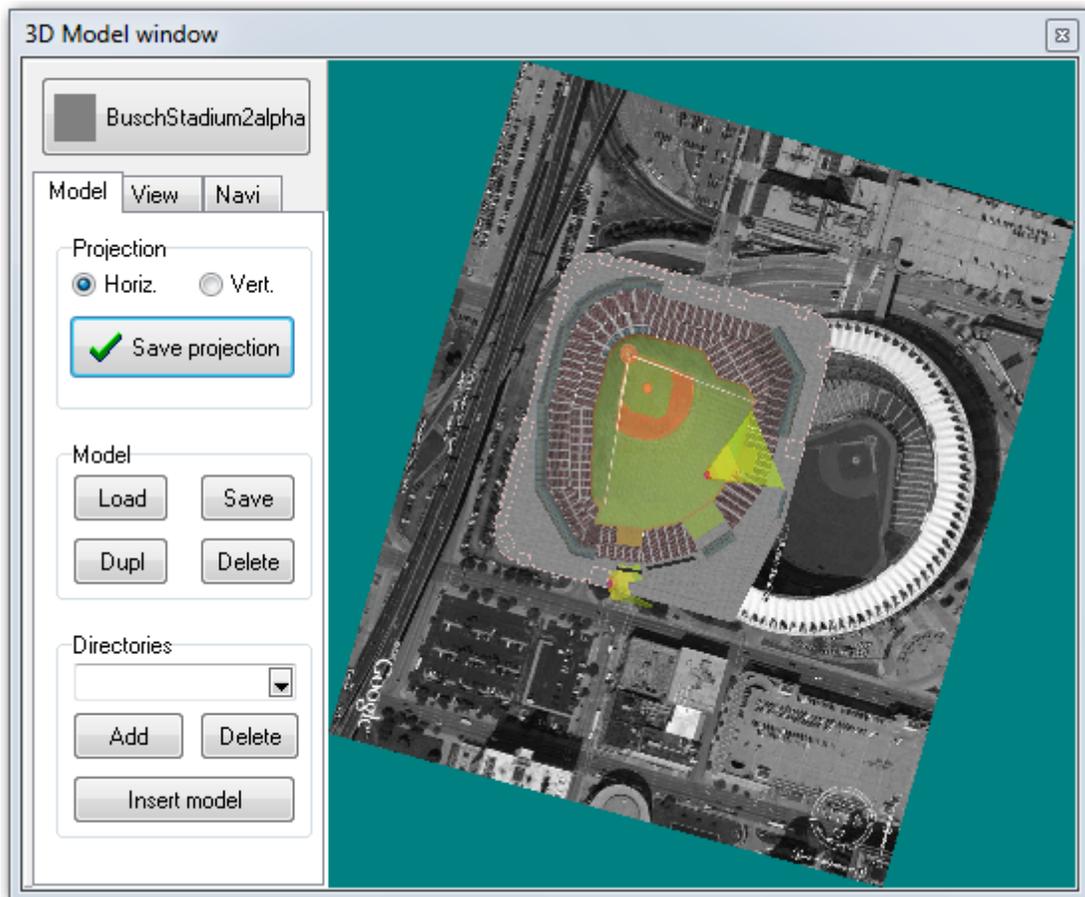
The [Base height](#)^[255] in the camera geometry parameters. All heights related to a camera (height of installation, heights of the lower and upper bounds of view area, heights of person detection, identification, license plate reading areas) counted from the base height. The Base height together with layers is used in work with multilevel 3D constructions.



More capabilities of the [3D models](#)^[291] window. In the window you can create 3D model projections with specified brightness, create projection in the form of faces, points and lines.



Ability to make projections in the form of sections of 3D models at the specified range of heights. These projections of 3D models of buildings can be used as background for placing cameras in the Graphics window.



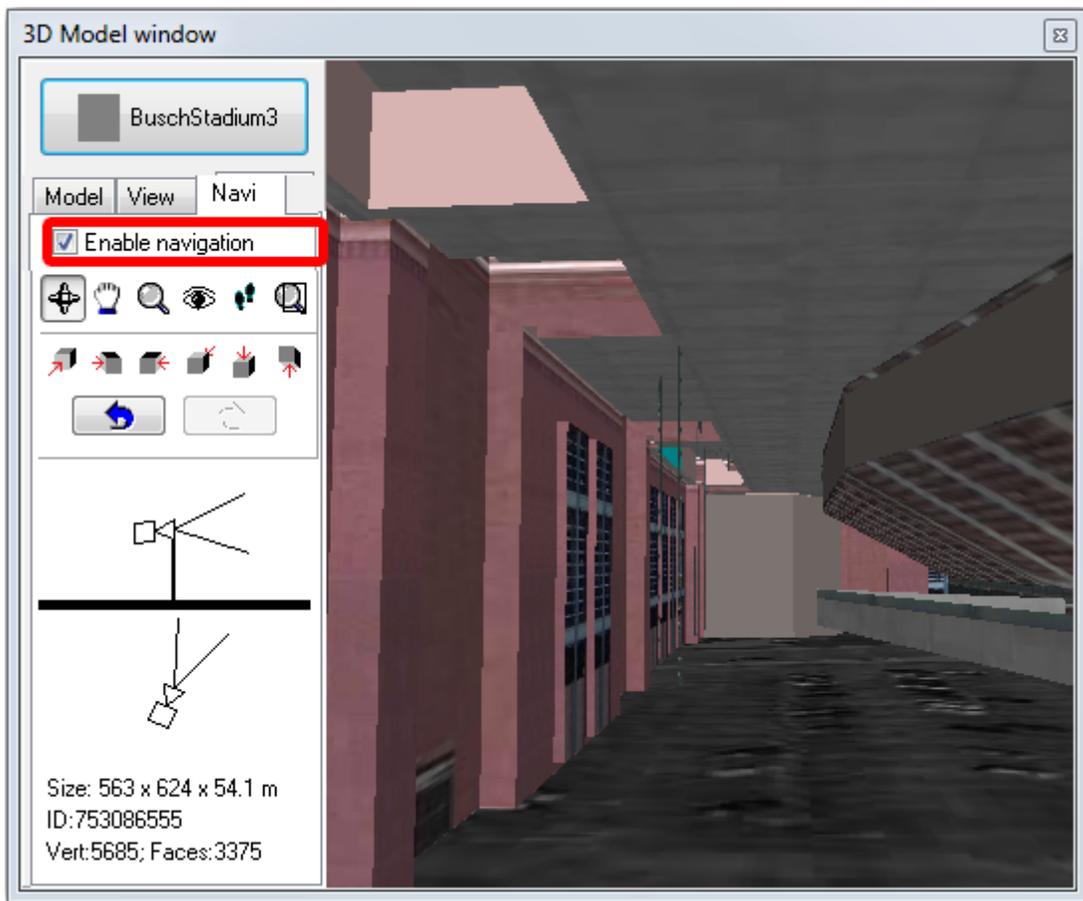
Ability to create 3D model projections with exceeding Windows screen resolution.

Possibility to create a projection of individual area of 3D model with even higher resolution using PiP (Picture in Picture) tool.

To use the 3D models as territories, and their projections as a background, a new ability to block the projection of certain 3D models from selection by mouse click was added.

Ability to consider a 3D model as obstacle in the calculation of shadows.

In the 3D Models window you can [also](#) ^[292] earn 3D models using 3D interface similar to the 3D World window.

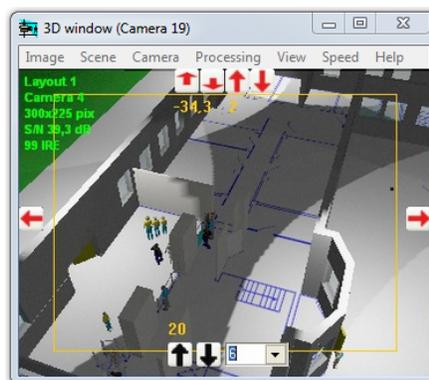
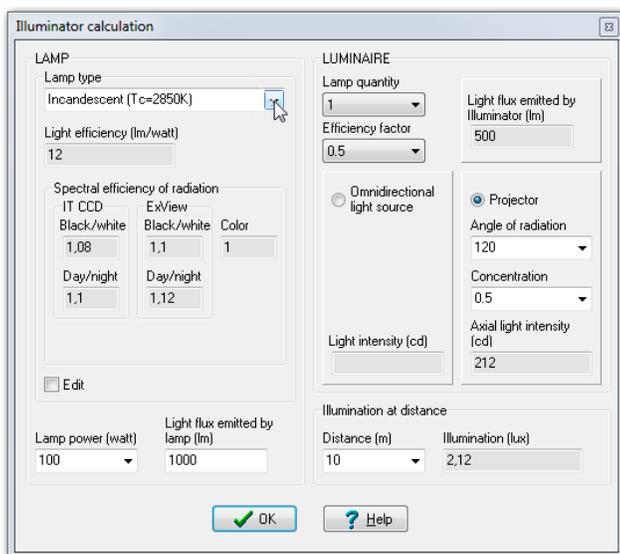


▼ Modeling images from cameras based on camera parameters and scene conditions

Modeling observed scene parameters (illumination, visibility limitations).



Model luminaires considering spectrum of radiation and spectral sensitivity of image sensors, including discharge lamps with complex spectrum and infrared LED illuminators.



Model camera parameters (spectral response, number of pixels, resolution, minimum illumination at known signal/noise ratio, IRE and aperture, maximum signal/noise ratio, electronic shutter, AGC, BLC, gamma, day/night cameras, frame rate, interlace scan, global shutter and rolling shutter).

Model
 =Unassigned=   Help

CAMERA

Color: color
 Number of pixels: 3000 X 2250
 Resolution: N/A 10%

ExView Horiz. only

Min. Illum. (lx): 1.1
 Aperture: 2.0
 S/N max.: 45
 On sensor: 0.0539
 AT: S/N (dB): 17
 IRE: 55
 S/N current: 0.1
 exposure (ms): 20

AESC Exposure time limits
 1/ 50 - 1/ 100000 S
 Current: 1/50 S - Level +

AGC Current: 42 Maximum: 42 Set

BLC Center
 Gamma: 0.45
 Auto Iris DC: - Level +

Model lens parameters (aperture, auto iris DC and Video Drive, resolution).

LENS

Fixed Iris Aperture limits: F 2.0 -F 2

Manual Iris Curr. aperture: F 2.0 Min. Illum.: 1.1

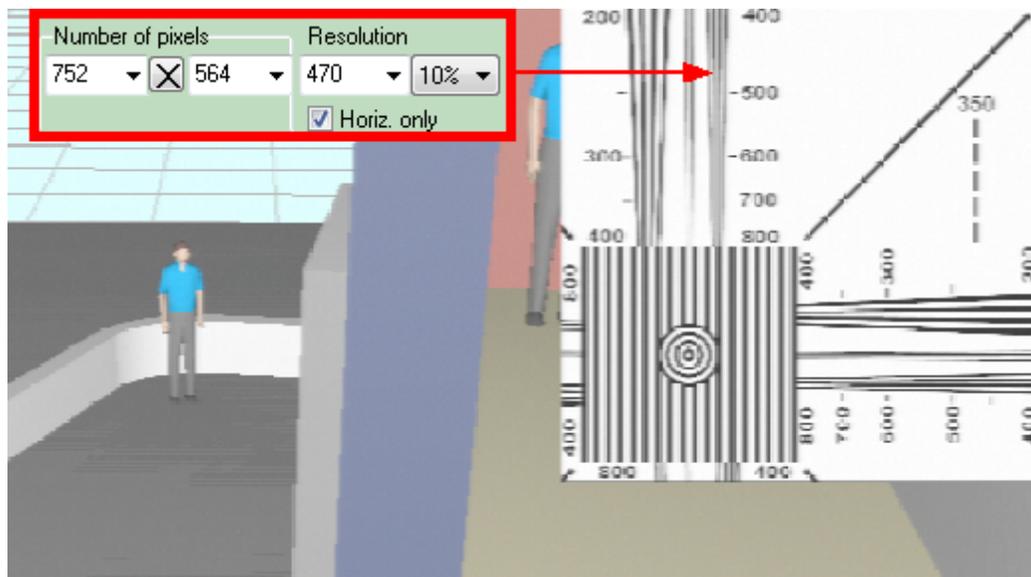
Auto Iris - Level +

DC Peek < Average

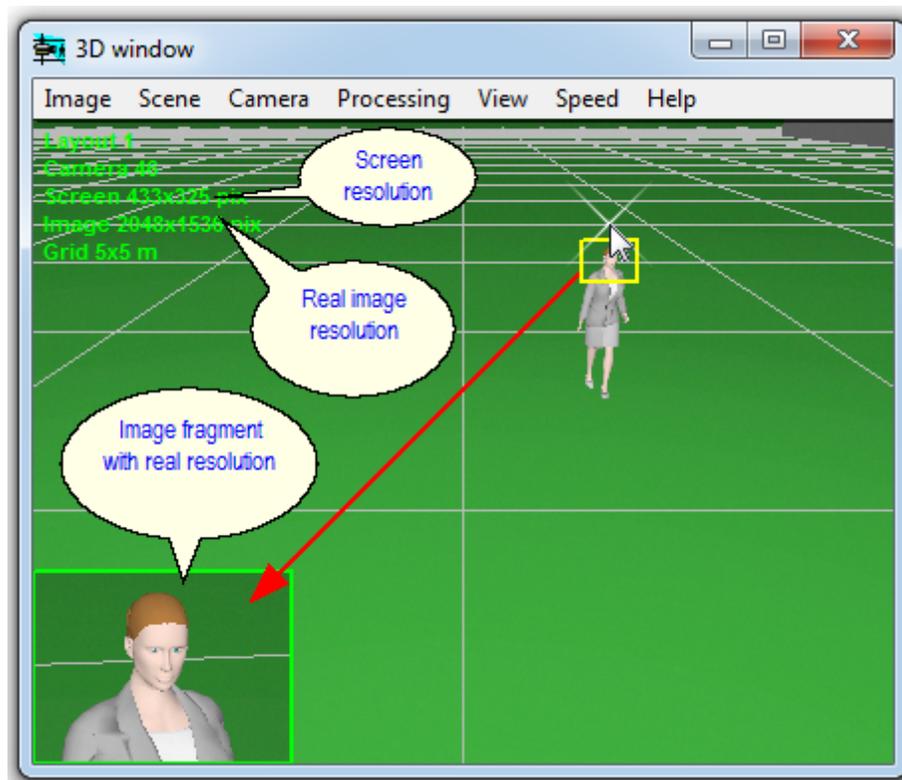
Video Drive

Resol.(lp/mm): N/A
 Contrast: 50%

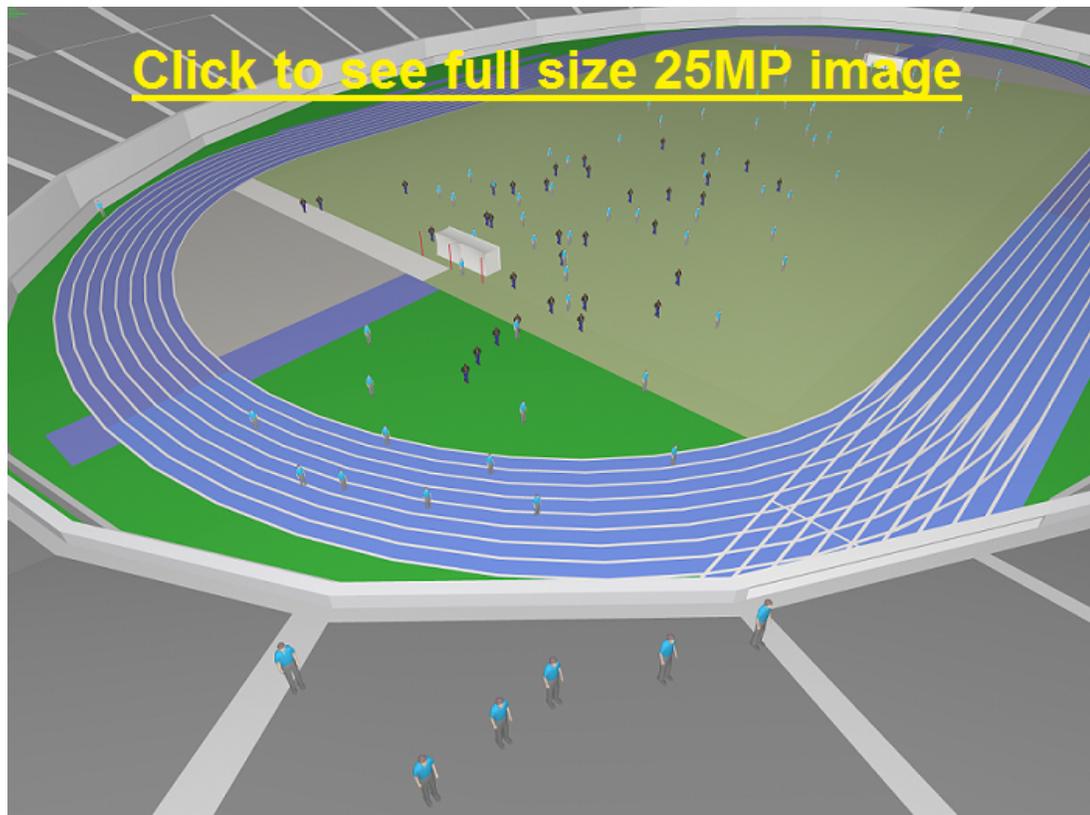
Visually control modeled resolution with the help of the Test chart



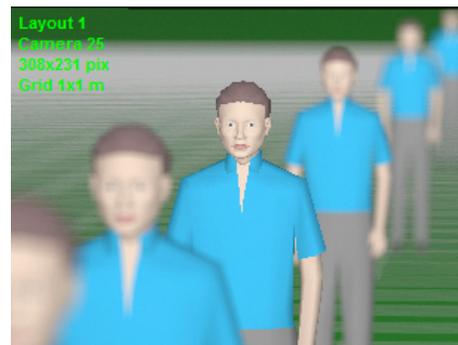
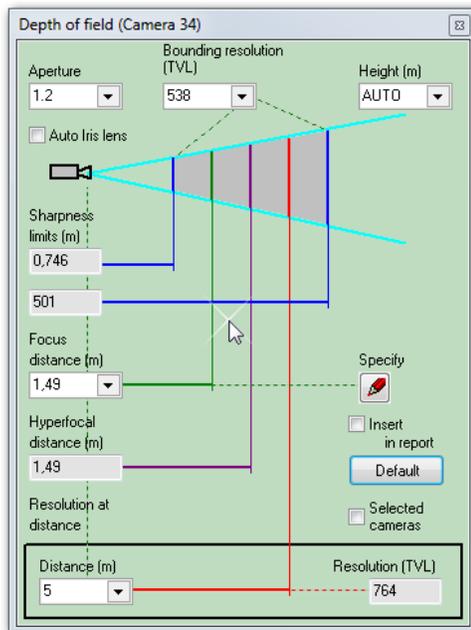
Model images from [megapixel cameras](#) ^[378] with number of pixels exceeds Windows screen number of pixels (Up to 100 megapixel and more!) with PiP (Picture in Picture) and without PiP.



See examples: [5 megapixels](#), [10 megapixels](#), [25 megapixels](#).



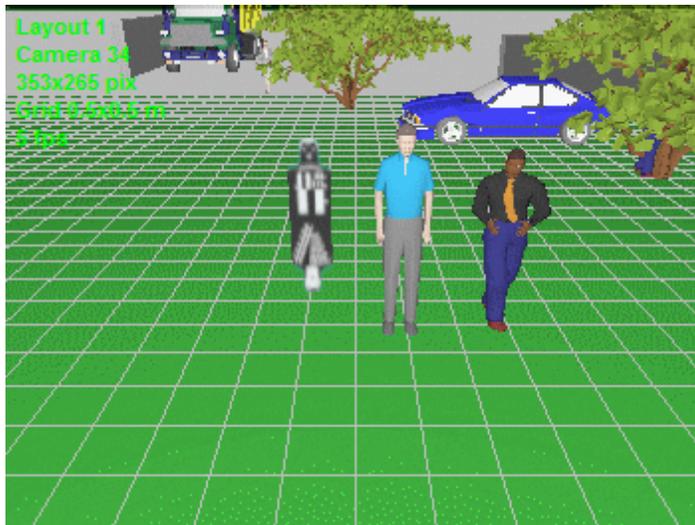
Calculate and model depth of field of each camera in project.



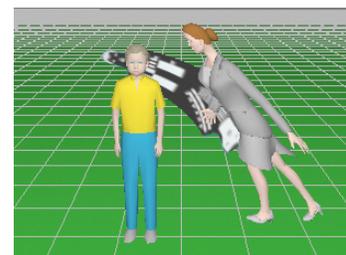
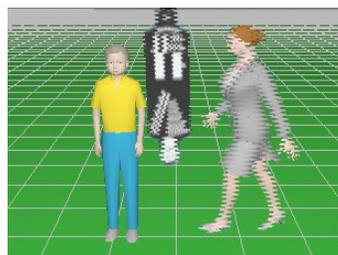
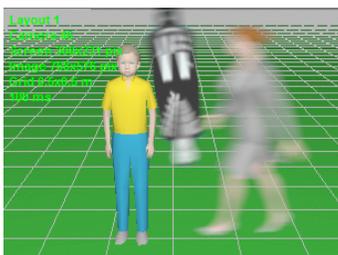
Model brightness, contrast, horizontal and vertical sharpness.



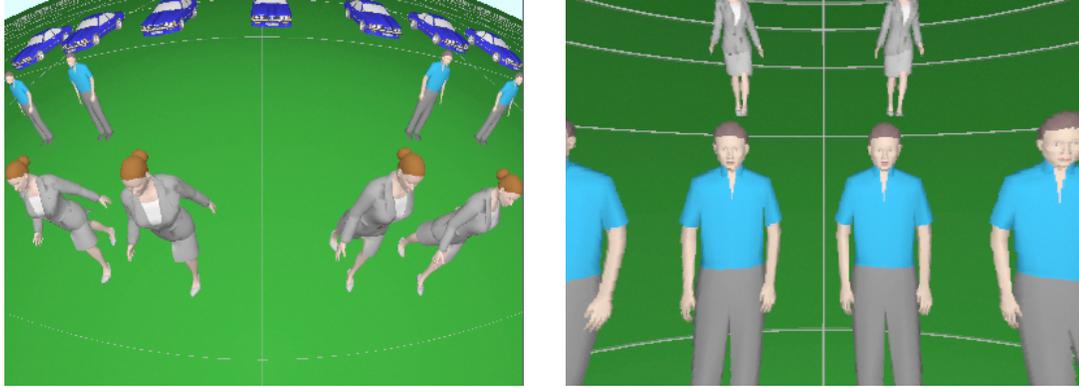
Model [moving_objects](#)^[166], camera [frame_rate](#)^[379], create animated images with moving 3D models.



Model [blur_and_distortion](#)^[385] of moving 3D models depending on camera parameters (exposure time, interlacing, rolling shutter).



Modeling images taking into account [lens distortion](#)^[429] (barrel and pincushion). Correct modeling wide-angle lenses with strong distortion.

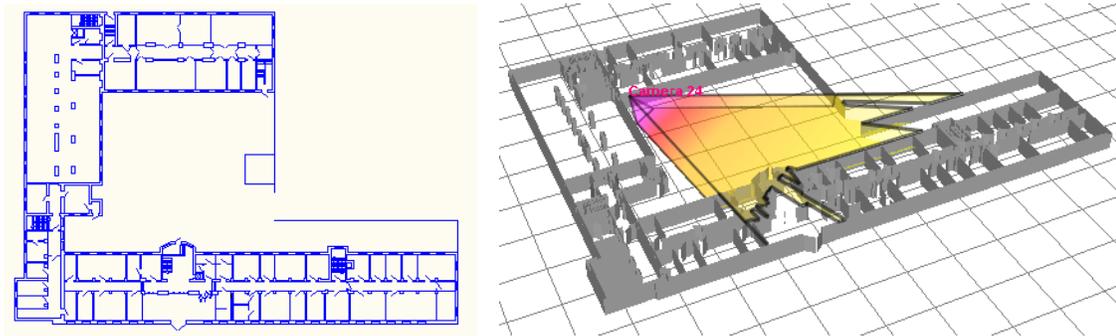


▼ Design operator interface

Create [animated monitor models](#)^[380] as html files with moving 3D models and different frame rates of each camera. [See an example of animated monitor \(file size about 4 Mb\)](#).

▼ Import from other CAD programs

[Import constructions](#)^[199] from a 2D background in AutoCAD formats to 3D VideoCAD constructions automatically. Use of this tool allows to reduce efforts of outlining background to convert it to 3D constructions.



▼ Export

[Export](#)^[202] the 2D drawing into any of the following formats: *.pdf (vector), **AutoCAD *.dwg**, PLT (HPGL/2), CGM (Computer Graphic Metafile), SWF (Adobe Flash).

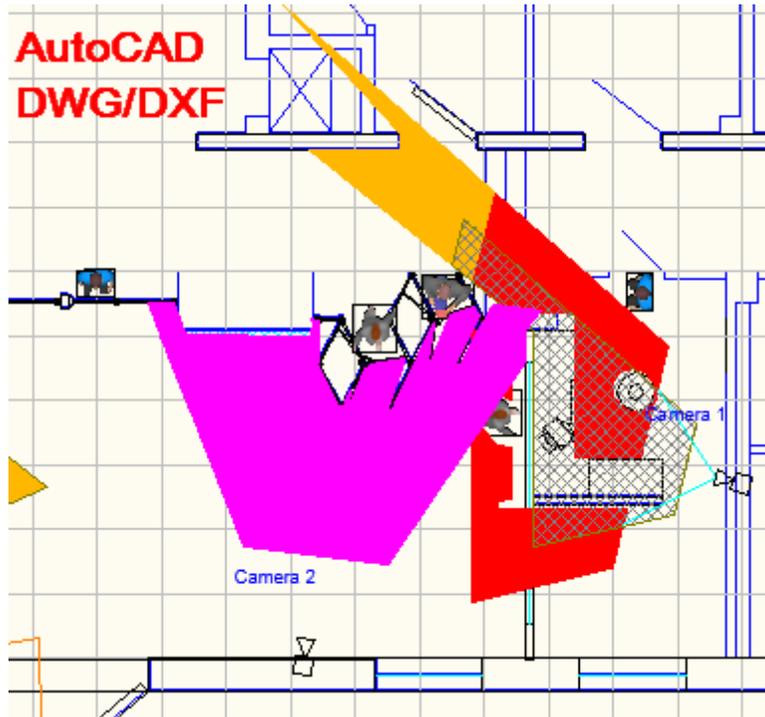
Advanced export to AutoCAD formats. At exporting to AutoCAD DWG and DXF formats, cameras and illuminators are exported as blocks. The most important parameters of cameras and illuminators are recorded to the block attributes. VideoCAD layers, fonts and line types are exported.

When you export a drawing with a background in AutoCAD DWG/DXF format, VideoCAD constructions can be [added to the background on separate layers](#)^[329] or the background can be added as an external links to the file of the background. In both cases the structure of the

background is saved.

Possible scheme of the combining AutoCAD + VideoCAD:

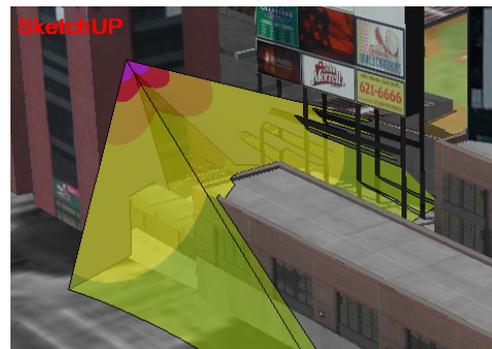
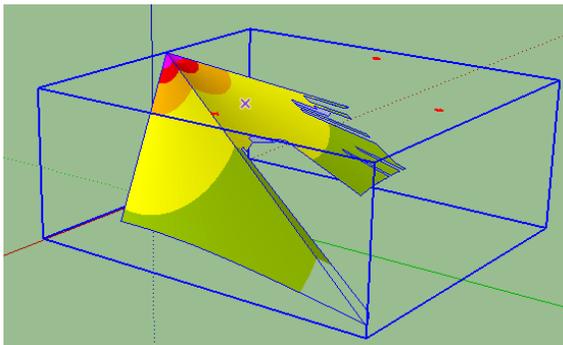
1. [Load drawing](#)^[204] in AutoCAD format as a background;
2. [Import](#)^[199] AutoCAD lines to VideoCAD 3D constructions automatically;
3. Adding cameras and constructions on special layers.
4. [Export](#)^[202] the obtained drawing to AutoCAD format to work with it in AutoCAD.



Export to DXF file 3D view areas and camera coverage taking into account lens distortion, spatial resolution, and shading.

This feature allows the convenient scheme of work with combination of 3D BIM Software (SketchUP) + VideoCAD.

1. Export layout as a 3D model-territory through SketchUP and loading it into VideoCAD.
2. Adding cameras with 3D view areas in VideoCAD.
3. Export 3D view areas in DXF format, loading them into 3D BIM Software and combining with the original layout in 3D.



Export images from the 3D World window to any of the following formats: *.bmp, *.jpg, *.gif, *.tif, *.

png. Size in pixels of the exported file can exceed the Windows screen size.

During export [3D images](#)^[286] from cameras to any of the following formats: *.bmp, *.jpg, *.gif, *.tif, *.png, size in pixels of the exported file can [exceed](#)^[378] the Windows screen size.

Export [animated image models](#)^[286] with moving 3D models to **animated gif**. [See an example of animated monitor \(file size about 4 Mb\)](#).

Export images from monitors to [animated monitor models](#)^[380] as html files, with moving 3D models, taking into account frame rate of each camera.

Get detailed adjustable table of all initial and calculated parameters of cameras in project. Print the table or export it to *.txt, *.csv, *.rtf, *.xls, *.htm formats.

Number	Name	Layout	Description	Name	Producer	Key Feature	Type				Model	Format
							TV system	Fixed, PTZ, Dome, Mini	Output	Color		
1	Camera 1	Layout 1		KPC-S230C	KT&C		CCIR/PAL	mini	VHS	color	HAD*** CCD	1/3"
2	Camera 2	Layout 1		KPC-S230C	KT&C		CCIR/PAL	mini	VHS	color	HAD*** CCD	1/3"
3	Camera 3	Layout 1		KPC-S230C	KT&C		CCIR/PAL	mini	VHS	color	HAD*** CCD	1/3"
4	Camera 4	Layout 1		TK-C925E-4mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
5	Camera 5	Layout 1		TK-C925E-12mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
6	Camera 6	Layout 1		TK-C925E-8mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
7	Camera 7	Layout 1		WAT-137HL	Water Co., Ltd	HIGH AGC	CCIR/PAL	fixed	VHS	b/w	Exview HAD	1/3"
8	Camera 8	Layout 1		TK-C925E-16mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
9	Camera 9	Layout 1		TK-C925E-16mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
10	Camera 10	Layout 1		TK-C925E-16mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
11	Camera 11	Layout 1		TK-C925E-16mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
12	Camera 12	Layout 1		TK-C925E-16mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
13	Camera 13	Layout 1		TK-C925E-16mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
14	Camera 14	Layout 1		TK-C925E-16mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
15	Camera 15	Layout 1		TK-C925E-16mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
16	Camera 16	Layout 1		TK-C925E-12mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
17	Camera 17	Layout 1		TK-C925E-12mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"
18	Camera 18	Layout 1		TK-C925E-12mm	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"

▼ Printing

Printing 3D images from the 3D World window.

Printing the Table of cameras as a whole or by selected fragments.

▼ Database of camera models

Maintain [database of camera models](#)^[304] with extended parameters (up to 117 camera parameters), assign different models to cameras in project, compare models with each other.

Table of Camera Models

Number	Model Name	Producer	Key Feature	Type				Image sensor						Hor. resolution (TVL)	Max frame rate (fps)	Signal/ (dB) / (weigh)	
				TV system	Fixed, PTZ, Dome, Mini	Output	Color	Model	Format	Number of pixels		Scan	Aspect ratio				Row read time (mcs)
										Horiz.	Vert.						
1	indoor standa			fixed					1/1.7"	352	512		4:3				
2	indoor mini			mini													84
3	indoor PTZ			PTZ					1/3"				4:3				
4	outdoor standa			fixed					4.8*3.6	352	512		4:3				
5	outdoor mini	JVC		mini													84
6	outdoor PTZ	JVC	1231231231231	PTZ					Exview HAD*	1/3"			interleaved				
7	TK-WD310E	JVC	Wide Dynamic F	CCIR/PAL	fixed	VHS	easy day/ni	unknown	1/3"	720	540		interleaved	4:3		480	50
8	STC-3010/0	Smartec	full day/night	CCIR/PAL	fixed	VHS	day/night	Exview HAD*	1/3"	752	582		interleaved	4:3		500	50
9	STC-1000/0	Smartec		CCIR/PAL	fixed	VHS	b/w	Super HAD***	1/3"	752	582		interleaved	4:3		550	50
10	TK-C921EG	JVC		CCIR/PAL	fixed	VHS	easy day/ni	IT CCD	1/3"	752	582		interleaved	4:3		540	50
11	QN-B309	QW/DNN	HIGH AGC	CCIR/PAL	fixed	VHS	b/w	Exview HAD*	1/3"	752	582		interleaved	4:3	25	564	3 51
12	QN-196	QW/DNN	Color-8 Av	CCIR/PAL	fixed	VHS	color	HAD CCD	1/3"	752	582		interleaved	4:3		480	48
13	WAT-137HL	Watec Co., Ltd	HIGH AGC	CCIR/PAL	fixed	VHS	b/w	Exview HAD*	1/3"	752	582		interleaved	4:3		500	51
14	KPC-1905B1	KT&C		CCIR/PAL	mini	VHS	b/w	HAD CCD	1/3"	500	582		interleaved	4:3		375	50
15	KPC-1905B1	KT&C		CCIR/PAL	mini	VHS	b/w	HAD CCD	1/3"	752	582		interleaved	4:3		550	50
16	KPC-400P	KT&C		CCIR/PAL	mini	VHS	b/w	IT CCD	1/3"	500	582		interleaved	4:3		330	50
17	ACE-E560C	KT&C		CCIR/PAL	mini	VHS	b/w	Exview HAD*	1/3"	752	582		interleaved	4:3		550	50
18	KPC-S230C	KT&C		CCIR/PAL	mini	VHS	color	HAD CCD	1/3"	500	582		interleaved	4:3		375	45
19	KPC-HD200C	KT&C		CCIR/PAL	mini	VHS	color	Super HAD***	1/3"	752	582		interleaved	4:3		500	50
20	MC3710H-7X	PELCO	twisted pair, gen	CCIR/PAL	fixed	VHS	twisted b/w	Super HAD***	1/3"	752	582		interleaved	4:3		564	50
21	TK-C925E	JVC	screen menu	CCIR/PAL	fixed	VHS	day/night	IT CCD	1/3"	752	582		interleaved	4:3		540	50
22	STC-IP2070/	Smartec	IP	N/A	fixed	Ethernet	color	Super HAD***	1/3"	795			progressive	4:3	0	480	50

Camera model: [] Data: [] Views: []

Buttons: Assign, New, Edit, Delete, Save, Load, Export, Print, >|<, Hide Columns, Show all, Save view, Delete view

Registration

VideoCAD 8 Professional is registered with USB dongle. All other VideoCAD versions are registered only by personal registration code. This code doesn't depend on computer hardware or a dongle. This code is valid on any computer.

You can install **VideoCAD 8.2 Professional** on many computers, but launch on one computer with dongle connected. One license of **VideoCAD 8 Lite**, purchased separately, allows to use the program on two workplaces nonsimultaneously (work and home computers) if both workplaces belong to one person - owner of the license.

Demo version

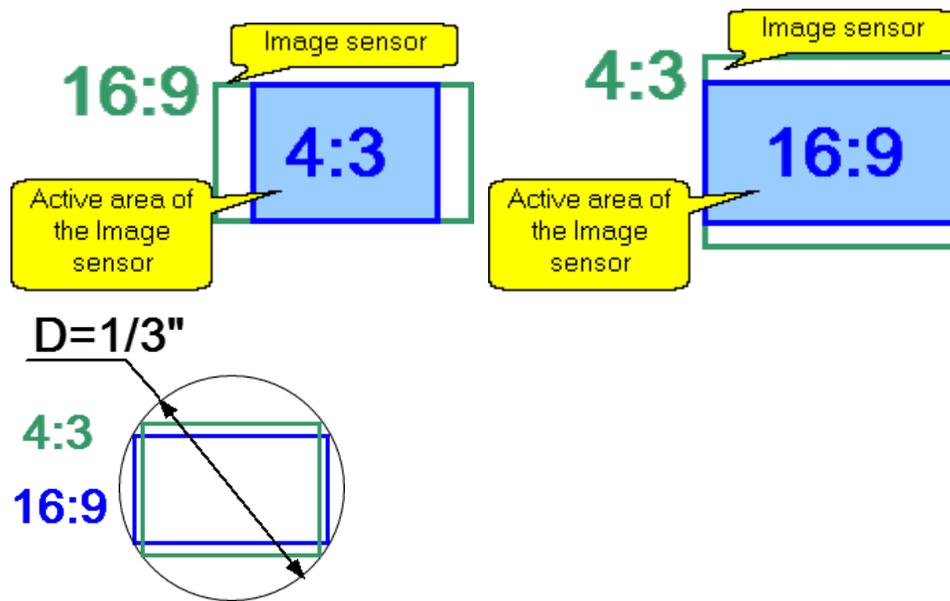
You can't change lens focal length, lens aperture, image sensor format, aspect ratio and light sensitivity in the demo-version of **VideoCAD Professional**. You may install the demo-version of VideoCAD Professional to test and evaluate it for 30 days; after this time you must either buy the license to use the VideoCAD Professional permanently or delete the demo version from your hard drive.

In the demo version of **VideoCAD 8 Lite** changing lens focal length and image sensor is allowed. Instead of this, saving working project to a file is prohibited and there is a limit on the maximum number of cameras (5) in one project.

Differences between [VideoCAD 8 Lite](#)^[31] and [VideoCAD Starter II](#)^[45]

Calculations

More accurate modeling cameras taking into account size of active area of the image sensor in dependence of the aspect ratio of the image sensor and the aspect ratio of the output image of the camera. Model cameras with [non standard image sensor size](#)^[267] and aspect ratio.

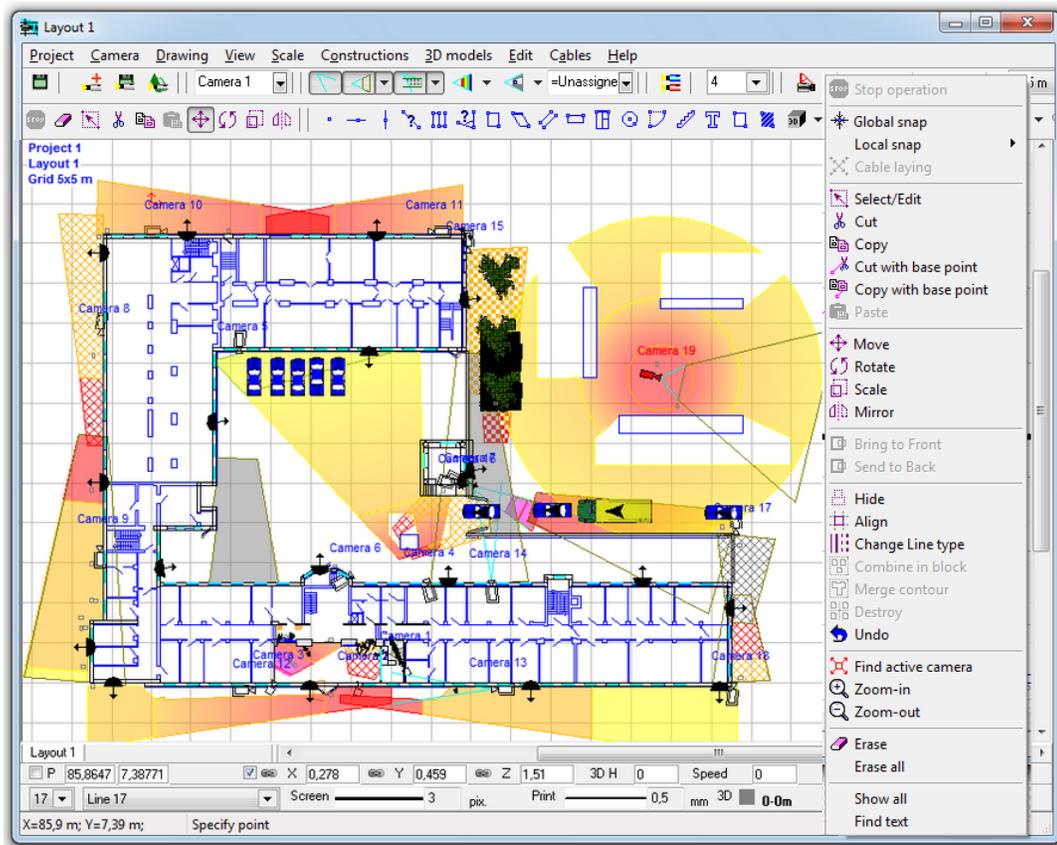


Calculate [length](#)^[388] and electric parameters of [cables](#)^[342].

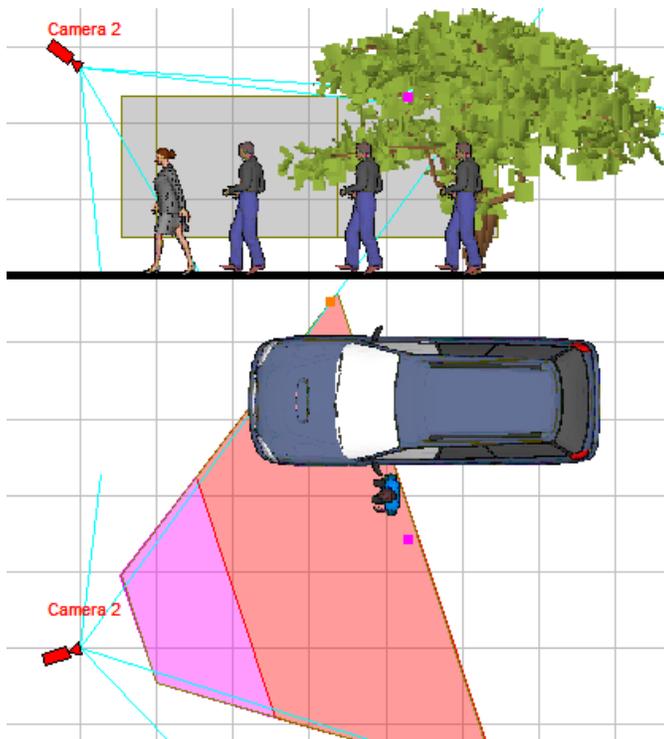
Power cable (Camera 2)			
Cable brand	Line 26	Conductor cross-section area (mm ²)	0,75
Total length of all segments in layouts (m)	0	Conductor diameter (mm)	0,98
Reserve for cable laying (%)	10	AWG	-
Reserve for camera connection (m)	2	Cable resistance (Ohm) (both directions)	0,209
Reserve for source connection (m)	2	Voltage at cable start (V)	12
Cable length including reserves (m)	4	Consumption current (A)	0,117
Cable coil size (m)	250	Quantity of cameras	1
Cable coil number	1	Voltage at cable end (V)	12
Cable surplus (m)	246		
<input type="button" value="OK"/> <input type="button" value="Cancel"/> <input type="button" value="Help"/>			

▼ Working with 2D projections

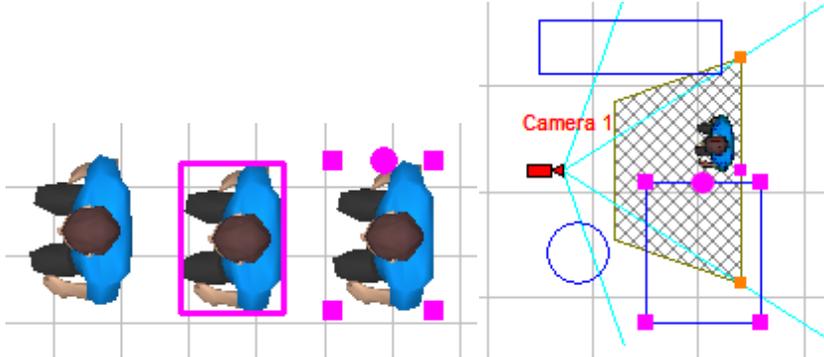
Use more than 30 additional constructions and CAD tools (Point, Horizontal line, Vertical line, Line segment, Angle, Double line, Arc, Mask, Filling, Text, 3D image, Inclined rectangle, Change installation height, Change view area upper bound, Change view area lower bound, Copy with base point, Cut with base point, Scale, Mirror, Change line type, Hide camera names, Cameras over constructions, Bring to front, Send to back, Hide, Align, Combine in block, Destroy block, Find text, Hidden state of objects, Numerate cameras, Length calculation of line segments, Merge contour, High resolution on top).



Work with [vertical projection](#) ¹⁷⁶ of the site plan.



More convenience in editing on the layout 3D models, Rectangle, Wall, Aperture in wall, Stairs, Mask, Filling, 3D Image. You can scale them and rotate around its axis using the square grips and pink circle.

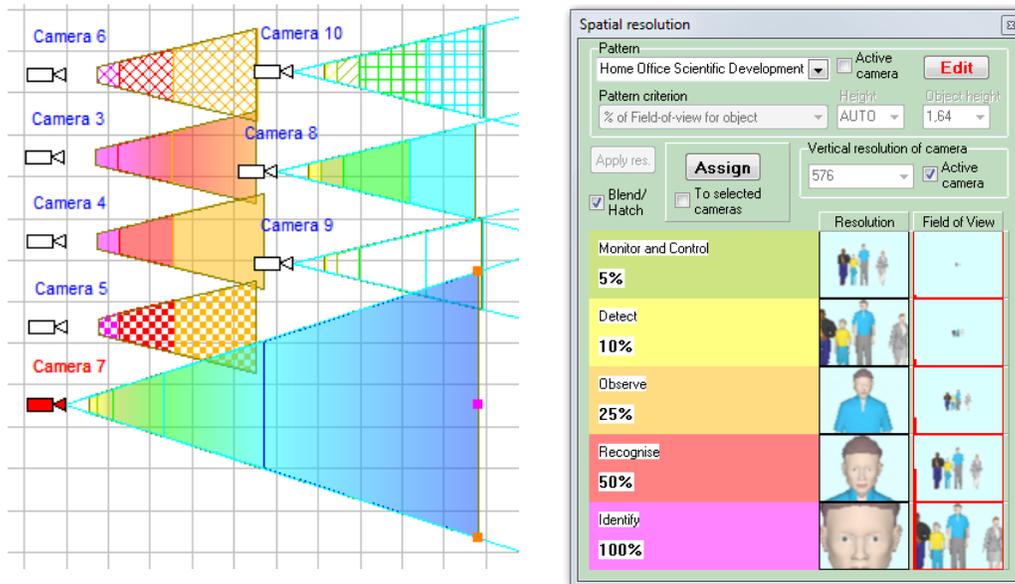


Use [Titles](#)^[216] and [texts](#)^[189] on the drawing. Different [fonts](#)^[322] are supported.

Use up to 10 [layouts](#)^[242] in each project.

Use up to 30 [spatial resolution patterns](#)^[272] in each project. Each pattern can contain up to 10 regions. Adjust [object height](#)^[276] in the patterns, [height of measuring spatial resolution](#)^[275], direction (horizontal or vertical) of measuring spatial resolution. The Spatial resolution box contains models of [field-of-view images](#)^[277] for each region in current pattern.

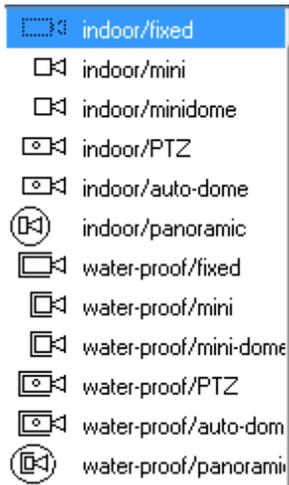
There are prepared spatial resolution patterns according to the following criteria: Home Office Scientific Development Branch; Home Office Guidelines for identification; P 78.36.008-99, Australian Standard AS4806: Closed Circuit Television, European Standard EN50132-7, ISO/IEC 19794 Biometric data interchange formats.



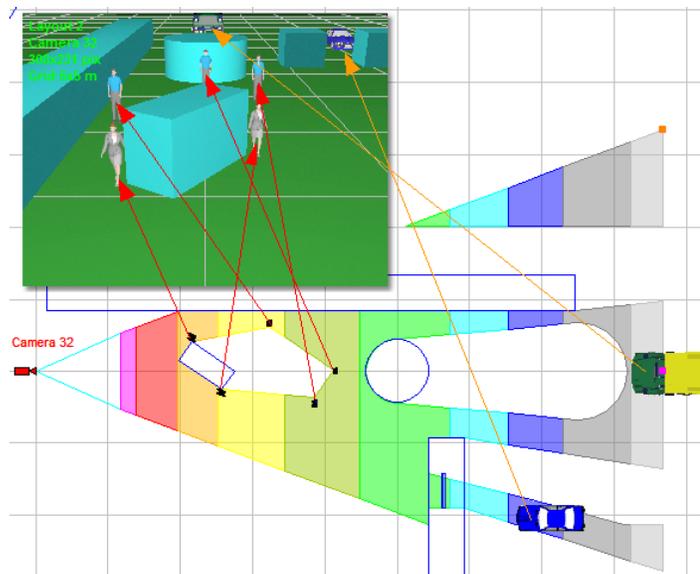
Use gradient color and hatching for visualization of spatial resolution.

Show view area projections by different colors and hatch styles, using different line types.

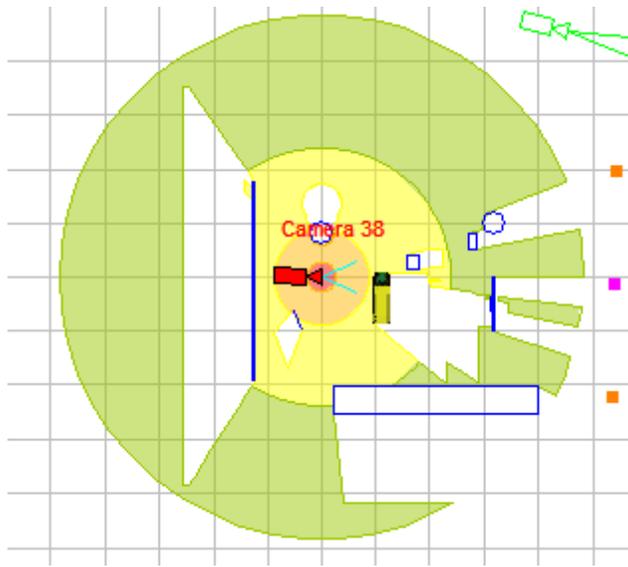
Use different camera icons (fixed, PTZ, outdoor..).



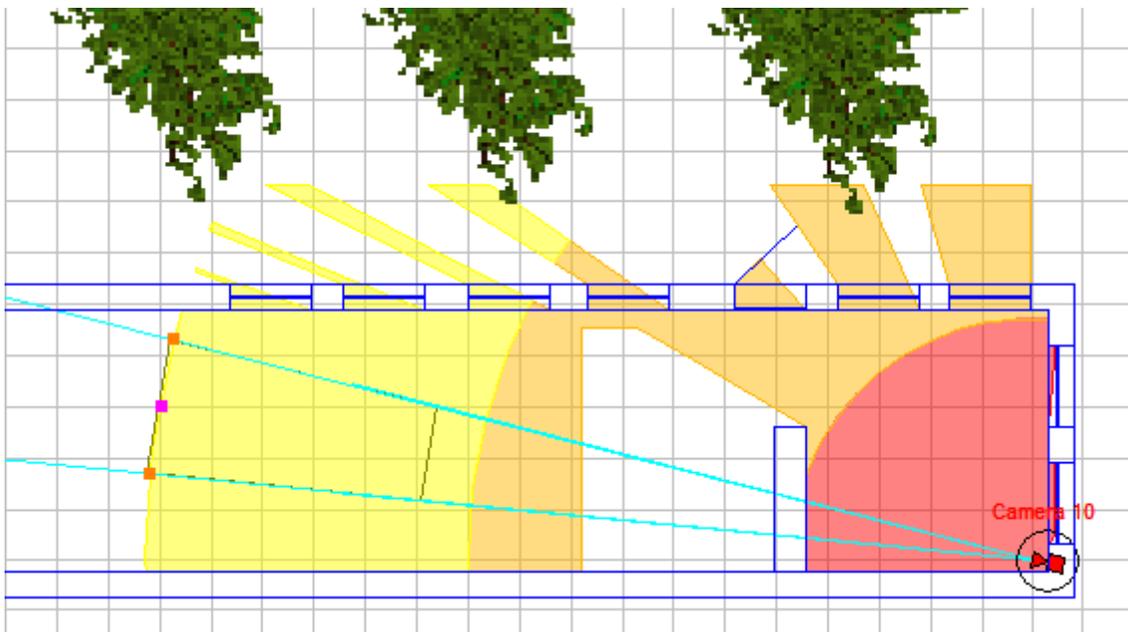
Construct the horizontal projection of camera control areas including [shadows](#)¹⁷² from obstacles on the scene. In VideoCAD Lite obstacles can be constructions only. In [VideoCAD Professional](#)³ 3D models also can be obstacles.



Choose the best positions and calculate control areas of [PTZ cameras](#)³⁸⁴, Dome cameras and 360 degree cameras.



Simulation of the horizontal projection of the view area and visualization of the spatial resolution distribution of [panoramic cameras](#)^[409] (fisheye, 360°/180°).

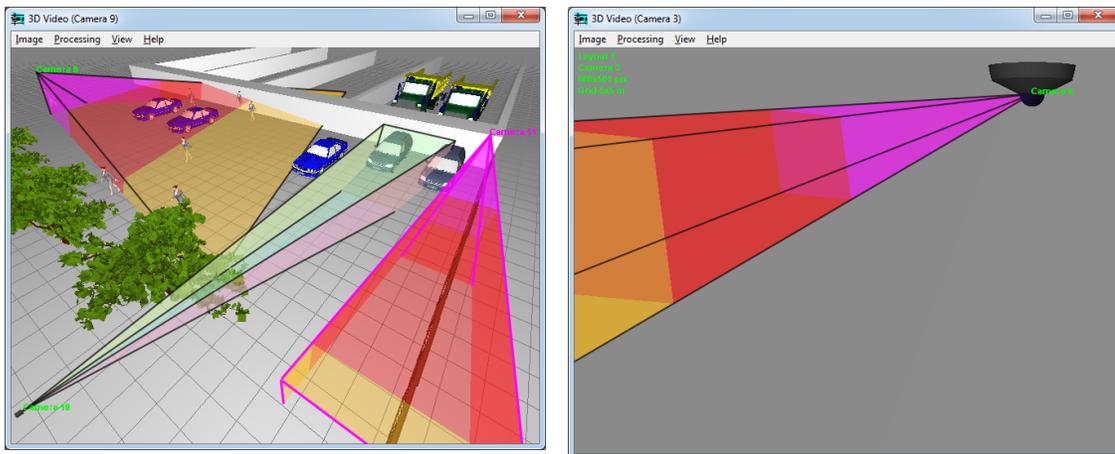


Adjust [keyboard shortcuts](#)^[324] for each item in the Main menu.

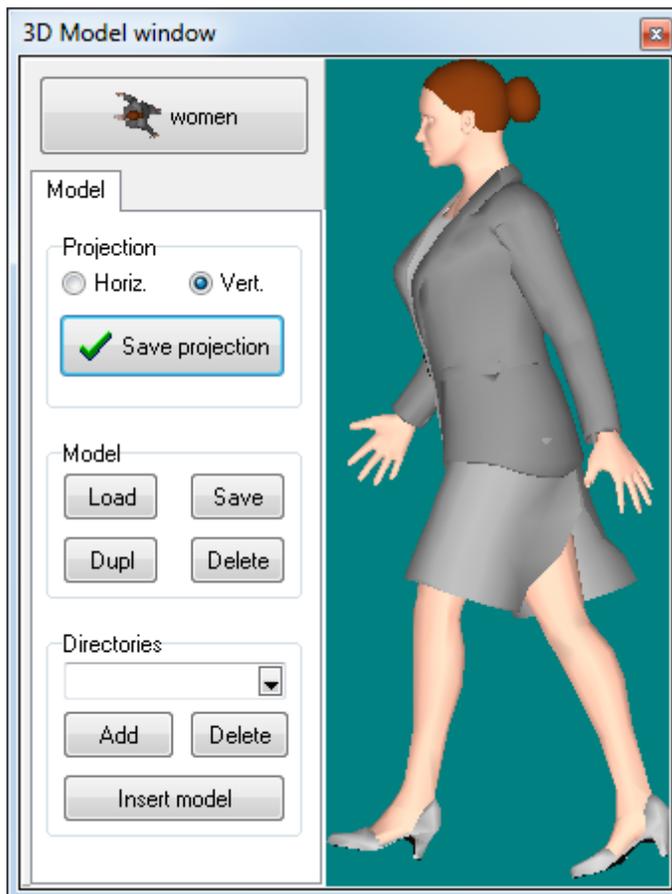
Adjust [visibility](#)^[332] of buttons on the Toolbar.

▼ 3D modeling layout and camera view areas

3D visualization of the location plan and camera view areas in the [3D Video](#)^[284] window by other cameras. Visualization of the spatial resolution. Flexible adjustment of displaying view areas from the side.



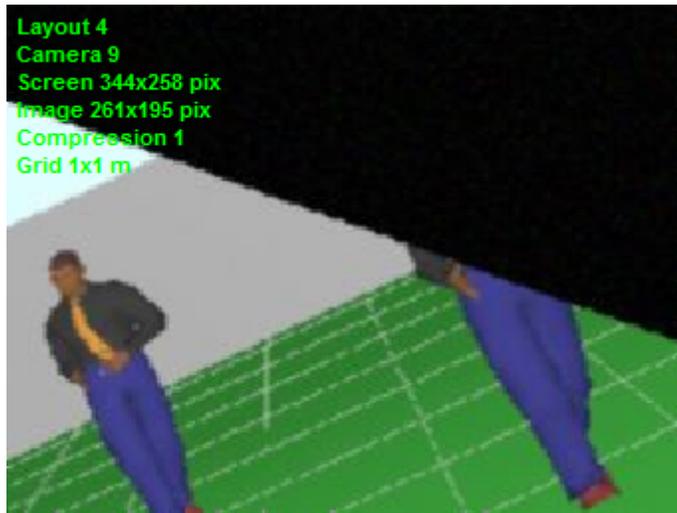
In special [3D models](#) window you can create 3D model projections with specified resolution. You can load 3D models from files, save 3D models to files, create copies of 3D models



Support of 3D models with textures, transparent texture and opacity of materials. New version of **VideoCAD Plugin for SketchUP** with possibilities of export textures, transparent textures, opacity of materials and scaling.

▼ Modeling images from cameras based on camera parameters and scene conditions

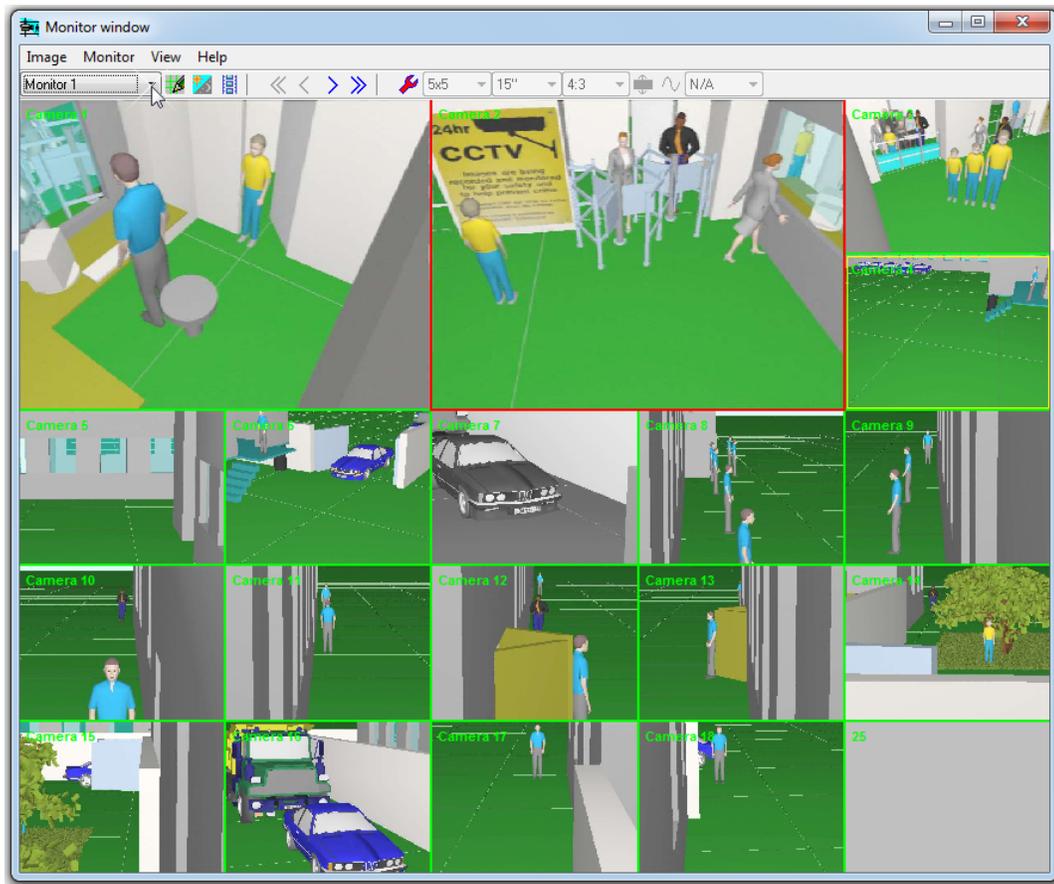
Simulation of image resolution and view area limits of [panoramic cameras](#)^[269] (fisheye, 360°/180°).



Obtain [Image Model](#)^[284] for each camera in the project based on models of scene and equipment.

▼ Design operator interface

Design operator interface using the [Monitor window](#)^[294].

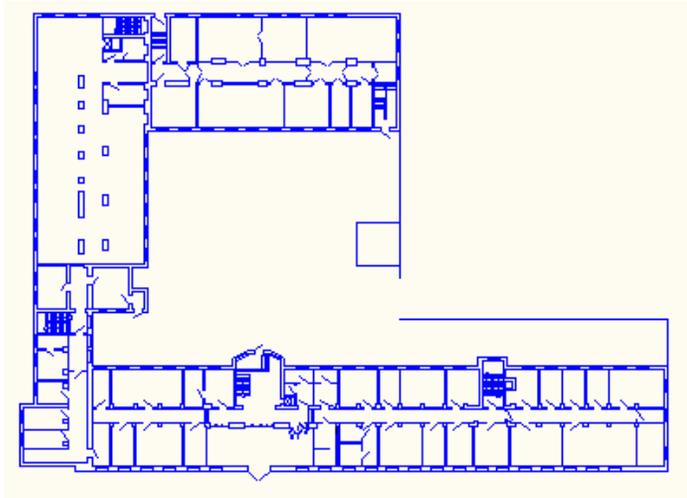


Modeling size and [resolution](#)^[297] of monitors.

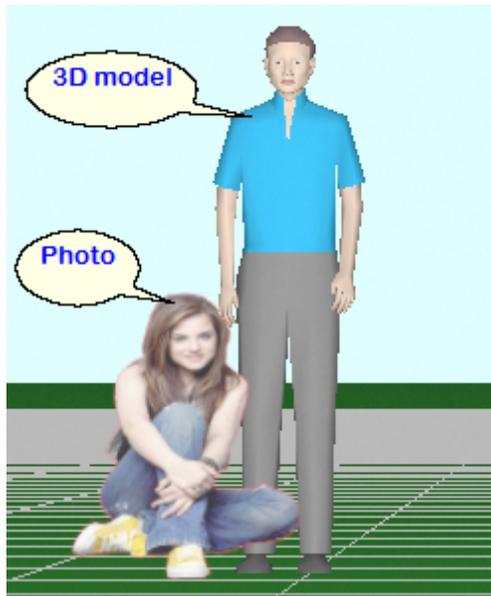
▼ Import from other CAD programs

Locate cameras and cables on the [prepared layouts](#)^[204] in formats ***.emf**, ***.wmf**, ***.png**, ***.gif**, ***.tif**, ***.pdf**. Upgraded AutoCAD import modules can read much more CAD files.

For backgrounds in **AutoCAD *.dxf *.dwg** formats you can choose Layout in the background, control visibility of layers, hide texts. For backgrounds in PDF format you can choose page and resolution of the background.



Import [raster images](#)^[191] to display them in 3D.



Import camera model parameters to the **Table of camera models** via copying and [pasting](#)^[313] from Excel.

▼ Export

[Export](#)^[202] the 2D drawing into any of the following formats: *.emf, *.wmf, *.png, *.gif, *.tif, *.pdf (raster), **AutoCAD *.dxf**.

Export [images from monitors](#)^[298] to *.bmp, *.jpg, *.gif, *.tif, *.png.

Obtain the [text report](#)^[200] with full description of all cameras in the project, view areas and cables to be pasted into a project explanatory note or used as instruction for installation.

Get a [report in PDF format](#)^[200], with full description of all cameras in the project, view areas and cables. The **PDF Report** can include images from the cameras, fragments of layouts with camera placed, a cover with logo. Report parameters and the structure of information in the report is configurable. See [example of PDF report](#).

Obtain the [cable report](#)^[240].

▼ Printing

[Printing](#)^[207] the obtained 2D drawing in raster or vector mode on one or several pages for pasting together. You can use prepared frames with standard title-block and logo. Sizes, colors styles of fonts and lines, weights of lines can be adjusted.

Printing image models from [cameras](#)^[286] and [monitors](#)^[298].

Printing the [Table of camera models](#)^[314] as a whole or by selected fragments.

▼ Database of camera models

Maintain [database of camera models](#)^[304] with the most important parameters (22 fields 22 fields for each camera model). You can add your models, assign different models to cameras in project, compare models with each other.

Producer	Model Name	Key Feature	Type	Image sensor				Lens						Power supply			Provider	Cost	
				Fixed, PTZ, Dome, Mini	Size	Number of pixels		Aspect ratio	Type	Focal length		Angles of view (deg.)			Voltage (V)	Consumption			
						Horiz.	Vert.			Min. (mm)	Max. (mm)	Max.	Min.	Max.		Min.			Power (watt)
AVOS	M1033-W		mini	1/4"	800	600	4:3	standard	2.8	2.8	65.5	65.5	51.5	51.5	5	6.5	1.3		
AVOS	M1034-W		mini	1/4"	1280	800	16:10	standard	2.8	2.8	65.5	65.5	43.8	43.8	5	6.5	1.3		
AVOS	M1054		mini	1/4"	1280	800	16:10	standard	2.8	2.8	65.5	65.5	43.8	43.8	5	6.5	1.3		
AVOS	M1025		mini	1/2.7"	1920	1080	16:9	standard	3.6	3.6	73.4	73.4	45.5	45.5	5	2.4	0.48		
AVOS	M1004-W		mini	1/4"	1280	800	16:10	standard	2.8	2.8	65.5	65.5	43.8	43.8	5	6.5	1.3		
AVOS	M1013		mini	1/4"	800	600	4:3	standard	2.8	2.8	65.5	65.5	51.5	51.5	5	6.5	1.3		
AVOS	M1014		mini	1/4"	1280	800	16:10	standard	2.8	2.8	65.5	65.5	43.8	43.8	5	6.5	1.3		

▼ Registration

One license of **VideoCAD Starter II** allows to use VideoCAD Starter II on one computer. One license of **VideoCAD 8 Lite**, purchased separately, allows to use the program on two workplaces nonsimultaneously (work and home computers) if both workplaces belong to one person - owner of the license.

▼ Package contents

VideoCAD Starter II is offered only in a kit of three programs - **VideoCAD Starter II Kit**. This Kit includes:

- VideoCAD Starter II;
- IP Camera CCTV Calculator;
- VideoCAD Plugin for SketchUp.

▼ Demo version

In the demo version of **VideoCAD 8 Lite** there is a limit on the maximum number of cameras (5) in one project.

License of **VideoCAD 8 Lite** allows free use of the **demo version** for educational purposes, for research, theses, writing articles, etc. non-profit activities.

Differences between [VideoCAD 7 Starter II](#)^[45] and [VideoCAD 7 Starter](#)^[49]

- Possibility of using [3D models](#)^[190] from version Lite (people, trees, cars etc.).
- Possibility of import 3D models and scenes from **SketchUp** and **Autodesk 3ds MAX**; [VideoCAD Plugin for SketchUp](#) is included in the **VideoCAD Starter II Kit**.
- Loading [background](#)^[204] in **AutoCAD *.dxf** and ***.dwg** formats.
- [Saving the drawing](#)^[202] in the Graphics windows with **resolution exceeding Windows screen resolution**.
- **Additional constructions and CAD tools:** [Rotakin](#)^[192] (without modeling rotation), [Copy](#)^[180] and [Paste](#)^[180] constructions and cameras.
- [Modeling number of pixels](#)^[287] and [JPEG compression](#)^[286] in the 3D window.
- Displaying [examples of images](#)^[278] in the **Spatial resolution box** (resolution only).
- Modeling cameras with any image sensor sizes and aspect ratio.
- Modeling images from cameras [turned by 90 degrees](#)^[257].

*VideoCAD Starter II is offered only in a kit of three programs - **VideoCAD Starter II Kit**. This Kit includes:*

- **VideoCAD Starter II;**
- [IP Camera CCTV Calculator;](#)
- [VideoCAD Plugin for SketchUp.](#)

[Download VideoCAD 8 Professional demo version](#)

[Download VideoCAD 8 Lite demo version](#)

[Download VideoCAD 7 Starter II demo version](#)

[Download VideoCAD 7 Starter demo version](#)

[What is new in VideoCAD](#)^[89]

Part



**What is new in
VideoCAD**

6 What is new in VideoCAD

Information in the Help file can be outdated. Please see actual information on the [cctvcad.com web site](http://cctvcad.com)

[What is new in VideoCAD 8.2 Lite](#)^[89] (April 2016)

[What is new in VideoCAD 8.1](#)^[107] (18 May 2015)

[What is new in VideoCAD 8.0](#)^[103] (September 2014)

[What is new in VideoCAD 7.0](#)^[123] (March 2011)

[What is new in VideoCAD 6.1](#)^[132] (October 2008)

[What is new in VideoCAD 6.0](#)^[133] (October 2007)

[What is new in VideoCAD 5.0](#)^[138] (April 2006)

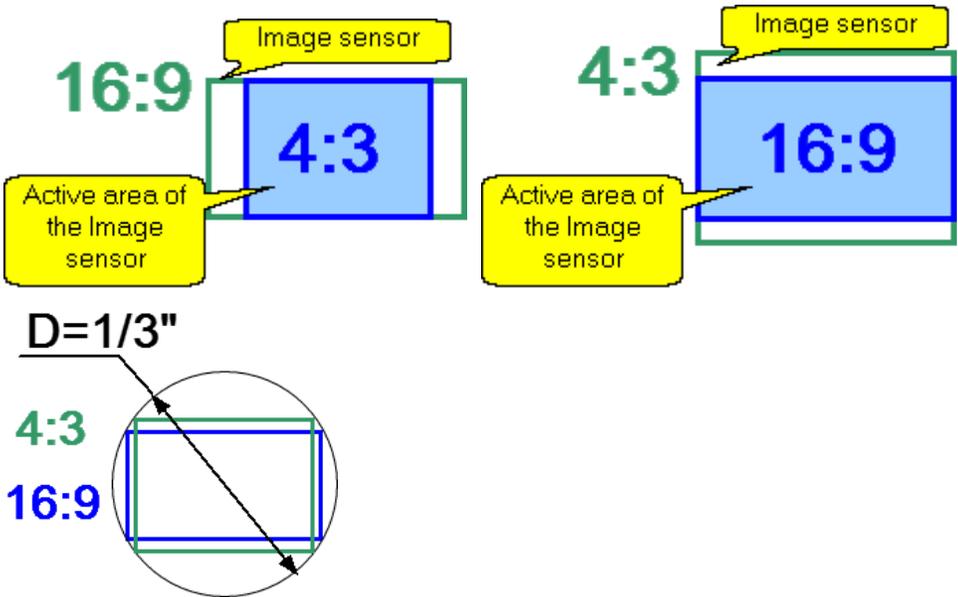
[What is new in VideoCAD 4.0](#)^[140] (April 2005)

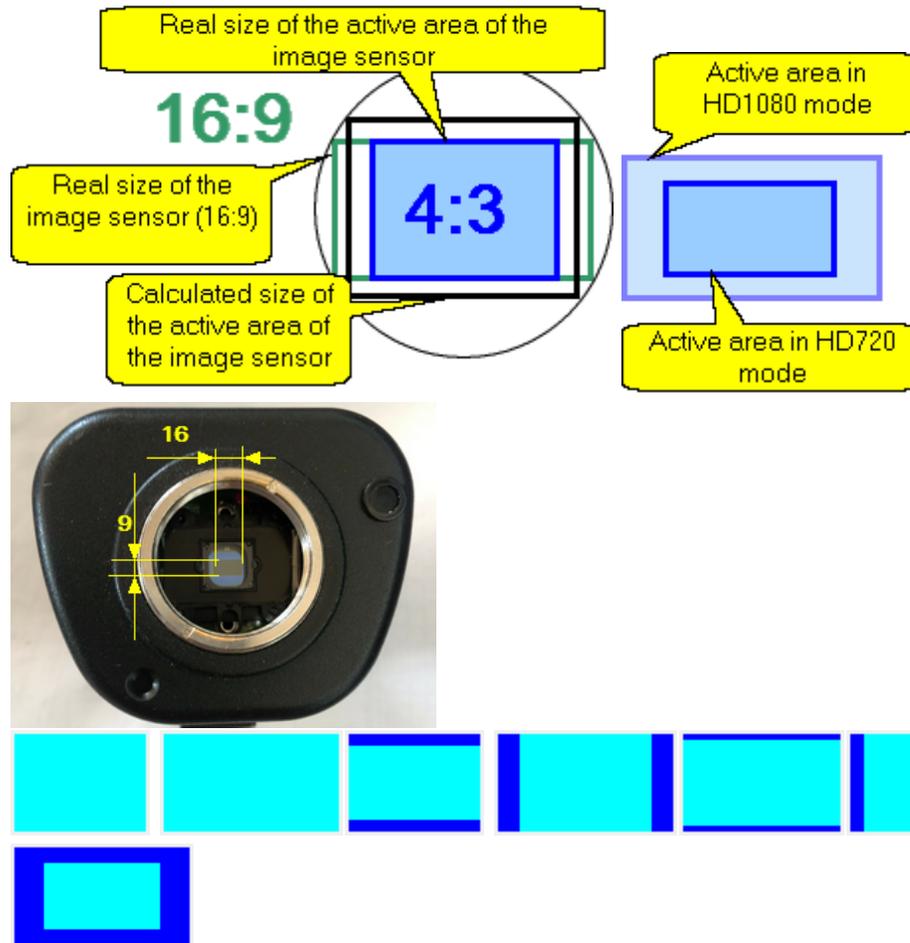
[What is new in VideoCAD 3.0](#)^[142] (June 2004)

☐ **8.L. What is new in VideoCAD 8.2 Lite**

New features of VideoCAD 8 Lite have been chosen from features, available in VideoCAD 8 Professional. In addition: The [registration rules](#)^[100] have been simplified, Functional and license restrictions of the [demo version](#)^[100] have been reduced, [Upgrade](#)^[100] from [VideoCAD Starter](#)^[49] and [VideoCAD Starter II Kit](#)^[45] to [VideoCAD Lite](#)^[31] and [VideoCAD Professional](#)^[3] has been allowed.

MORE PRECISE MODELING IMAGE SENSOR SIZES AND ASPECT RATIO OF MODERN CAMERAS





8L.1 The following parameters have been separated:

- **image sensor size** and size of active area of the image sensor;
- **aspect ratio of image sensor** and **aspect ratio of output image** of the camera.

8L.2 The **Image sensor format** box has been renamed to the [Image sensor size](#)^[255].

8L.3 New abilities to [specify the size of image sensor](#)^[267] through arbitrary sensor format (type) in inches or through the length of diagonal in millimeters, or through width and height in millimeters.

8L.4 New ability to set aspect ratio of image sensor separately from the aspect ratio of output image for a given **format in inches** or **length of diagonal** of the image sensor.

8L.5 New ability to set the [Crop factor](#)^[420] to model image sensors with active area does not touch the edges of the image sensor.

8L.6 [Detailed guide](#)^[415] of specifying the **active area size** of image sensors of modern cameras has been added.

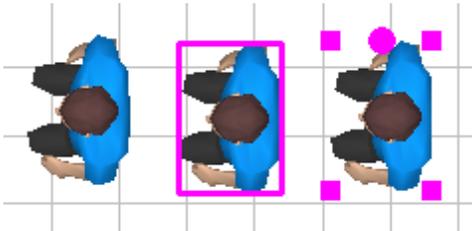
8L.7 The **Sensor and Distortion** box has been renamed to [Sensor and Lens](#)^[267]. Its interface has been changed.

8L.8 [The Image sensor calculator](#)^[349] was added.

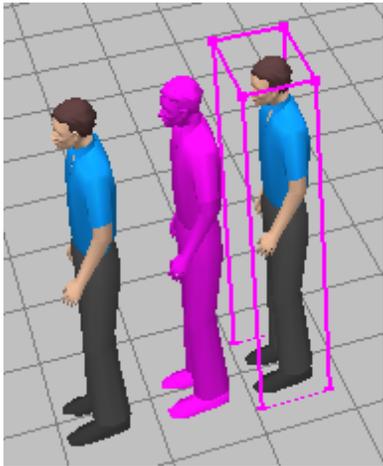
IMPROVING USABILITY OF WORKING WITH 3D MODELS AND CONSTRUCTIONS IN EDITING STATE

8L.9 Switching 3D models^[190] from the selected state^[161] to the editing state^[161] by double clicking on its projections was added (previously it was possible to switch a 3D model to the editing state only from the normal state^[160]).

8L.10 In the editing state^[161], 3D models^[190] are displayed with square grips and pink circle. You can rotate the 3D model by the mouse using the circle, scale 3D model on X and Y axis using the square grips. You can move the 3D model by pressing the left mouse button on the 3D model, as well as in the selected state.



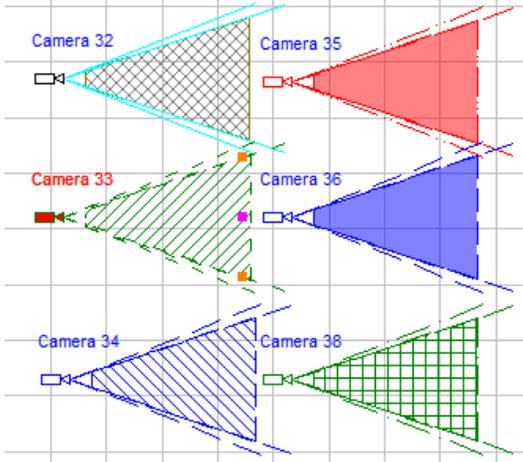
8L.11 In the 3D Video^[284] views of 3D models in editing state and in the selected state differ.



8L.12 New possibility to rotate around its axis in editing state Rectangle, Wall, Aperture in wall, Stairs, Mask, Filling, 3D Image.

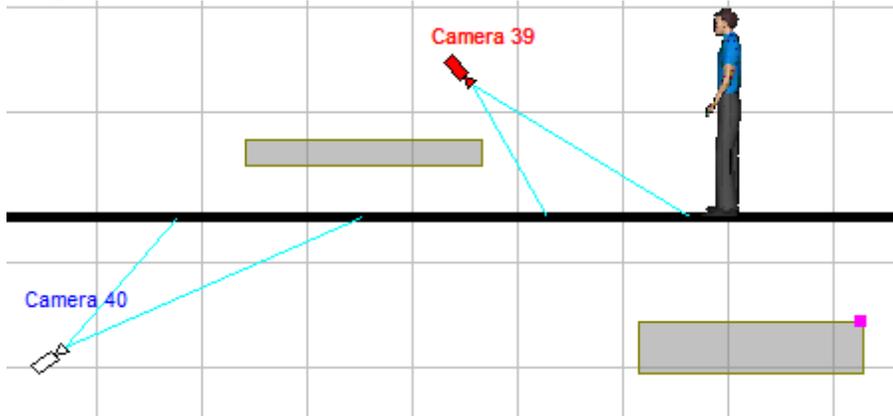
MODELING VIEW AREA AND CAMERA POSITION

8L.13 The Style of line type^[320] assigned to a camera determines not only style of lines, but hatching style of view area projection.

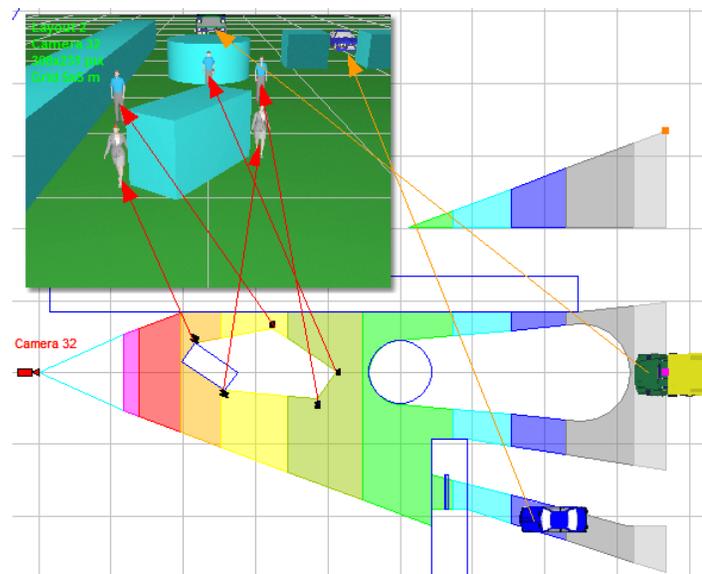


8L.14 The [Maximum distance](#)^[265] of drawing view area is added to the camera geometry parameters. This distance limits view area in 2D and 3D drawings. It is convenient in case of infinite view areas.

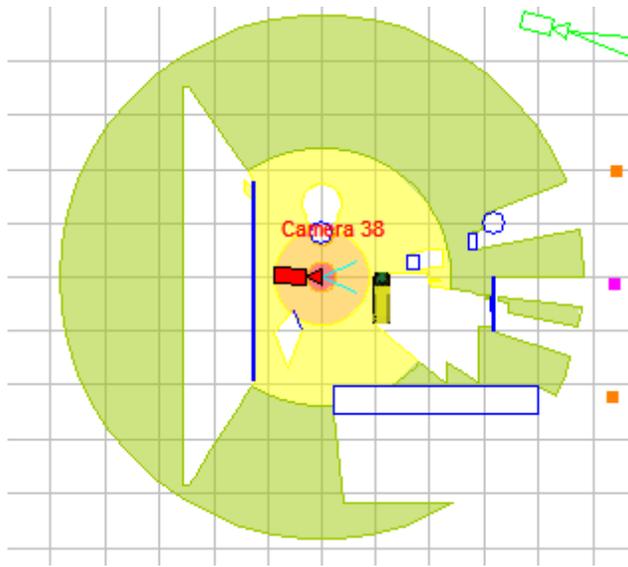
8L.15 The ground is no longer the lowest possible height limiting view area. Height of installation, heights of the lower and upper bounds of view area can be negative. A camera can see from under the ground and under the ground.



8L.16 Constructing the horizontal projection of camera control areas including [shadows](#)^[172] from obstacles on the scene. In VideoCAD Lite obstacles can be constructions only. In [VideoCAD Professional](#)^[3] 3D models also can be obstacles.

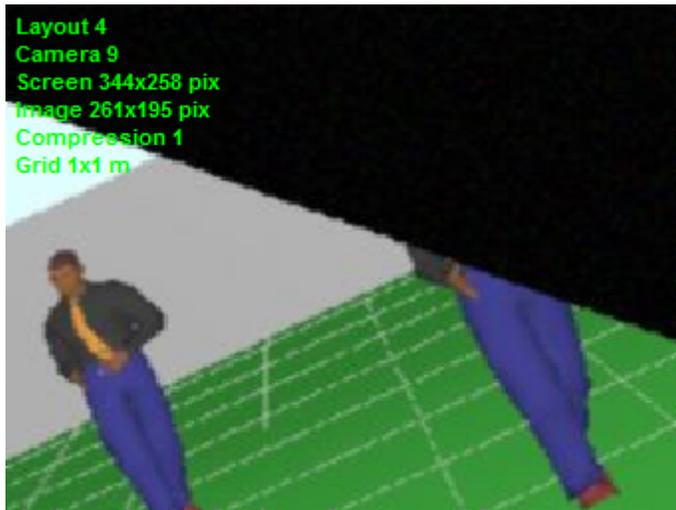


8L.17 Choosing the best positions and calculate control areas of [PTZ cameras](#)^[384], Dome cameras and 360 degree cameras.

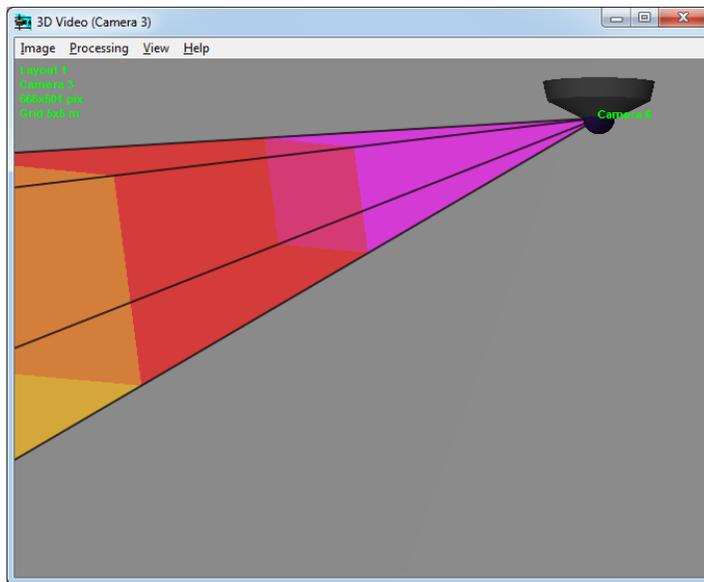


MODELING PANORAMIC CAMERAS (FISHEYE, 360°/180°)

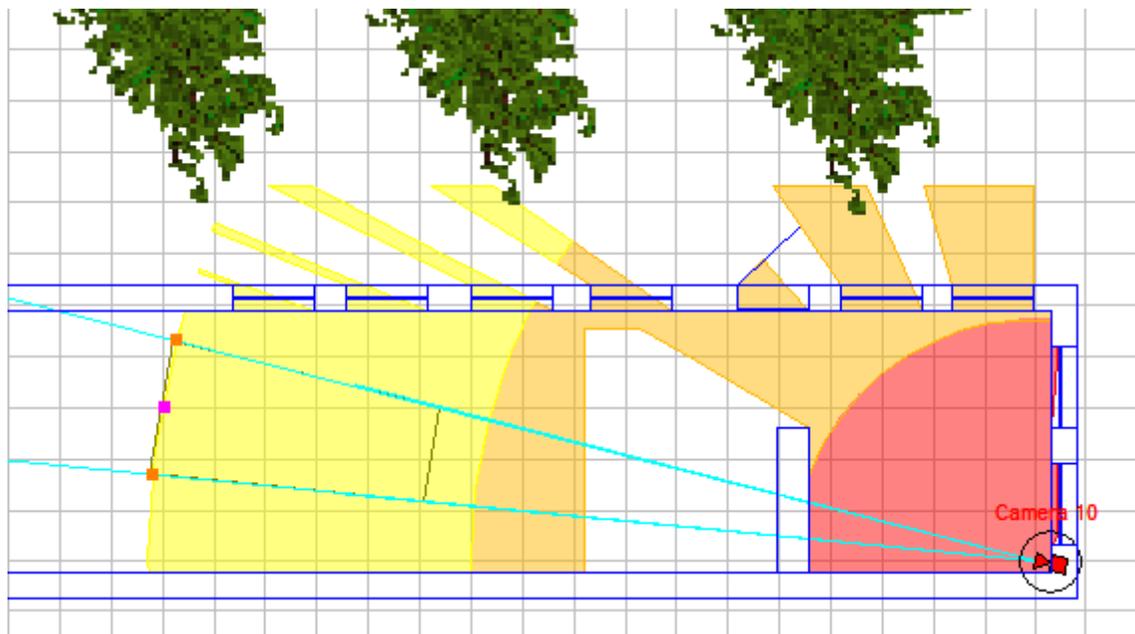
8L.18 Simulation of image resolution and view area limits of [panoramic cameras](#)^[409] in the 3D Video.



8L.19 Model spatial resolution of panoramic cameras in the 3D Video window.



8L.20 Simulation of the horizontal projection of the view area and visualization of the spatial resolution distribution of [panoramic cameras](#)^[269] in the Graphics window.



8L.21 New [icons](#)^[336] for panoramic cameras were added  and .

8L.22 In the [Sensor and Lens](#)^[267] box a new Panoramic panel was added. On the panel the Pan and Tilt angles of panoramic camera installation can be specified.

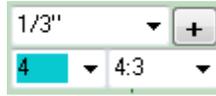


8L.23 To the list of camera [model parameters](#)^[315]: Type>Fixed, PTZ,Dome, Mini a new panoramic

item was added,

8L.24 To the list of camera model parameters: Lens>Type a new fisheye item was added,

8L.25 Lens focal length boxes in the Graphics window and the Camera geometry box are colored



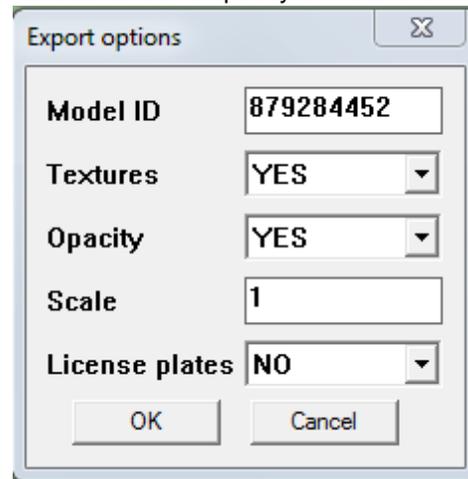
in Aqua when the active camera is panoramic.

8L.26 In [reports](#)^[345] panoramic cameras have *fisheye* word instead of lens focal length value;

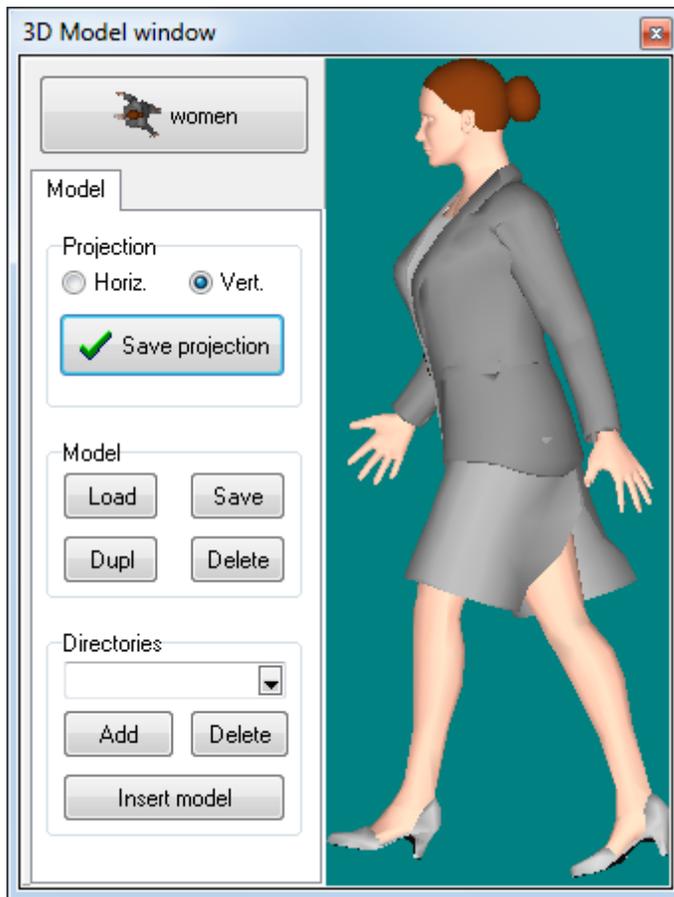
WORK WITH 3D MODELS

8L.27 Support of 3D models with textures, transparent texture and opacity of materials.

8L.28 New version of **VideoCAD Plugin for SketchUP** was released with possibilities of export textures, transparent textures, opacity of materials and scaling.



8L.29 Import of new 3D models was simplified. The special [3D models](#)^[291] window was added for creation of 3D model projections. In the window, you can create 3D model projections with specified resolution. In the 3D Models window you can [also](#)^[292] save 3D model to a file, make copy of the 3D model.



8L.30 Tools related to 3D models were moved to [special branch](#)^[229] of the main menu.

8L.31 Ability to [distribute](#)^[293] 3D models by folders in the menu.

8L.32 [Loading](#)^[237] files of 3D models via a dialog box.

8L.33 3D model file name can contain spaces.

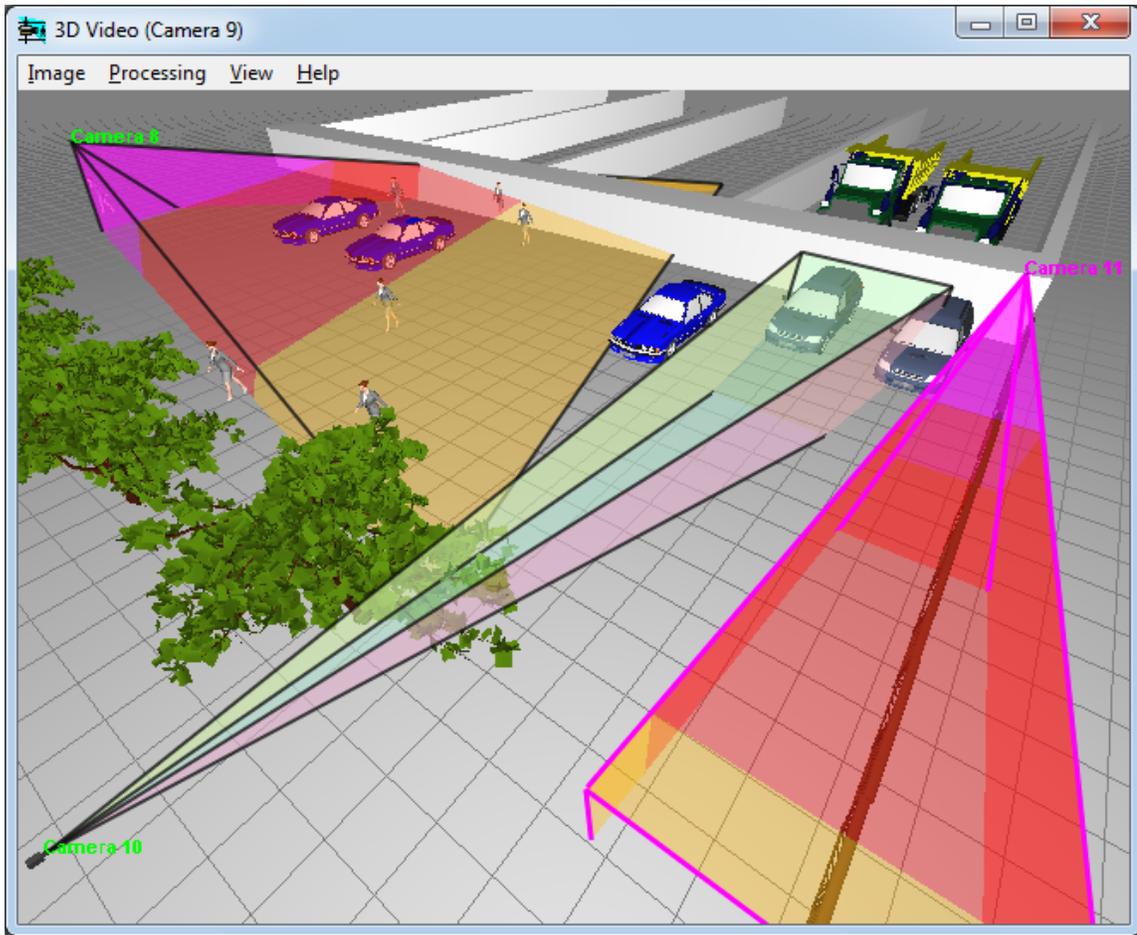
8L.34 During placing or editing 3D models, on the [Current construction parameter panel](#)^[248] the

3D Models button  appears to quick open the [3D Models window](#)^[297].

3D VIDEO WINDOW

8L.35 A window, which shows models of camera images, named **3D Window** in the past, was renamed to the [3D Video](#)^[284] window.

8L.36 3D visualization of the location plan and camera view areas in the [3D Video](#)^[284] window by other cameras. Visualization of the spatial resolution. Flexible adjustment of displaying view areas from the side.



8L.37 In the main menu of the **3D Video** window, in View submenu, a new [3D view areas](#)^[288] item was added. It allows to enable visualization of view areas of other cameras.

8L.38 In the main menu of the **3D Video** window, in **View** submenu, a duplicating [Ground](#)^[288] item was added for quick hiding the ground surface in the **3D Video** window.

8L.39 In the main menu of the **3D Video** window, in Image submenu, a new [Copy to clipboard](#)^[286] item was added.

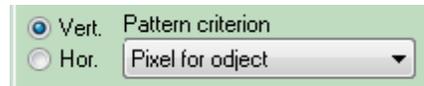
8L.40 In the PTZH mode a camera is panned and tilted by moving mouse cursor on the image with left mouse button pressed..

8L.41 Background representation in the 3D Video window was improved.

8L.42 Ability to [switch](#)^[326] image generation thread: in separated thread or in the main thread.

SPATIAL RESOLUTION

8L.43 Ability to specify spatial resolution in spatial resolution patterns not only vertically but also horizontally. To do this, a new [switch](#)^[275] to the Spatial resolution box was added.



8L.44 Numbers of pixels horizontally and vertically can be specified.

8L.45 Additional [Spatial resolution patterns](#)^[274] were added based on the Standards:

- Australian Standard AS4806: Closed Circuit Television;
- European Standard EN50132-7;
- ISO/IEC 19794 Biometric data interchange formats.

8L.46 As a result of right-click on the [Pattern](#)^[274] combo box a pop up menu will appear. Selecting the **Default patterns** item, you can erase all changes in the patterns and return to the patterns set by default.

8L.47 To the [Spatial resolution box](#)^[278] new test images were added.



IMPORT AND EXPORT TO AUTOCAD

8L.48 Import module was upgraded. Up to AutoCAD **DWG 2015** formats are supported.

8L.49 The dialog box **Scale background** was renamed to the [Adjust background](#)^[205]. For backgrounds in DWG or DXF formats, abilities to choose Layout in the background, control visibility of layers, hide texts were added. For backgrounds in PDF format you can choose page and resolution of the background.

8L.50 [Export module](#)^[329] was updated.

IMPORT AND EXPORT TO OTHER FORMATS

8L.51 Supporting PDF files to use as [background](#)^[204] including multi-page PDF files.

8L.52 [Export](#)^[202] to PDF (raster).

8L.53 [Export](#)^[329] tab in the **Options box** is divided into two sub-tabs: "DXF" and "BMP,WMF, EMF,GIF, TIFF, PNG, JPG, rPDF".

8L.54 To the options of export to BMP, JPG, EMF, WMF, GIF, TIFF, PNG, rPDF possibility to set [hatch step factor](#)^[330] was added.

8L.55 In the [3D Image](#)^[191] you can load images in BMP, JPG, PNG, GIF TIF (early BMP and JPG). Transparency of PNG files is supported.

8L.56 New [PDF report](#)^[200] was added. Unlike the [Text report](#)^[200], the **PDF Report** can include images from the cameras, fragments of layouts with camera placed, a cover with logo. Report parameters and the structure of information in the report is configurable. See [example of PDF report](#).

PRINTING

8L.57 New mode [Use buffer](#)^[334] was added. Using this mode, you can get the correct results and print transparent gradient fills, projections of 3D models even on printers do not support these tools, including most of free virtual printer to print to PDF.

8L.58 New mode [Scale Hatching](#)^[333] was added. Using this mode, you can get the correct hatching even on printers do not support scaling hatching.

8L.59 Menu item [Print setup](#)^[207] remains enabled even VideoCAD can not get access to the current printer.

DATABASE OF CAMERA MODELS

8L.60 Maintain [database of camera models](#)^[304] with the most important parameters (22 fields for each camera model). You can add your models, assign different models to cameras in project, compare models with each other.

Producer	Model Name	Key Feature	Type	Image sensor			Lens						Power supply			Provider	Cost			
				Fixed, PTZ, Dome, Mini	Size	Number of pixels		Aspect ratio	Type	Focal length		Angles of view (deg.)						Voltage (V)	Consumption	
						Horiz.	Vert.			Min. (mm)	Max. (mm)	Max.	Min.	Max.	Min.				Power (watt)	Current (A)
AVOS	M1033-W	mini	1/4"	800	600	4:3	standard	2.8	2.8	65.5	65.5	51.5	51.5	5	6.5	1.3				
AVOS	M1034-W	mini	1/4"	1280	800	16:10	standard	2.8	2.8	65.5	65.5	43.8	43.8	5	6.5	1.3				
AVOS	M1054	mini	1/4"	1280	800	16:10	standard	2.8	2.8	65.5	65.5	43.8	43.8	5	6.5	1.3				
AVOS	M1025	mini	1/2.7"	1520	1080	16:9	standard	3.6	3.6	73.4	73.4	45.5	45.5	5	2.4	0.48				
AVOS	M1004-W	mini	1/4"	1280	800	16:10	standard	2.8	2.8	65.5	65.5	43.8	43.8	5	6.5	1.3				
AVOS	M1013	mini	1/4"	800	600	4:3	standard	2.8	2.8	65.5	65.5	51.5	51.5	5	6.5	1.3				
AVOS	M1014	mini	1/4"	1280	800	16:10	standard	2.8	2.8	65.5	65.5	43.8	43.8	5	6.5	1.3				

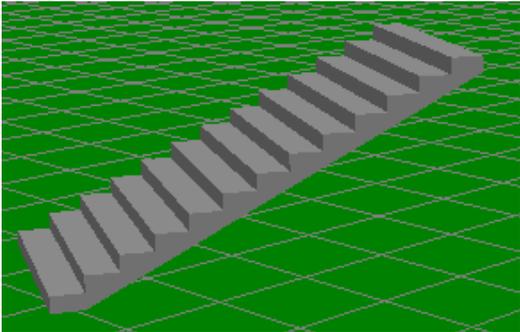
MISCELLANEOUS

8L.61 Ability to change the minimum and maximum heights of several objects at once through changing their line type. If during changing the line type of selected objects by the [Change line type](#)^[237] tool, to press and hold **Ctrl**, then the selected objects will also change their minimum and maximum height according to the chosen line type . If **Ctrl** is not pressed, the heights remain unchanged.

8L.62 [Autosaving](#)^[334] the project in specified intervals during running the program in a chain of files (up to 100 copies of the project are saved and rewritten in the regular intervals around the ring).

8L.63 Image update with lots of rotated projections of the 3D models was accelerated.

8L.64 New construction - [Stairs](#)^[226].



8L.65 Added a possibility to draw [legends](#)^[276] of Spatial resolution patterns on the layouts.

Home Office Scientific Development Branch 2009
 ■ Monitor and Control (20pix/obj)
 ■ Detect (39pix/obj)
 ■ Observe (100pix/obj)
 ■ Recognise (200pix/obj)
 ■ Identify (400pix/obj)
 vertical; Hobj=1.64 m; Hmeas=AUTO

8L.66 New tool [Merge contour](#)^[237] was added.

8L.67 New possibility to adjust transparency of [filling view area projections](#)^[169] in the Graphics window.

8L.68 A mode to improve visibility of [thin lines](#)^[334] at scaling background in BMP, JPG, PDF formats.

8L.69 The cursor coordinates in the lower left corner of the **Graphics window** are displayed rounded to the second decimal place .

8L.70 The [Export to Text](#)^[200] menu item was renamed to **Text report**.

8L.71 In the [Text report](#)^[200] for each camera additional lines were added: layer, the base height , angle of rotation around its axis, number of pixels.

8L.72 Child windows "sticks" to the screen edges.

8L.73 An option of [changing registration code](#)^[241] via the Main menu was added.

8L.74 Titles of the 3D video window includes camera resolution in pixels.

8L.75 Detected bugs were fixed.

8L.76 The Help system was updated.

8L.77 [Examples of work with VideoCAD](#)^[353] in the Help were updated according to the new features. Several new examples were added.

8L.78 Project format of VideoCAD7 - *.vc7 is supported. There are possibilities of [export](#)^[199] and [import](#)^[199] of the previous project format *.vmp, supported by versions from 4 to 6.

8L.79 The program was tested under Windows 8 and Windows 10.

SIMPLIFYING REGISTRATION RULE

8L.80 *VideoCAD 8 Lite is registered only by personal registration code as well as VideoCAD Starter. This code doesn't depend on computer hardware or a dongle. This code is valid on any computer.*

8L.81 One license of VideoCAD 8 Lite, purchased separately, allows the use of the program on two workplaces nonsimultaneously: work and home computers if both workplaces belong to one person.

CHANGING DEMO VERSION RESTRICTIONS

8L.82 In the demo version of VideoCAD 8 Lite changing lens focal length and image sensor is now allowed. Instead of this, saving working project to a file is prohibited and a limit on the maximum number of cameras (5) in one project is added.

8L.83 Licenses of **VideoCAD 8 Professional** and **VideoCAD 8 Lite** allows free use of the **demo versions** for educational purposes, for research, theses, writing articles, etc. non-profit activities.

RULES OF UPGRADE

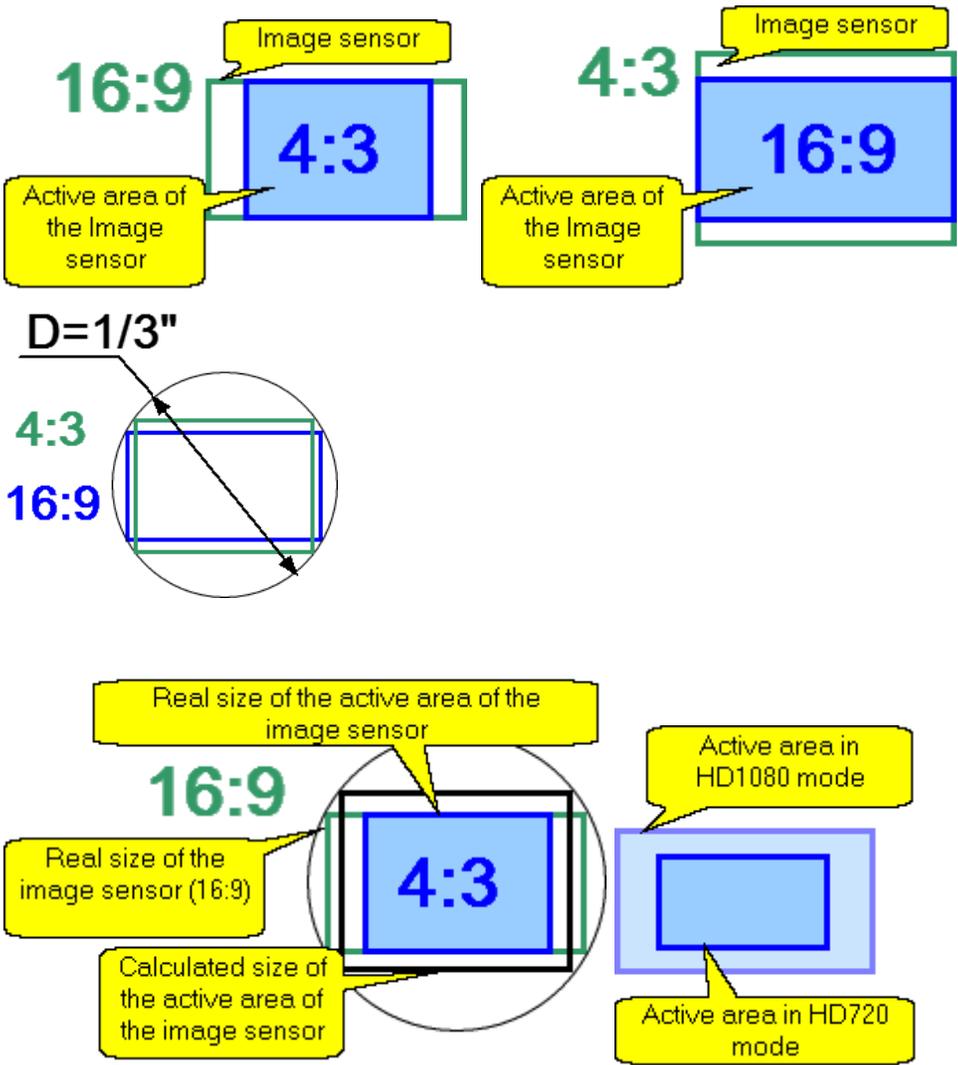
8L.84 The Rules of upgrade from previous VideoCAD versions to VideoCAD 8 Lite:

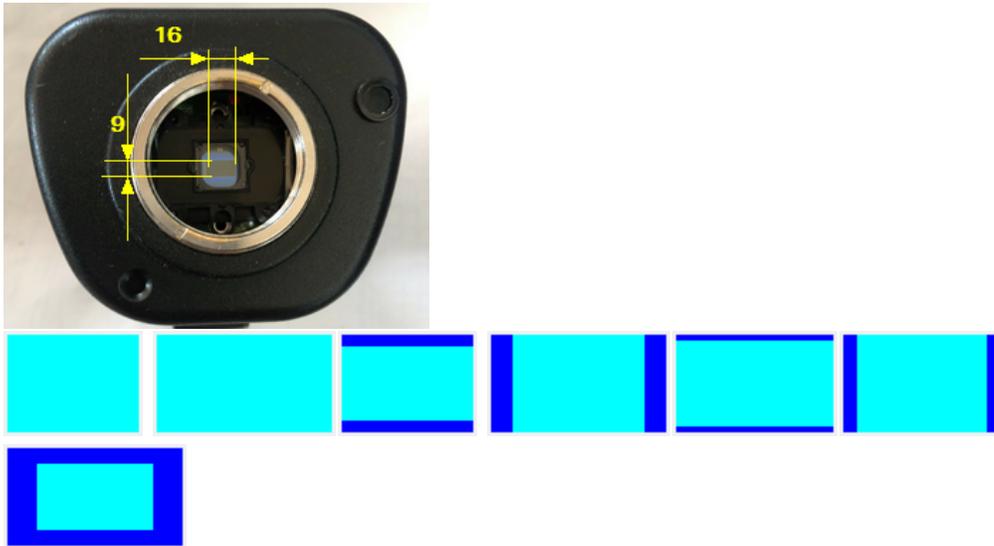
- For the customers who have purchased VideoCAD Lite (or upgraded to VideoCAD Lite) after **01 January 2016** upgrade to VideoCAD 8 Lite is free.

- For the customers who have purchased VideoCAD Lite (or upgraded to VideoCAD Lite) before **01 January 2016** updating cost makes half of the VideoCAD 8 Lite cost.
- For the customers who has VideoCAD3..VideoCAD6 and didn't upgrade to VideoCAD 7 Lite, updating cost makes 3/4 of VideoCAD 8 Lite cost.
- For the customers, whose original valuable suggestions have found application in VideoCAD 8.0, the additional discount for upgrade is given.
- Upgrade of **VideoCAD plugin for SketchUP** is free with upgrade to VideoCAD 8 Lite.

8.1. What is new in VideoCAD 8.1

MODELING IMAGE SENSOR SIZES AND ASPECT RATIO OF MODERN CAMERAS





8.1.1 The following parameters have been separated:

- **image sensor size** and size of active area of the image sensor;
- **aspect ratio of image sensor** and **aspect ratio of output image** of the camera.

8.1.2 The **Image sensor format** box has been renamed to the [Image sensor size](#)^[255].

8.1.3 New abilities to [specify the size of image sensor](#)^[267] through arbitrary sensor format (type) in inches or through the length of diagonal in millimeters, or through width and height in millimeters.

8.1.4 New ability to set aspect ratio of image sensor separately from the aspect ratio of output image for a given **format in inches** or **length of diagonal** of the image sensor.

8.1.5 New ability to set the [Crop factor](#)^[420] to model image sensors with active area does not touch the edges of the image sensor.

8.1.6 [Detailed guide](#)^[415] of specifying the **active area size** of image sensors of modern cameras has been added.

8.1.7 The **Sensor and Distortion** box has been renamed to [Sensor and Lens](#)^[267]. Its interface has been changed.

8.1.8 [The Image sensor calculator](#)^[349] was added.

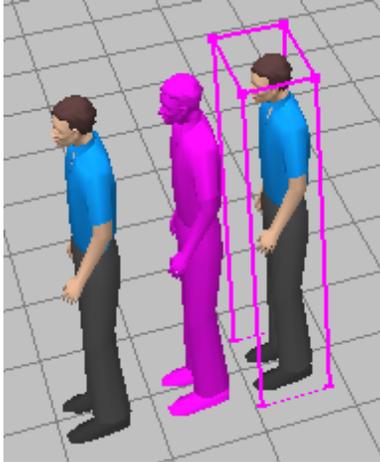
IMPROVING USABILITY OF WORKING WITH 3D MODELS AND CONSTRUCTIONS IN EDITING STATE

8.1.9 Switching [3D models](#)^[190] from the [selected state](#)^[161] to the [editing state](#)^[161] by double clicking on its projections was added (previously it was possible to switch a 3D model to the editing state only from the [normal state](#)^[160]).

8.1.10 In the [editing state](#)^[161], [3D models](#)^[190] are displayed with square grips and pink circle. You can rotate the 3D model by the mouse using the circle, scale 3D model on X and Y axis using the square grips. You can move the 3D model by pressing the left mouse button on the 3D model, as well as in the selected state.



8.1.11 In the 3D World and [3D Video](#)^[284] views of 3D models in editing state and in the selected state differ.



8.1.12 New possibility to rotate around its axis in editing state Rectangle, Wall, Aperture in wall, Stairs, Mask, Filling, 3D Image.

OTHER

8.1.13 Import and export modules of AutoCAD were upgraded. Some improvements were added.

8.1.14 An inaccuracy of [snap](#)^[194] operation during construction of walls and aperture in wall has been fixed.

8.1.15 New tool [Merge contour](#)^[237].

8.1.16 Printing on some virtual PDF printers has been improved.

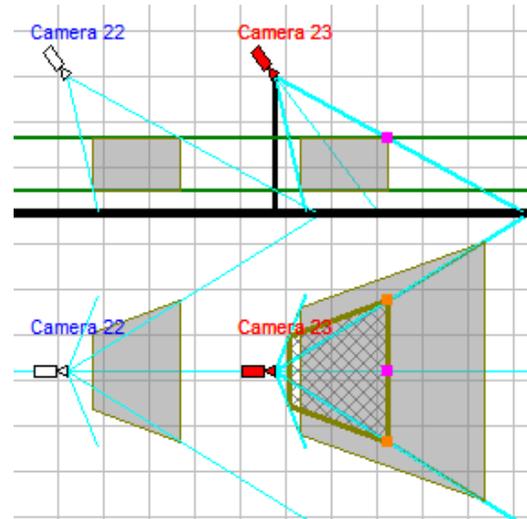
RULES OF UPGRADE

8.1.17 Upgrade from VideoCAD 8.0 is offered free-of-charge. Upgrade from earlier versions is performed according to [rules](#)^[89] of upgrade up to VideoCAD 8.0

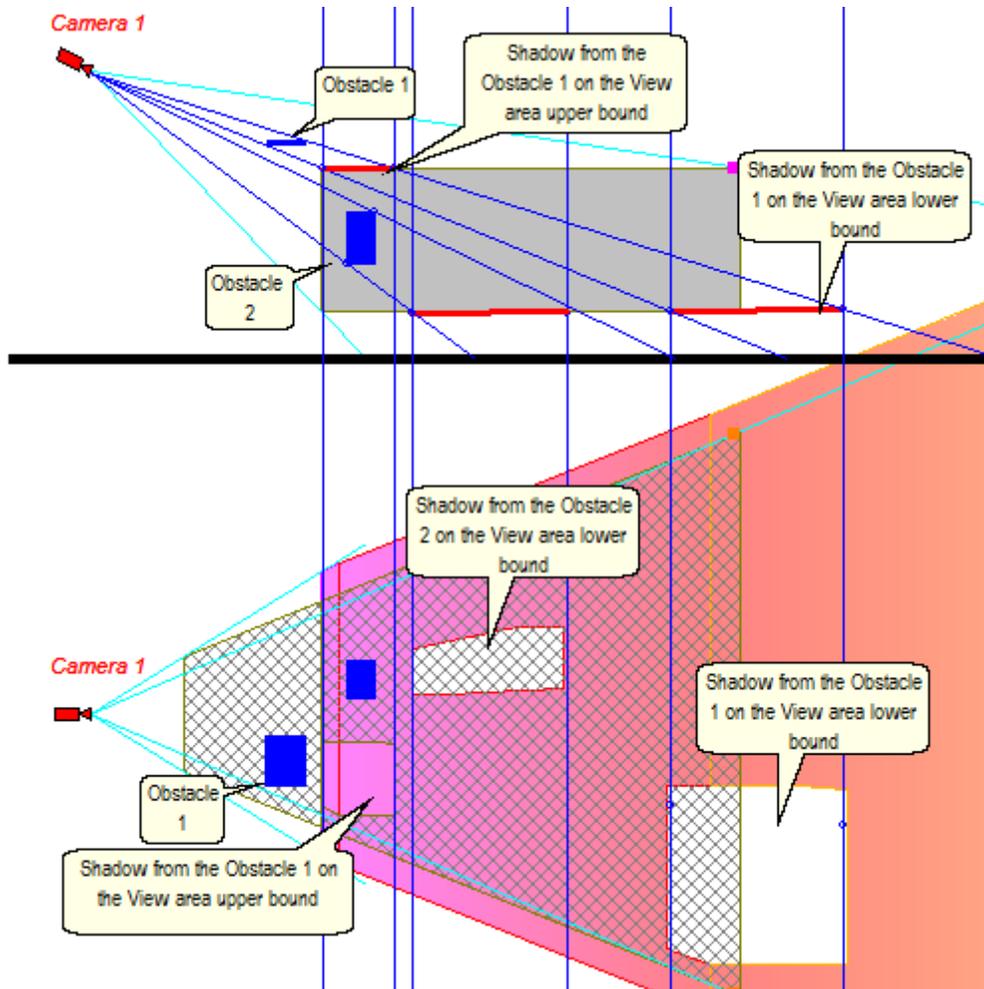
8. What is new in VideoCAD 8.0

MODELING VIEW AREA AND CAMERA POSITION

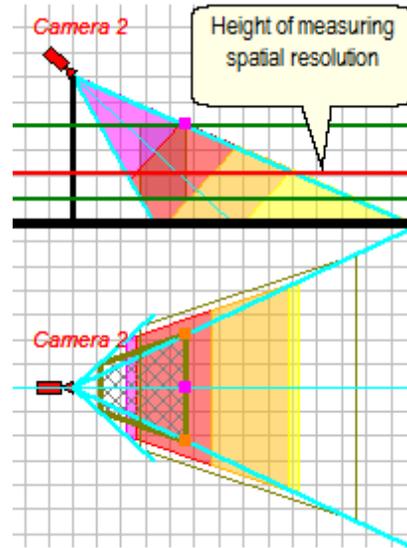
8.1 Ability to display horizontal projection of the view area [as two sections](#)^[169] by planes on the minimum and maximum heights of the view area (Camera 23). One of the sections is drawn by a transparent filling, the other in the form of hatching. In many camera positions such representation is more informative than standard volume projection (Camera 22).



8.2 When the projection of the view area is displayed as [two sections](#)^[173] by horizontal planes located at height of [lower](#)^[259] and [upper](#)^[258] bounds, the shading from obstacles appears as shadows from objects on these planes.



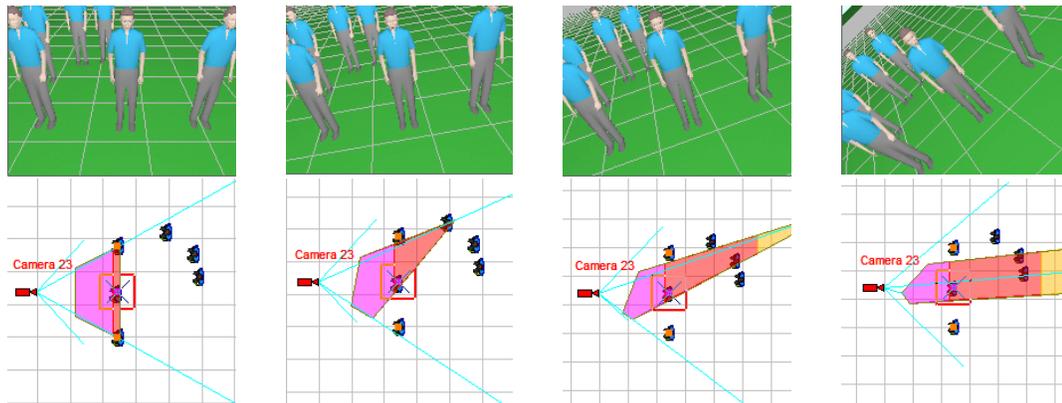
8.3 When visualizing spatial resolution with two levels, lower section is not at the view area lower bound but at the [height of measuring spatial resolution](#)^[275], determined in the [spatial resolution pattern](#)^[274] assigned to the camera. Spatial resolution is rendered on this level.



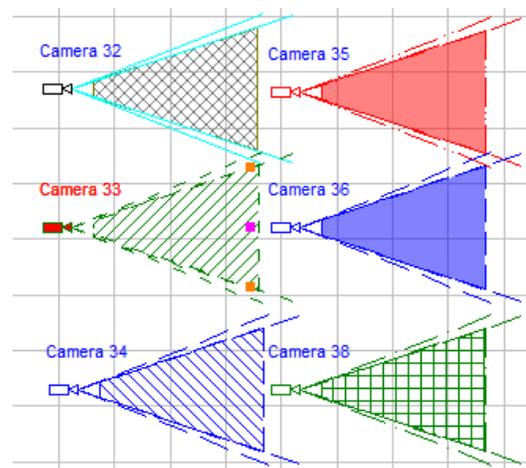
8.4 If the [height](#)^[275] of measuring spatial resolution is set to AUTO, then:

- if the [view area projection bounds](#)^[168] is set to **2 Levels**, the height of measuring spatial resolution is set at the [view area lower bound](#)^[259];
- if the **view area projection bounds** is set to **Projection**, the height of measuring spatial resolution is set at the halfway between the lower and [upper](#)^[258] bounds of the view area (as in previous versions).

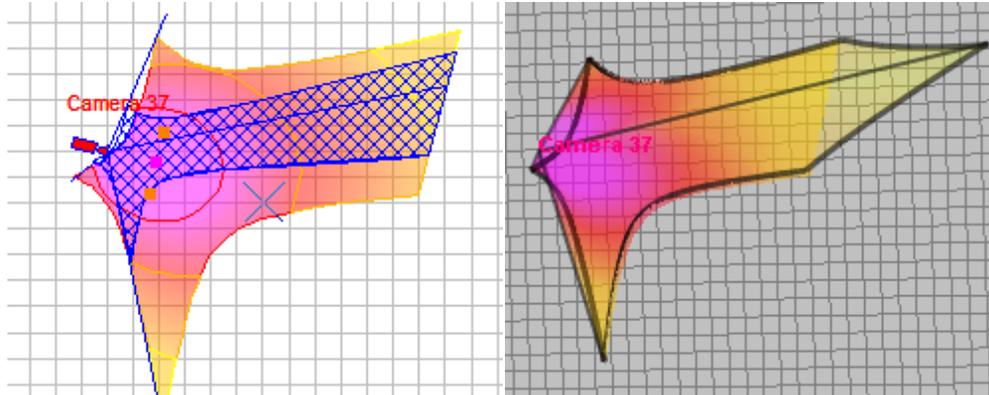
8.5 Simulation of camera [rotation](#)^[255] around the main optical axis. Even a slight turn significantly changes the view area projection.



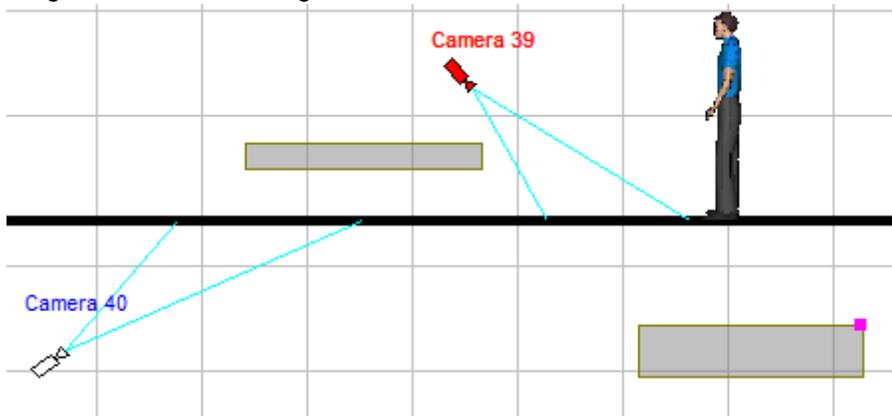
8.6 The Style of [line type](#)^[320] assigned to a camera determines not only style of lines, but hatching style of view area projection.



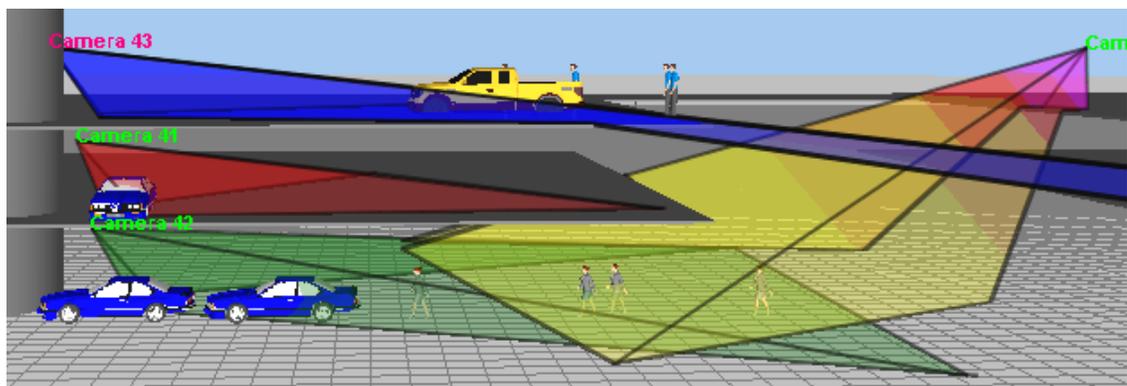
8.7 The Maximum distance^[255] of drawing view area is added to the camera geometry parameters. This distance limits view area in 2D and 3D drawings. It is convenient in case of infinite view areas.



8.8 The ground is no longer the lowest possible height limiting view area. Height of installation, heights of the lower and upper bounds of view area can be negative. A camera can see from under the ground and under the ground.



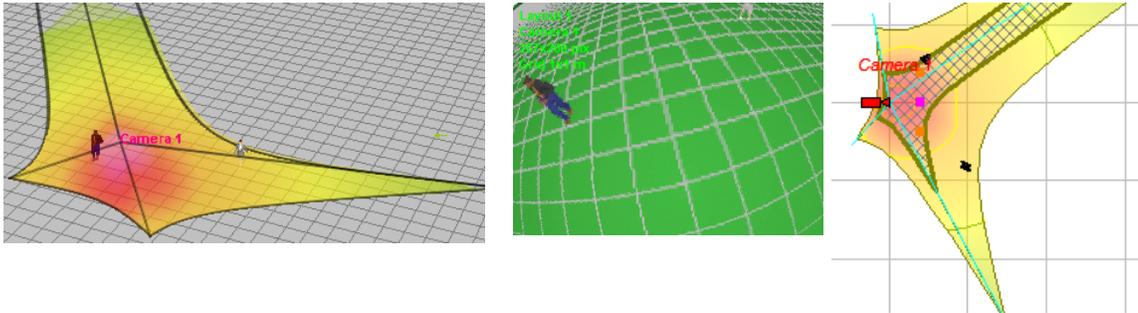
8.9 The Base height^[255] is added to the camera geometry parameters. All heights related to a camera (height of installation, heights of the lower and upper bounds of view area, heights of person detection, identification, license plate reading areas) counted from the base height. The Base height together with layers is used in work with multilevel 3D constructions.



MODELING LENS DISTORTION

8.10 Simulating [lens distortion](#)^[429]. Distortion is especially pronounced in the short-focus lenses and may lead to significant deviation of form of view area of real cameras from regular pyramid.

8.11 Modeling the influence of lens distortion on a 3D image model (pincushion and barrel distortion), the shape of the view area and its projections, on the distribution of spatial resolution.



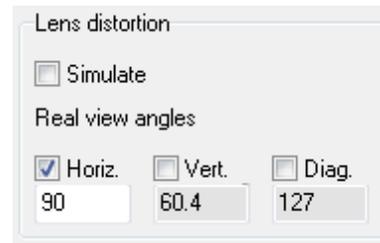
8.12 Correct modeling wide-angle lenses with strong distortion.

8.13 The **Special sensor size** box was renamed to the [Sensor and Distortion](#)^[267].

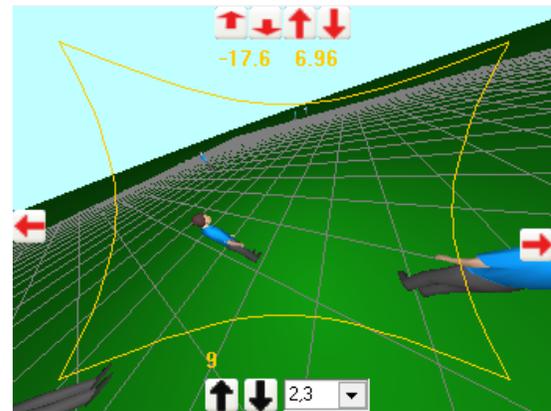
8.14 The order of calculation in the **Sensor and distortion** box was changed. You can enter any image sensor size, then from it the calculated view angles and the aspect ratio are calculated.

8.15 To the **Sensor and distortion** box a box with a calculated diagonal angle was added..

8.16 To the the **Sensors and distortion** box new [Distortion](#)^[267] panel was added. On the panel you can specify Real view angles from the camera and lens specifications. Distortion is calculated from the ratio between the calculated and real angles.



8.17 In the [PTZH](#)^[237] mode, FOV frame is drawn taking into account lens distortion.

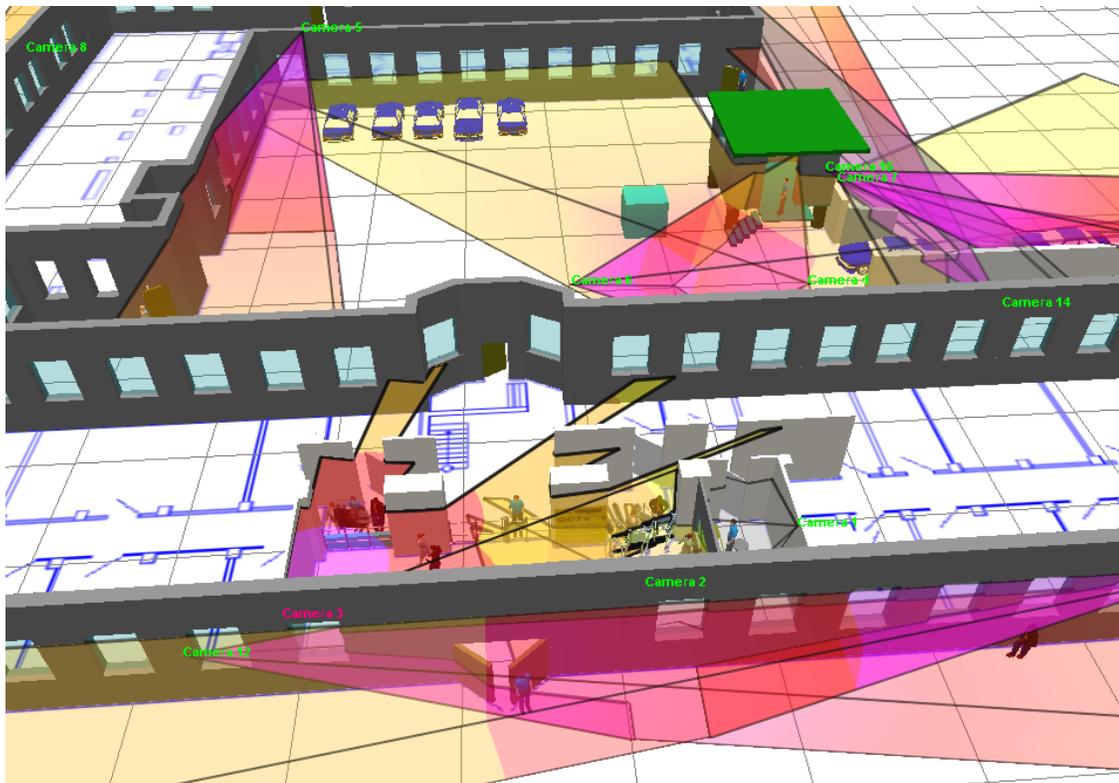
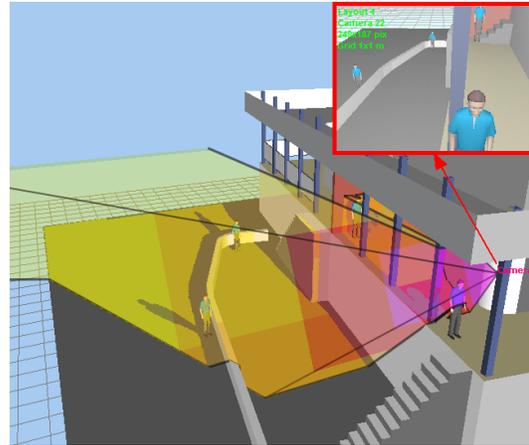
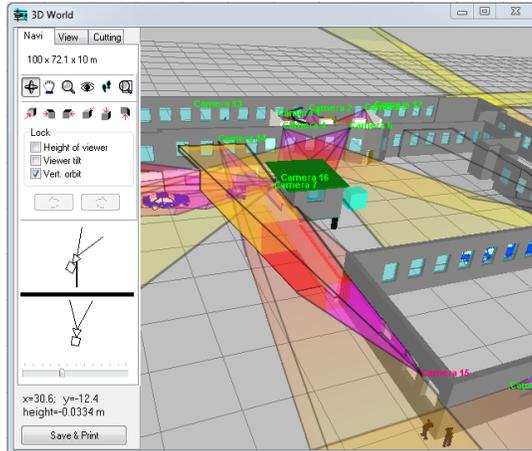


8.18 The following **camera model parameters** were added: [Distortion>ON](#)^[316], horizontal, vertical, diagonal [real angles](#)^[316].

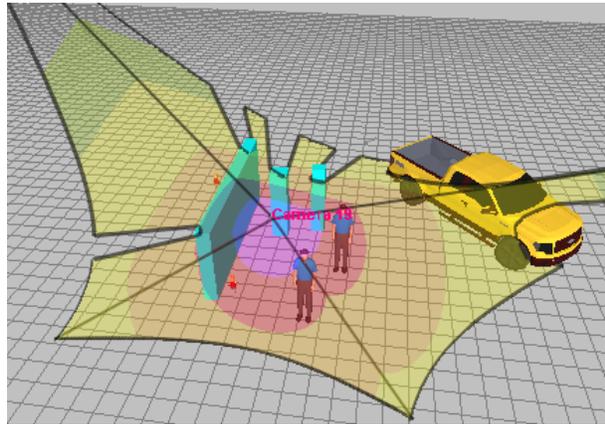
8.19 Using PiP and [Real frame size](#)^[286] for simulating real camera number of pixels with distortion.

3D WORLD WINDOW

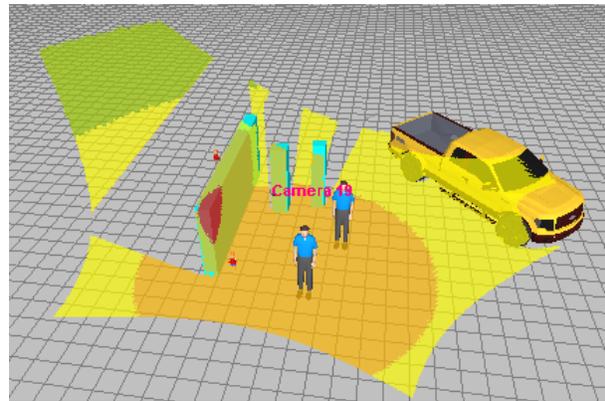
8.20 New 3D World window with 3D navigation. There are the main tools for 3D navigation (**Orbit, Move, ZOOM, Walk, Look around, Zoom frame**). In the window you can observe the layout in 3D representation. You can work on the project in usual 2D projections and watch it in 3D. You can "walk" on the floors of 3D models of buildings and study every detail.



8.21 3D visualization of the camera view area surface taking into account spatial resolution, shadows, lens distortion.



8.22 3D visualization of the active camera coverage on the environment taking into account spatial resolution, shadows, lens distortion.

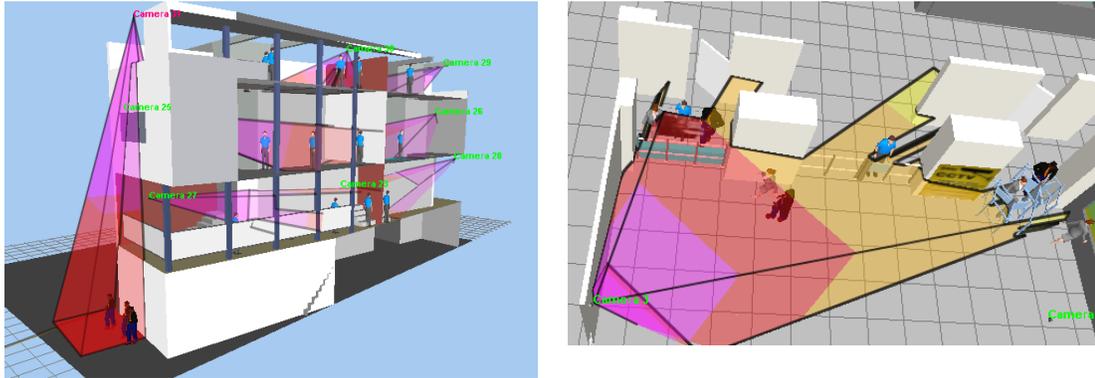


8.23 3D visualization of control areas of [PTZ cameras](#)^[384], Dome cameras and 360 degree cameras.



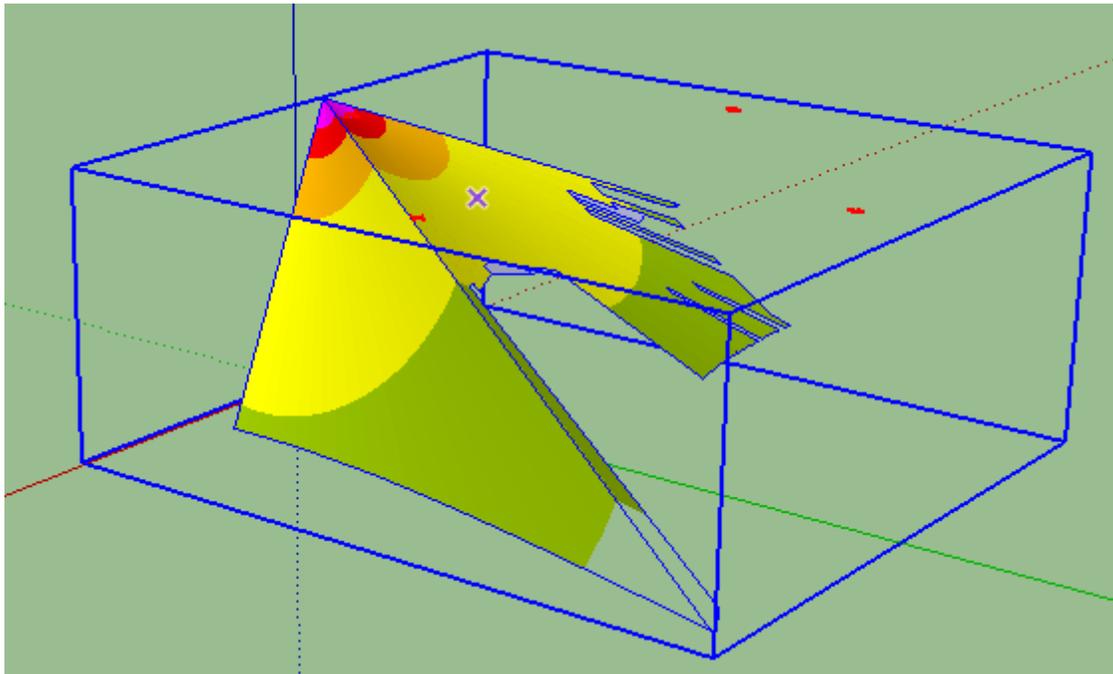
8.24 Free cutting 3D layout by six planes to provide access to any point of complicated 3D

buildings.



8.25 Export images from the 3D World window to any of the following formats: *.bmp, *.jpg, *.gif, *.tif, *.png. Size in pixels of the exported file can exceed the Windows screen size.

8.26 3D camera view area and camera coverage constructed in the **3D World** taking into account distortion, spatial resolution and shading can be exported to a DXF file for insertion into a 3D project processed in another 3D program. This important feature makes possible to use VideoCAD to build 3D models of the view areas for designers working with any 3D design software that support import DXF files, including [SketchUP](#)^[400].

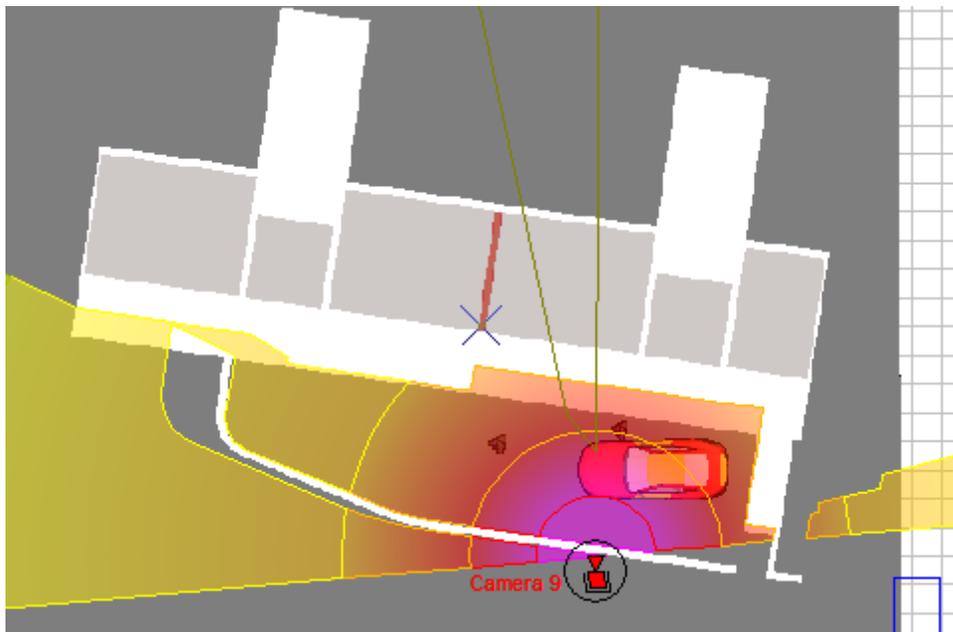


MODELING PANORAMIC CAMERAS (FISHEYE, 360°/180°)

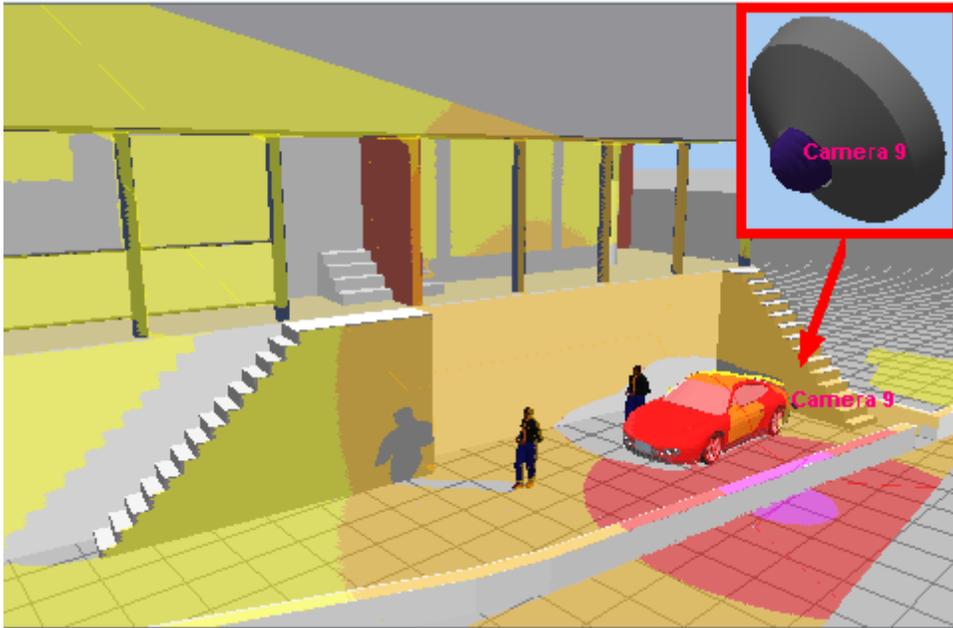
8.27 Simulation of image resolution and view area limits of [panoramic cameras](#)^[409] in the 3D Video.



8.28 Simulation of the horizontal projection of the view area and visualization of the spatial resolution distribution of [panoramic cameras](#)^[269] in the Graphics window.



8.28 Visualization of camera coverage area and spatial resolution distribution of [panoramic cameras](#)^[409] on the surrounding objects in the 3D World window.



8.30 New icons^[336] for panoramic cameras were added  and .

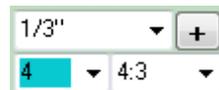
8.31 In the [Sensor and Distortion](#)^[267] box a new Panoramic panel was added. On the panel the Pan and Tilt angles of panoramic camera installation can be specified.



8.32 To the list of camera [model parameters](#)^[315]: Type>Fixed, PTZ,Dome, Mini a new panoramic item was added,

8.33 To the list of camera model parameters: Lens>Type a new fisheye item was added,

8.34 Lens focal length boxes in the Graphics window and the Camera geometry box are colored



in Aqua when the active camera is panoramic.

8.35 In [reports](#)^[345] panoramic cameras have *fisheye* word instead of lens focal length value;

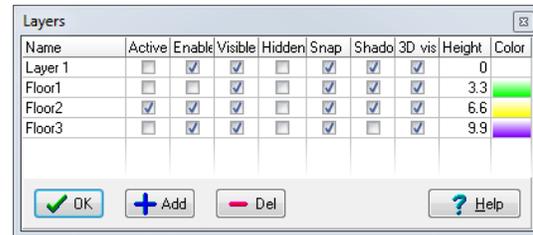
LAYERS

8.36 Constructions, 3D models and cameras can be distributed by layers.

8.37 Each layer can have its own Base height. All constructions belong to the layer will be shifted in 3D by the Base height. This feature is useful in work with multilevel 3D constructions.

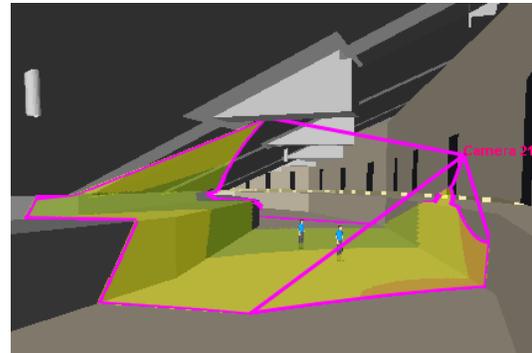
8.38 In addition to the Base height, each layer has the following parameters: Active, Enabled, Visible, Hidden, Snap, Shadows, 3D Visible, Color.

8.39 To the main and pop-up menus of the Graphics window the [Move to Active layer](#)^[199] item was added to move constructions and cameras between layers.

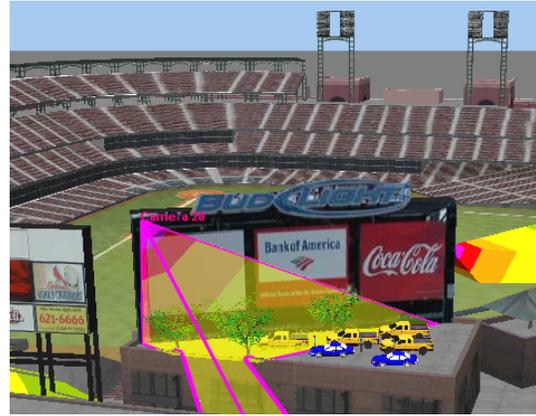


WORK WITH 3D MODELS

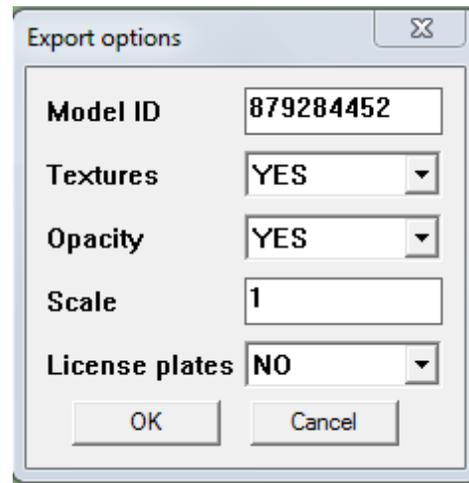
8.40 Possibility of using [3D models-territories](#)^[398], to place inside them cameras, constructions and other 3D models.



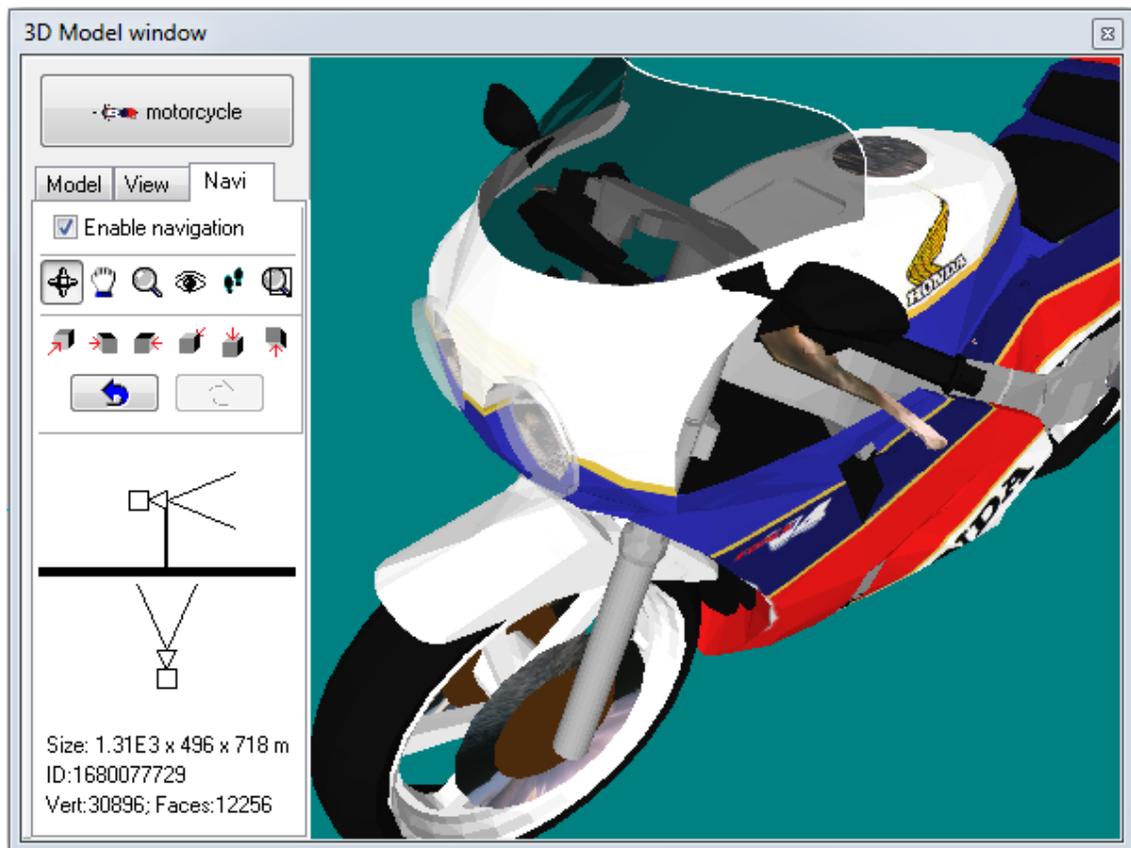
8.41 Support of 3D models with textures, transparent texture and opacity of materials.



8.42 New version of **VideoCAD Plugin for SketchUP** was released with possibilities of export textures, transparent textures, opacity of materials and scaling.



8.43 Import of new 3D models was simplified. The special [3D models](#) window was added for creation of 3D model projections. In the window, you can create 3D model projections with specified resolution, brightness, create projection in the form of faces, points and lines.



8.44 Ability to make projections in the form of sections of 3D models at the specified range of heights. These projections of 3D models of buildings can be used as background for placing cameras in the Graphics window.

8.45 Ability to create 3D model projections with exceeding Windows screen resolution.

8.46 Possibility to create a projection of individual area of 3D model with even higher resolution using PiP (Picture in Picture) tool.

8.47 To use the 3D models as territories, and their projections as a background, a new ability to block the projection of certain 3D models from selection by mouse click was added.

8.48 Ability to consider a 3D model as obstacle in the calculation of shadows.

8.49 In the 3D Models window you can [also](#)^[292]: save 3D model to a file, make copy of a 3D model, earn 3D models using 3D interface similar to the 3D World window.

8.50 Tools related to 3D models were moved to [special branch](#)^[229] of the main menu.

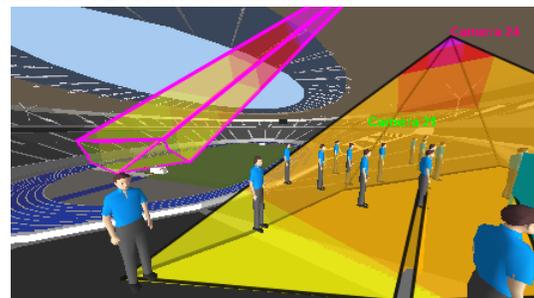
8.51 Ability to [distribute](#)^[293] 3D models by folders in the menu.

8.52 [Loading](#)^[237] files of 3D models via a dialog box.

8.53 3D model file name can contain spaces.

8.54 During placing or editing 3D models, on the [Current construction parameter panel](#)^[248]

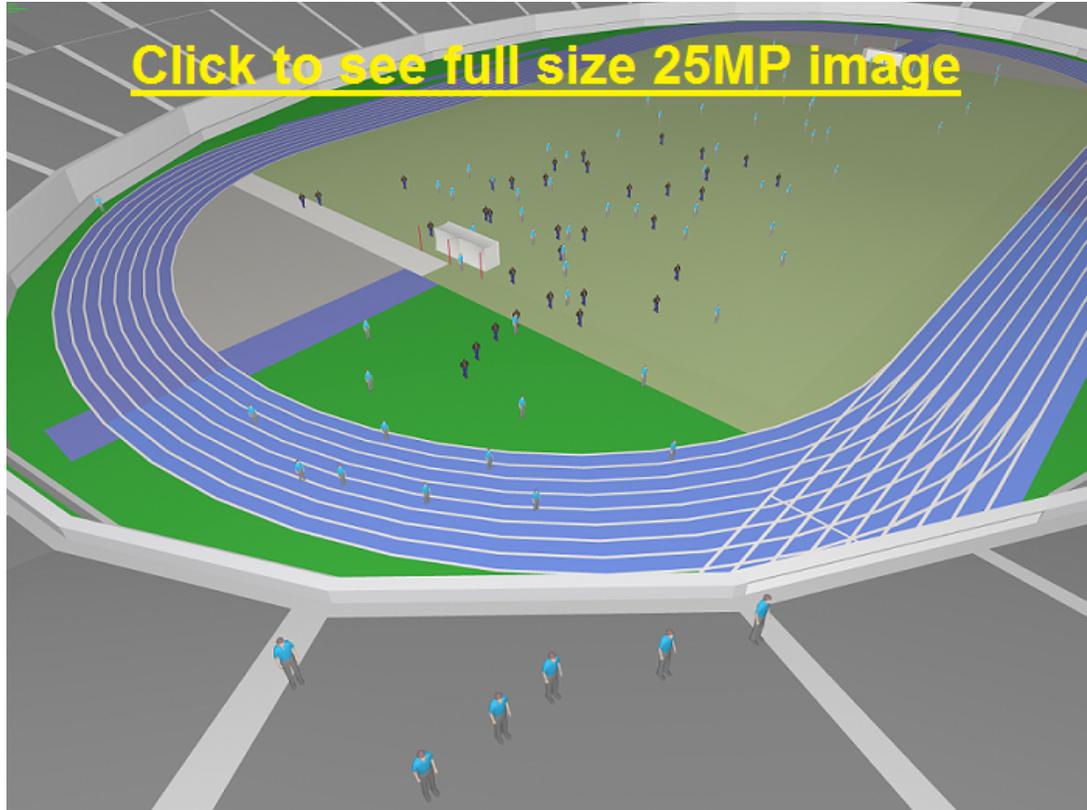
the **3D Models** button  appears to quick open the [3D Models window](#)^[297].



MODELING RESOLUTION OF CAMERAS AND LENSES

8.55 Ability to obtain [full-size](#)^[286] image models of cameras with number of pixel exceeding Windows screen size, without using PiP. See examples of exported files: [5 megapixels](#), [10 megapixels](#), [25 megapixels](#).

This feature can be useful to model real resolution model of images with [distortion](#)^[429].



8.56 Resolution modeling algorithms were reworked.

8.57 As an unit of measuring resolution instead of actually ambiguous **TVL (TV lines)**, the **Lines per Picture Height (LPH)** is used. For analog cameras the **LPH** is the same as "actual" TV lines, ie the number of vertical lines fit within the part of picture width equals to the picture height.

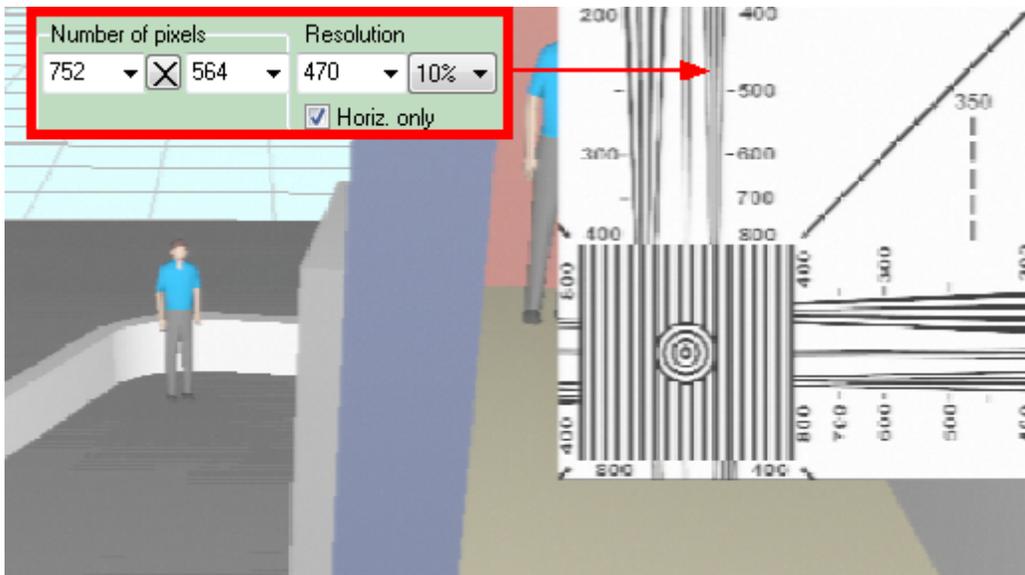
8.58 Accuracy of modeling resolution in LPH was increased. When you set the image resolution in LPH, you can also set the drop of contrast in %.

8.59 In modeling the camera resolution in LPH, it is possible to model as only horizontally resolution (for analog cameras) as the resolution in both directions (for IP cameras).

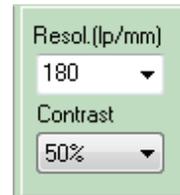
8.60 The Test chart EIA1956 is tied to the frame height and saves equal aspect ratio regardless of the aspect ratio of the simulated images that allows you to watch resolution of the simulated images in LPH (lines per picture height) in any aspect ratios of the frame.

8.61 Size in pixels of the Test chart EIA1956 is increased twice.

8.62 Ability to display the Test chart EIA1956 in reduced-size (up to 64 times), what extends the range of estimates resolution using the test chart up to **100 000 LPH**.



8.63 Simulating lens resolution in **line pair per millimeter** at specified contrast drop by MTF (10%, 20%, 30%, 50%).



8.64 The following **camera model parameters** were added: [Rolling shutter>Up \(scan direction\)](#) [316]; [Resolution>LPH](#) [316] (lines per picture height); [Resolution>Contrast %](#) [316]; [Resolution>Horizontal only](#) [316]; [Lens>Resolution>lp/mm](#) [316] (line pair per mm); [Lens>Resolution>Contrast %](#) [316].

3D VIDEO WINDOW

8.65 A window, which shows models of camera images, named **3D Window** in the past, was renamed to the **3D Video** [284] window.

8.66 In the main menu of the **3D Video** window, in Image submenu, a new **Real frame size** [286] item was added. If it is checked, then saving the image in the **3D video** window will be with the number of pixels of the camera, which can exceed the screen size in Windows. This item is also used to simulate resolution of image with lens **distortion** [429].

8.67 In the main menu of the **3D Video** window, in **View** submenu, a duplicating **Ground** [288] item was added for quick hiding the ground surface in the **3D Video** window.

8.68 In the main menu of the **3D Video** window, in Image submenu, a new **Copy to clipboard** [286] item was added.

8.69 View area faces of cameras are invisible in the **3D Video** window, they are visible in the 3D World window.

8.70 In the PTZH mode a camera is panned and tilted by moving mouse cursor on the image with left mouse button pressed..

8.71 Background representation in the 3D Video window was improved.

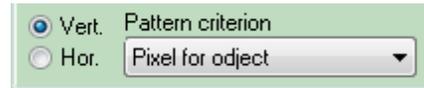
8.72 Ability to **switch** [326] image generation thread: in separated thread or in the main thread.

8.73 Ability to model Rolling Shutter with line scan order from up to down was added.

8.74 Accuracy of positioning PiP and accuracy of working PiP together with Rolling Shutter was increased.

SPATIAL RESOLUTION

8.75 Ability to specify spatial resolution in spatial resolution patterns not only vertically but also horizontally. To do this, a new [switch](#) ^[275] to the Spatial resolution box was added.



8.76 To the Option box an [option of switching](#) ^[333] direction of the spatial resolution calculation in dependence of the camera rotation around its optical axis was added.

8.77 Additional [Spatial resolution patterns](#) ^[274] were added based on the Standards:

- Australian Standard AS4806: Closed Circuit Television;
- European Standard EN50132-7;
- ISO/IEC 19794 Biometric data interchange formats.

8.78 As a result of right-click on the [Pattern](#) ^[274] combo box a pop up menu will appear. Selecting the **Default patterns** item, you can erase all changes in the patterns and return to the patterns set by default.

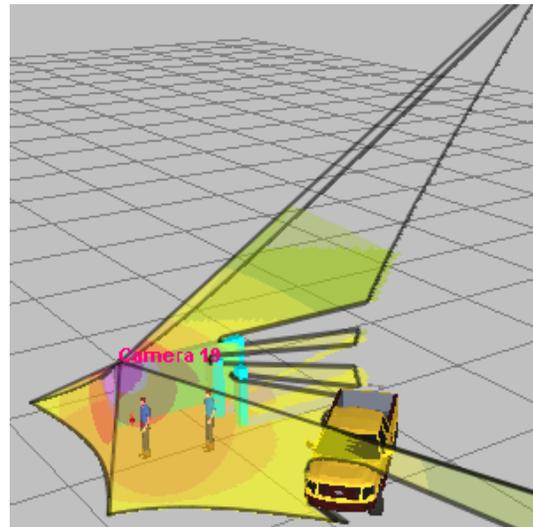
8.79 The [Vertical resolution of camera](#) ^[277] field in the Spatial resolution box was renamed to the [Vert. \(Horiz\) number of pixels](#) ^[277].

8.80 To the [Spatial resolution box](#) ^[278] new test images were added.

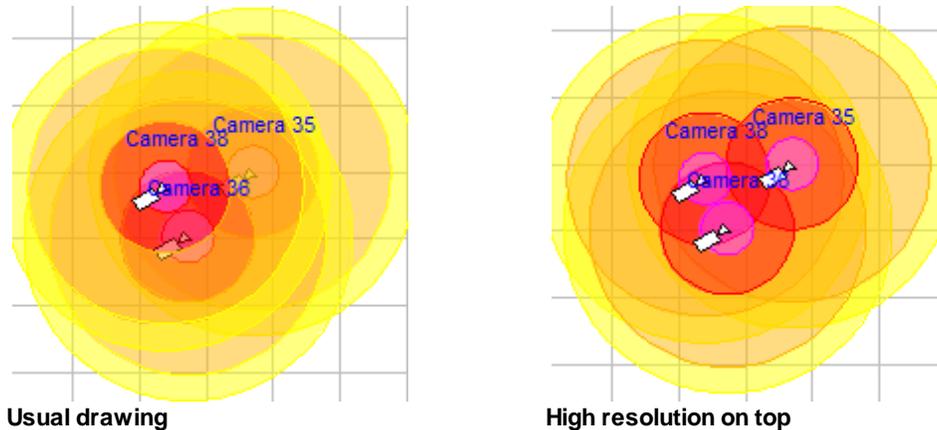


8.81 Spatial resolution visualization on the view area faces and on the active camera coverage in the 3D World window.

8.82 Spatial resolution visualization taking into account [lens distortion](#) ^[429].



8.83 A new option for drawing regions of spatial resolution in the Graphics windows in ascending resolution - [High resolution on top](#)^[199] was added. With this option enabled all cameras remain visible despite the shading of projections of different cameras. While regions with higher spatial resolution are drawn on the top.



IMPORT AND EXPORT TO AUTOCAD

8.84 Import module was upgraded. Up to AutoCAD **DWG 2015** formats are supported.

8.85 The dialog box **Scale background** was renamed to the [Adjust background](#)^[203]. For backgrounds in DWG or DXF formats, abilities to choose Layout in the background, control visibility of layers, hide texts were added. For backgrounds in PDF format you can choose page and resolution of the background.

8.86 [Export module](#)^[329] was updated and reworked. Export to AutoCAD was improved. Export accuracy was increased.

8.87 Cameras with view areas are exported as AutoCAD blocks, view area bounds are exported as polylines. In attributes of the block the most important parameters of the camera are recorded: Name, Model, Lens focal length, Height of installation, Base height, Heights of view area lower and upper bounds, View angles, Number of pixels, Spatial resolution pattern, Quality level.

8.88 Illuminators are exported as AutoCAD blocks. In attributes of the block the most important parameters of the illuminator are recorded: Lamp type, Number and power of lamps, Height of installation.

8.89 Distribution by layers, set in VideoCAD is saved.

8.90 Hatching and filling of [shadows](#)^[172] are saved.

8.91 Styles and weights of [lines](#)^[320] set in VideoCAD are saved.

8.92 Point of origin is saved.

8.93 Grid is exported as AutoCAD block with attributes.

8.94 In the exported file the references to raster insertions are saved: background and 3D model projections. Raster images are exported along with DXF or DWG file into a separate directory.

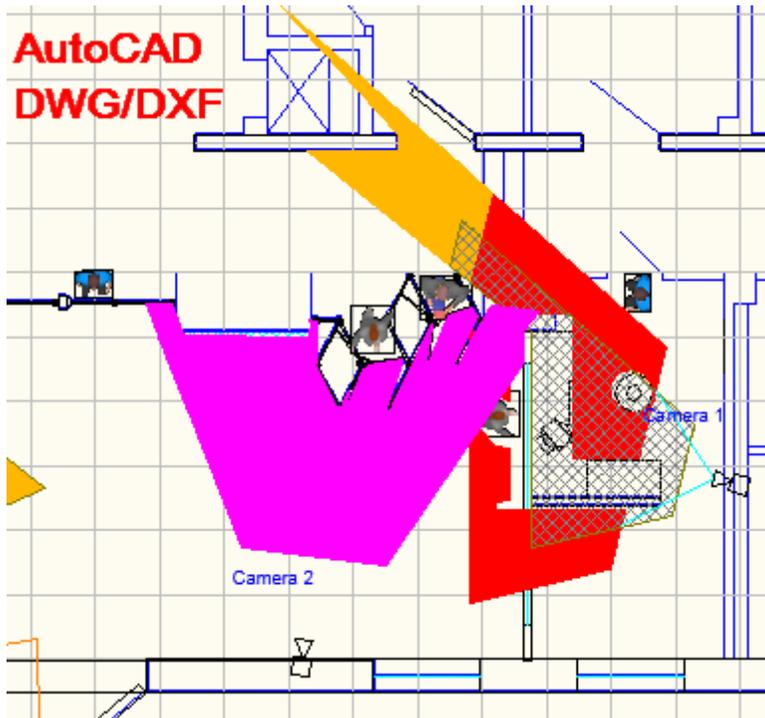
8.95 In addition to the DXF format, export to the following vector formats was added: DWG, vector PDF, PLT (HPGL/2), CGM (Computer Graphic Metafile), SWF (Adobe Flash).

8.96 When you export a drawing with the background in AutoCAD DWG/DXF format, VideoCAD constructions can be [added to the background on separate layers](#)^[329] or the background can be added as an external links to the file of the background. In both cases the structure of the background is saved.

8.97 Possible scheme of the combining AutoCAD + VideoCAD:

1. [Load drawing](#)^[204] in AutoCAD format as a background;
2. [Import](#)^[199] AutoCAD lines to VideoCAD 3D constructions automatically;
3. Adding cameras and constructions on special layers.

4. [Export](#)^[202] the obtained drawing to AutoCAD format to work with it in AutoCAD.



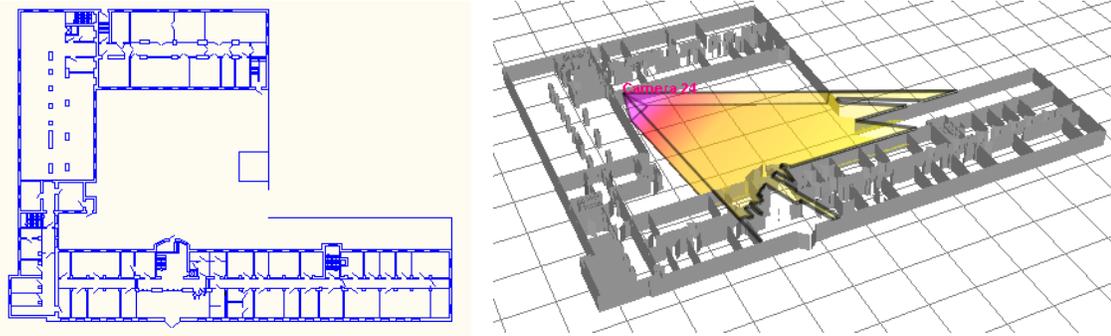
8.99 Export to DXF file 3D view areas and camera coverage taking into account lens distortion, spatial resolution, and shading.

This feature allows the convenient scheme of work with combination of 3D BIM Software (SketchUP) + VideoCAD.

1. Export layout as a 3D model-territory through SketchUP and loading it into VideoCAD.
2. Adding cameras with 3D view areas in VideoCAD.
3. Export 3D view areas in DXF format, loading them into 3D BIM Software and combining with the original layout in 3D.



8.99 [Import constructions](#)^[199] from a 2D background in AutoCAD formats to 3D VideoCAD constructions automatically. Use of this tool allows to reduce efforts of outlining background to convert it to 3D constructions.



IMPORT AND EXPORT TO OTHER FORMATS

8.100 Supporting PDF files to use as [background](#)^[204] including multi-page PDF files.

8.101 [Export](#)^[202] to PDF (raster and vector), AutoCAD DWG, PLT (HPGL/2), CGM (Computer Graphic Metafile), SWF (Adobe Flash).

8.102 Because of the increased number of export options, [Export](#)^[329] tab in the **Options box** is divided into two sub-tabs: "DXF,DWG,PLT,CGM,SWF,vPDF" and "BMP,WMF,EMF,GIF,TIFF, PNG,JPG,rPDF".

8.103 To the options of export to BMP, JPG, EMF, WMF, GIF, TIFF, PNG, rPDF possibility to set [hatch step factor](#)^[330] was added.

8.104 In the [3D Image](#)^[197] you can load images in BMP, JPG, PNG, GIF TIF (early BMP and JPG). Transparency of PNG files is supported.

8.105 New [PDF report](#)^[200] was added. Unlike the [Text report](#)^[200], the **PDF Report** can include images from the cameras, fragments of layouts with camera placed, a cover with logo. Report parameters and the structure of information in the report is configurable. See [example of PDF report](#).

PRINTING

8.106 New mode [Use buffer](#)^[334] was added. Using this mode, you can get the correct results and print transparent gradient fills, projections of 3D models even on printers do not support these tools, including most of free virtual printer to print to PDF.

8.107 New mode [Scale Hatching](#)^[333] was added. Using this mode, you can get the correct hatching even on printers do not support scaling hatching.

8.108 Menu item [Print setup](#)^[207] remains enabled even VideoCAD can not get access to the current printer.

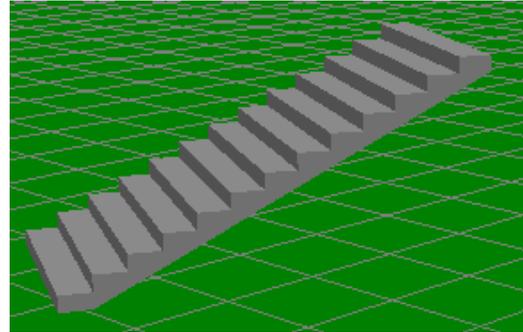
MISCELLANEOUS

8.109 Ability to change the minimum and maximum heights of several objects at once through changing their line type. If during changing the line type of selected objects by the [Change line type](#)^[237] tool, to press and hold **Ctrl**, then the selected objects will also change their minimum and maximum height according to the chosen line type. If **Ctrl** is not pressed, the heights remain unchanged.

8.110 [Autosaving](#)^[334] the project in specified intervals during running the program in a chain of files (up to 100 copies of the project are saved and rewritten in the regular intervals around the ring).

8.111 Image update with lots of rotated projections of the 3D models was accelerated.

8.112 New construction - [Stairs](#)^[226].



8.113 Added a possibility to draw [legends](#)^[276] of Spatial resolution patterns on the layouts.

Home Office Scientific Development Branch 2009
 ■ Monitor and Control (20pix/obj)
 ■ Detect (39pix/obj)
 ■ Observe (100pix/obj)
 ■ Recognise (200pix/obj)
 ■ Identify (400pix/obj)
 vertical; Hobj=1.64 m; Hmeas=AUTO

8.114 New possibility to adjust transparence of [filling view area projections](#)^[169] in the Graphics window.

8.115 A mode to improve visibility of [thin lines](#)^[334] at scaling background in BMP, JPG, PDF formats.

8.116 In the Test object box at calculation of the part of frame occupied by the test object, tv (TB- lines) and p (pixels) are not used.

8.117 The **Quality level** combo box with a list of quality level was removed from the **Camera geometry box**. You can assign a **quality level** to the active camera in the Quality levels box.

8.118 The item **Assign to active camera** was removed from the pop up menu of the Quality levels table. A quality level is assigned when you select a line with the quality level name. To save your selection, click **Save**. To cancel - click **Cancel**.

8.119 In the [graphical editing state](#)^[159] of the active camera, selection and rotation of the active camera is blocked to prevent displacement of the background, constructions and cameras relative to each other on other layouts.

8.120 The cursor coordinates in the lower left corner of the **Graphics window** are displayed rounded to the second decimal place .

8.121 The [Export to Text](#)^[200] menu item was renamed to **Text report**.

8.122 In the [Text report](#)^[200] for each camera additional lines were added: layer, the base height , angle of rotation around its axis, number of pixels.

8.123 When [lens distortion](#)^[267] is modeled, the [exported text file](#)^[200] contains real angles taking into account the distortion and in parentheses calculated angles.

8.124 Child windows "sticks" to the screen edges.

8.125 Maximum number of lamp in a illuminator was increased up to 250 for modeling LED illuminators.

8.126 An option of [changing registration code](#)^[241] via the Main menu was added.

8.127 An option of typing [sensor size](#)^[255] in millimeters was described in the Help system. Checking invalid sensor sizes was added.

8.128 Detected bugs were fixed.

8.129 The Help system was updated.

8.130 [Examples of work with VideoCAD](#)^[353] in the Help were updated according to the new features. Several new examples were added.

8.131 Project format of VideoCAD7 - *.vc7 is supported. There are possibilities of [export](#)^[199] and

[import](#)^[199] of the previous project format *.vmp, supported by versions from 4 to 6.

8.132 The program was tested under Windows 8.

RULES OF UPGRADE

8.133 The Rules of upgrade from previous VideoCAD versions to VideoCAD8:

- For the customers who have purchased VideoCAD7 (or upgraded to VideoCAD7) after **01 July 2014** upgrade cost makes a difference between cost of VideoCAD8 and VideoCAD7.
- For the customers who have purchased VideoCAD7 (or upgraded to VideoCAD7) before **01 July 2014** updating cost makes half of the VideoCAD8 cost.
- For the customers who has VideoCAD3..VideoCAD6 and didn't upgrade to VideoCAD7, updating cost makes 3/4 of VideoCAD8 cost.
- Upgrade Lite version to Professional is paid in addition.
- For the customers, whose original valuable suggestions have found application in VideoCAD 8.0, the additional discount for upgrade is given.
- Upgrade of **VideoCAD plugin for SketchUP** is free with upgrade to VideoCAD 8.

- **VideoCAD 8 Professional** can work **only with USB Senselock dongle**. HID registration with the Professional version is not applied. Senselock dongles from VideoCAD 6.XX and VideoCAD 7.XX are supported. In case of absence of USB Senselock dongle it is necessary to purchase it. Guardant dongles are not supported by VideoCAD 8.0.
- **VideoCAD 8 Lite**^[31] can work with USB Senselock dongle and with the HID registration.
- **VideoCAD 8 Starter**^[49] and **VideoCAD 8 Starter II**^[45] are registered only by personal registration code, without dongle, without hardware locking.

7. What is new in VideoCAD 7.0

NEW PROJECT FORMAT

7.1 New project file format *.vc7. There are possibilities of [export](#)^[199] and [import](#)^[199] of the previous project format *.vmp, supported by versions from 4 to 6.

7.2 Unlimited quantity of cameras in one project. In the previous versions each project could contain no more than 100 cameras.

7.3 Unlimited quantity of constructions on each layout. In the previous versions each layout could contain no more than 5000 constructions.

7.4 Quantity of [line types](#)^[320] is increased to 2000.

SPEED OPTIMIZATION

7.5 Resource-intensive operations are allocated in separate threads. This allows working in the graphics window without delays and also get considerable gain in efficiency on modern multicore processors.

7.6 [3D image](#)^[284] generation is allocated in a separate thread. This allows working in the graphics window with opened 3D window without delays for redrawing 3D images. The priority of the 3D window thread can be [switched](#)^[326]. During image generation in the 3D window on the [3D window button](#)^[176] blinking red frame appears.

7.7 New items were added to the 3D window's main menu: Speed>[Disable image processing](#)^[286] and [Update image only by clicking](#)^[286]. These items duplicate the same items in the Options box. When image processing is disabled the 3D image redraw speed considerably increases.

7.8 Possibility of [two-stage image generation](#)^[326] in the 3D window. At the first stage the image

without processing is quickly generated and displayed. Then resource-intensive per-pixel processing is carried out and the processed image is shown.

7.9 In the [PTZH frame](#)^[287] mode image processing is disabled to increase speed of image redrawing. Titles are disabled too.

7.10 The algorithm of modeling sensitivity of megapixel cameras is accelerated.

7.11 Image redrawing in the Graphic window was accelerated too. Bottlenecks were optimized.

CALCULATING SHADOWS IN THE VIEW AREA

7.12 Constructing horizontal projection of camera control area taking into account [shadows](#)^[172], arisen from obstacles on the scene environment. In three dimensions, shadows from any constructions (including 3D models) can be automatically calculated and displayed.

7.13 New definitions are introduced: Camera control area and Control area projection.

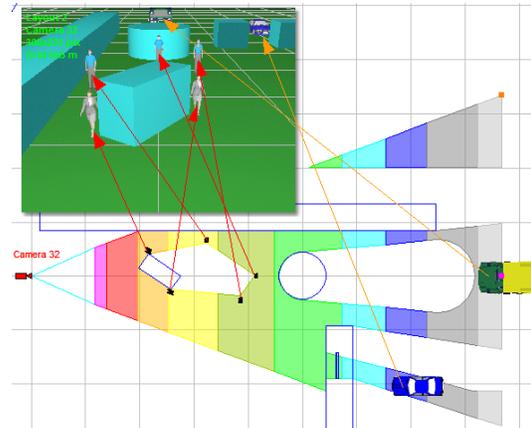
Camera control area forms by subtracting shadows of environment objects (uncontrolled areas) from [camera view area](#)^[147].

7.14 Constructing the Camera control areas of [PTZ](#)^[384](dome) cameras taking into account shadows, created by obstacles on the scene environment. The tool is also useful for choosing the best location for fixed cameras to make reachable required areas.

7.15 In the Line type properties there is new item: [Shadow](#)^[320]. If the item is checked then all constructions made by this line type are considered as obstacles at calculating shadows.

7.16 On the Current construction parameter panel when a 3D model is editing, there is additional checkbox- [Shadow](#)^[248]. If the checkbox is checked, then the 3D model is considered as an obstacle at calculating shadows.

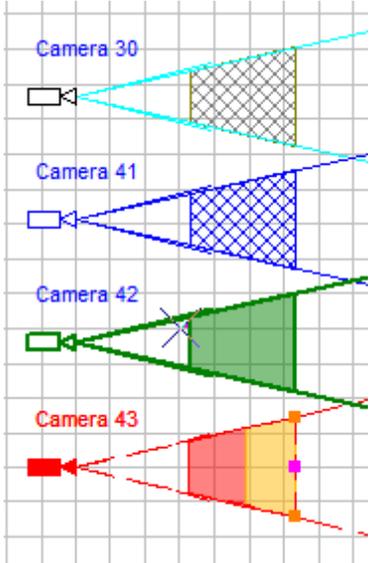
Shadows - a new powerful yet easy-to-use tool of VideoCAD 7. Shadows are calculated for all positions of cameras, shading objects can be located at any point of space. You should only enable calculation of shadows.



COLORS, FILLING AND HATCHING OF VIEW AREA PROJECTIONS

7.17 View area projection of different cameras can have different color according to parameters of line type of these cameras (in case of disabled spatial resolution visualization).

7.18 View area projection can be semitransparent. The Fill projection button and corresponding item of the main menu have a drop-down list in which it is possible to choose blend filling or hatching view area projection.

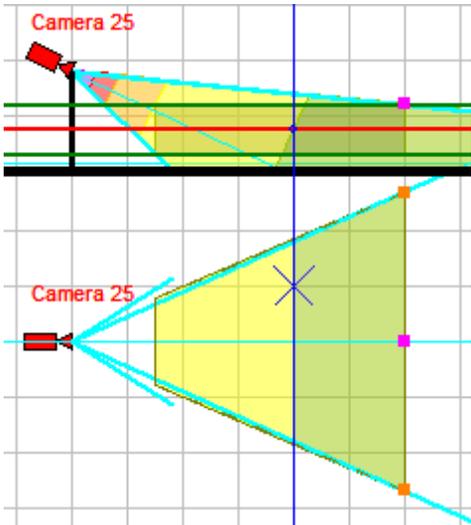
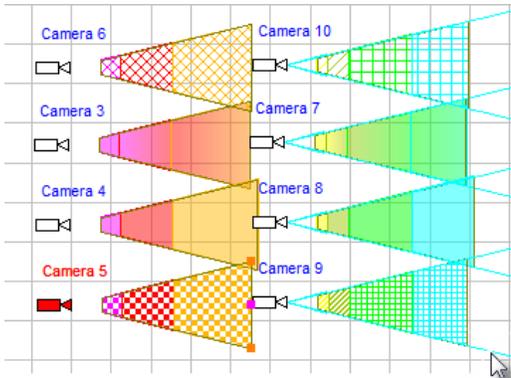


VISUALIZATION OF SPATIAL RESOLUTION AND FIELD OF VIEW SIZE

7.19 Camera view area can be divided into regions filled by different color and (or) type of hatching. Regions can differ depending on the following criteria:

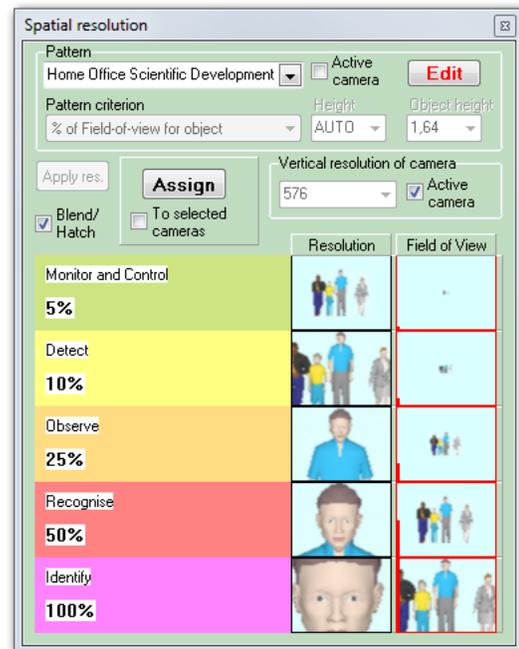
- spatial resolution (pixels/meters, pixels/foot);
- vertical field of view size (meter, foot);
- vertical number of pixels covered by an object of the specified height (meter, foot);
- the part of the frame (%) covered by an object of the specified height (meter, foot).

7.20 The spatial resolution is measured at the specified height and can be displayed in the Horizontal projection in all modes. In the Vertical projection the spatial resolution is displayed in the loaded (active) camera editing mode only.



7.21 The new [Spatial resolution box](#)^[272] was added in which it is possible to create and edit patterns of spatial resolution and field of view size visualization. In the box there are prepared spatial resolution patterns according to the following criteria: Home Office Scientific Development Branch, Home Office Guidelines for identification, P 78.36.008-99. Also in the box there are examples of images of group of people are automatically displayed for each region of spatial resolution. Different patterns can be assigned to different cameras.

7.22 View area projections can have [gradient colors](#)^[170]. In this case key colors of the gradient correspond to the colors in the assigned pattern from the Spatial resolution box.

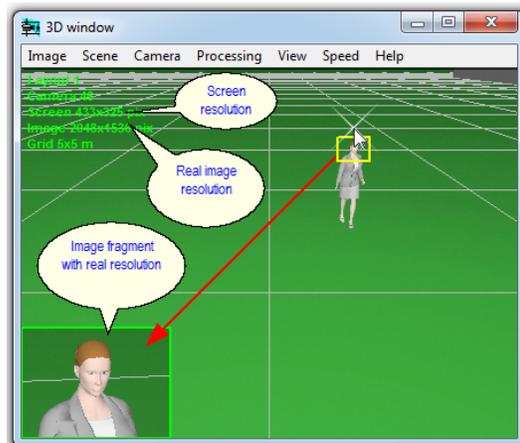


MODELING RESOLUTION OF MEGAPIXEL CAMERAS

7.23 On the Image parameter panel a new tab PiP (Picture in Picture) was added. The PiP mode allows to model in the 3D window images with resolution exceeding the 3D window resolution and even the resolution of the Windows screen.

7.24 Digital ZOOM in the PiP mode allows to additionally magnifying specified area on the 3D window for detailed analysis.

7.25 If the image resolution differs from the 3D window size and artificial decrease of resolution is performed or the PiP is displayed, in the [Titles](#)^[284] of the 3D window in separated lines the image resolution and the screen resolution are displayed.



7.26 New values of resolution in the drop-down lists. Lists of resolution are stored in files H_res.txt and V_res.txt in the VideoCAD installation directory. To add new resolution it is possible to edit these files. As well as in the previous versions you can type any resolutions by the keyboard.

MODELING MOVEMENT

7.27 You can specify speed and direction of movement for [3D models](#)^[166] in a velocity vector form and in a numerical form.

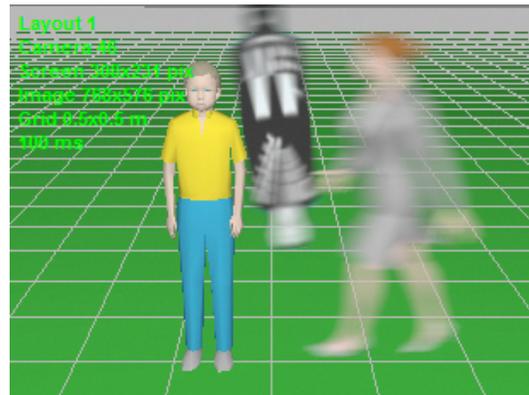
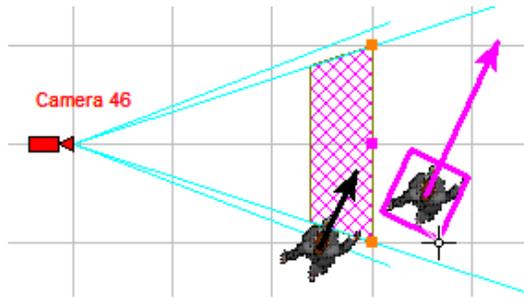
7.28 On the Current construction parameter panel when choosing 3D models there is an additional [Speed](#)^[248] box.

7.29 Frame rate was added to the camera parameters.

7.30 It is possible to model movement of 3D models and rotation of the [Rotakin](#)^[192] object.

7.31 [Visual estimation](#)^[379] in the Graphics window how many times moving object will get into the frame, depending on speed and direction of movement of the object, location and frame rate of the

camera and the view area form.



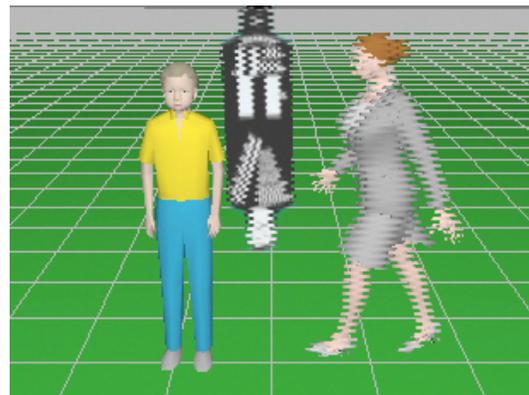
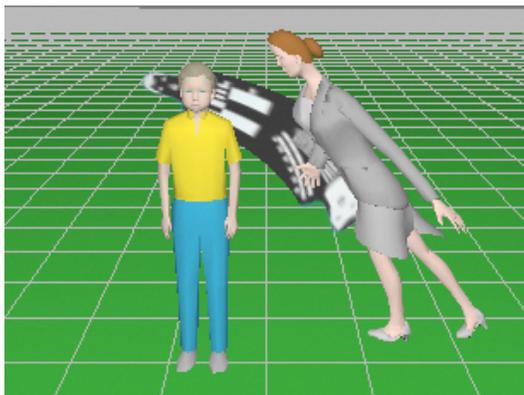
7.32 Exposure time and Row time of Rolling shutter were added to camera parameters.

7.33 It is possible to model blur of moving 3D models (motion blur) and rotating Rotakin depending on the speed, direction of movement and exposure time of camera.

7.34 When modeling exposure time in the 3D window Titles current exposure time value is displayed.

7.35 Modeling [distortions](#)^[385] of moving 3D models and rotating Rotakin from Rolling shutter and Global shutter.

7.36 Modeling [interlace distortions](#)^[385] of moving 3D models and rotating Rotakin.



CREATION OF ANIMATED IMAGES

7.37 Possibility of creation of animated images with moving 3D models.

7.38 On the Image parameter panel, View tab the Number of frames box was added.

7.39 When the Number of frames is more than one, in the 3D window's [titles](#)^[284] the Frame rate value is displayed and in the 3D window animated image with specified Frame rate is generated.

7.40 Animated images can be [saved](#)^[286] as animated GIF files and displayed on the Monitor window.



[See an example of animated monitor \(file size about 4 Mb\).](#)

NEW IN THE MONITOR WINDOW

7.41 Scaling the Monitor window in Windows 7 was improved.

7.42 New [sizes](#)^[296] of monitors were added.

7.43 Possibility of setting [resolution](#)^[297] of digital monitors.

7.44 During loading monitors it is possible to interrupt the long operation, having pressed ESC.

7.45 It is possible to set [correcting factor](#)^[334] for exact modeling physical sizes of monitors.

7.46 Displaying on the monitors [animated](#)^[295] images with moving 3D models.

7.47 [Saving](#)^[298] image of the monitors in formats *.gif, *.tif, *.png.

7.48 Exporting images on the monitors to the [*.html](#)^[299] file with static or animated images.

Camera's images are saved in the camera's original resolutions in the form of separate files PNG or animated GIF.

[See an example of animated monitor \(file size about 4 Mb\).](#)

NEW OBJECTS AND TOOLS

7.49 New object - [Rotakin](#)^[192] - an animated rotating test target for visual estimation of spatial resolution and motion distortions on the 3D images. In the Options box it is possible to change rotation speed of the Rotakin.

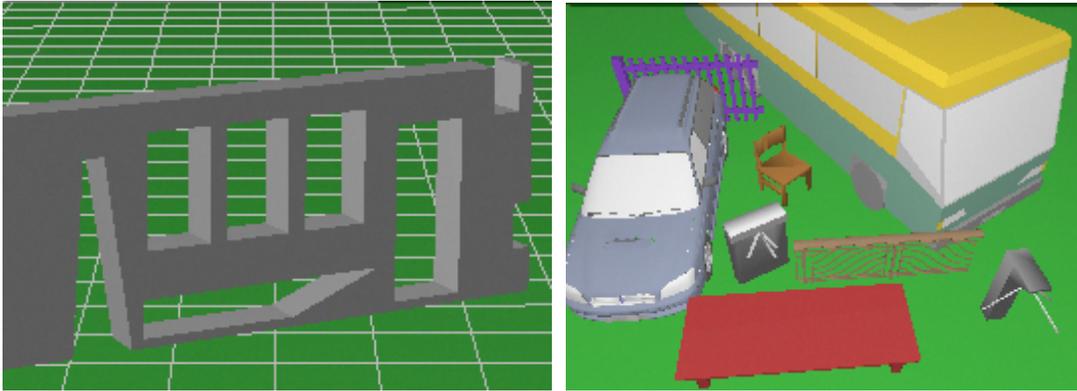
7.50 New object - [Wall](#)^[186]. It allows drawing walls with different thickness.

7.51 New object - [Aperture in Wall](#)^[187]. It allows making in 3D walls any apertures, for example for windows and doors.

7.52 New object - [Polyline](#)^[183]. It allows drawing line segments continuously.

7.53 New tool - [Scale](#)^[181]. It allows scaling selected constructions relative to a base point.

7.54 New tool - [Mirror](#)^[181]. It allows getting mirror copies of selected constructions relative to a horizontal or vertical line.



7.55 Existing Copy and Cut tools are renamed to [Copy with base point](#)^[234] and to [Cut with base point](#)^[234].

7.56 New [Copy](#)^[180] and [Cut](#)^[179] tools were added. In the new tools the base point is set automatically at the center of copied objects.

7.57 Several new [3D models](#)^[190] were added to the library.

CABLE REPORT

7.58 Possibility of using in the project a lot of brands of cables. [Line types](#)^[320] can be considered as cables.

7.59 Possibility of drawing main cables, which is not associated with cameras.

7.60 Possibility of getting the [Cable report](#)^[388]. The report contains lengths of all cables separated by brands and cameras, including the main cables.

7.61 Continuous drawing [cables](#)^[238]. The end of each segment is the start of the following one. To stop drawing cable press ESC.

DEPTH OF FIELD IN THE HORIZONTAL PROJECTION

7.62 The Height parameter was added to the depth of field parameter list. At the set Height the analysis of depth of field is performed do display the depth of field bounds in the Horizontal projection. The height can be different for different cameras.

7.63 When the Depth of field box is opened, all cameras in the horizontal projection have displayed borders of the sharpness area, hyperfocal distance, focus distance measured at the set height. In the vertical projection the borders of the sharpness area, hyperfocal distance, focus distance are displayed in the loaded (active) camera editing mode.

7.64 It is possible to specify focus distance by clicking on the view area horizontal projection of the loaded (active) camera. The Specify focus plane button is always accessible.

7.65 When the Specify focus plane button is pressed, during cursor movement over the view area horizontal projection of loaded (active) camera, on the [Status bar](#)^[243] the resolution under the cursor limited by the depth of field is displayed.

7.66 In the Depth of field box the new Default button was added. As a result of clicking this button, default values will be assigned to input parameters in the Depth of field box: the boundary resolution = 0.7*horizontal pixel count, focus distance = hyperfocal distance, height = AUTO (middle height of the camera's view area).

NEW IN TABLE OF CAMERAS AND TABLE OF CAMERA MODELS

7.67 A new menu for switching [visibility](#)^[308] of separate columns was added.

7.68 Several new possibilities of [filtering](#)^[308] data in the tables.

7.69 Several new parameters of camera model were added: [Exposure time at measuring sensitivity](#)^[316], [Maximal frame rate](#)^[316], [Row time](#)^[316] (parameter of the Rolling Shutter).

7.70 To the Table of cameras these three new parameters of model were added and in addition: Current frame rate, [Name of the assigned Spatial resolution pattern](#)^[272], [Signal cable brand](#)^[341] and [Power cable brand](#)^[342].

INTERFACE IMPROVEMENTS

7.71 Possibility to [adjust](#)^[332] visibility of buttons on the Tool bar.

7.72 When [Alt is pressed](#)^[249], it is possible to move drawing in the Graphics window using arrow keys and to change scale using plus and minus keys irrespective of the input focus.

7.73 In the PTZH frame mode of the 3D window you can pan and tilt the camera by moving the image in the 3D window with left mouse button pressed like moving drawing in the Graphics window.

7.74 In the Options box the [Default](#)^[319] button was added. Using this button you can assign default values to all parameters on the opened tab.

7.75 Sign of the [Scaling factor when turning the mouse wheel](#)^[333] in the Option box determines the reaction for direction of rotation the mouse wheel in the Graphics window.

7.76 Manual scaling 3D window in Windows 7 was improved.

7.77 On the Processing tab of the Image parameter panel and in the Sensitivity and resolution box between combo boxes with horizontal and vertical numbers of pixels, new buttons with a cross were added. These buttons are intended for fast calculation of vertical number of pixels from the specified horizontal number of pixels and on the contrary. Calculation is carried out using the [Aspect Ratio](#)^[257].

7.78 On the View tab of the Image parameter panel near to a box with the horizontal number of pixels, the calculated value of vertical number of pixels and the Aspect ratio are displayed.

7.79 At the left top corner of the Tool bar the [Save project](#)^[166] button was added for convenient regular saving the current project to a file.

7.80 Links to the last 10 used project files are accessible in the Main menu>[Project](#)^[199].

7.81 Accuracy of 3D model selection in the Graphics window was improved.

7.82 In the Main menu>[Help](#)^[240] new items with links to our web site and VideoCAD user forum in the Internet were added.

UNDO

7.83 Buffer of last operations (UNDO) stores now all parameters of cameras.

7.84 Depth of the undo buffer can be adjusted on the [Miscellaneous](#)^[334] tab of the Options box. This depth can be up to last 50 operations.

7.85 The [REDO](#)^[196] button was added for moving in the UNDO buffer in the opposite direction.

NEW FORMATS OF IMPORT AND EXPORT

7.86 Support of import as [background](#)^[204] and [export](#)^[202] drawing in the following formats: EMF +, GIF, TIFF, PNG. Blend color and gradient color are supported.

7.87 Support of export drawing to JPG format (Import of the JPG format is present in the previous versions).

7.88 Possibility of [saving](#)^[286] image from the 3D window in formats: GIF, animated GIF, TIF and PNG.

7.89 Possibility of [saving](#)^[298] image from the Monitor window in formats: GIF, TIF, PNG, HTML with PNG, HTML with animated GIF.

CHANGES

7.90 When editing by points a [rectangle](#)^[184], an [inclined rectangle](#)^[184] or [3D image](#)^[191], the rectangle remains rectangular by default. By pressing Ctrl it is possible to edit separate points and to change distance between lines. In the previous versions it was on the contrary.

7.91 [Double line](#)^[185] rotates as a whole, with keeping distance between lines that is more convenient at construction of walls.

7.92 When editing by points a double line, it rotates as a whole by default. Keeping Ctrl it is possible to edit separate points and to change distance between lines. In the previous versions it was on the contrary.

7.93 The Post in the 3D window is hidden by default. It is possible to show post on the View tab of the Image parameter panel.

7.94 Setting of export to raster formats on the [Export](#)^[329] tab of the Options box by default correspond to an exact copy of the screen.

7.95 At the moment of closing the Image parameter panel the According to camera parameters box on the Processing tab becomes marked automatically and all parameters on this tab get values from the loaded (active) camera. This is to avoid mess with displaying resolution of loaded (active) and inactive cameras.

7.96 Name of the loaded (active) camera is not red colored when exporting and printing.

7.97 When modeling interlaced fields, the vertical resolution of video sensor (if it is set) decreases twice. In the previous versions the vertical resolution of the whole image in the 3D window was decreased.

7.98 From the Camera tab of the Image parameter panel duplicating controls are removed to clear a place for new tools. The controls remain on the Sensitivity and resolution box.

RENAMINGS

7.99 The **Loaded camera** term is changed to the **Active camera**.

7.100 Menu item Project> Export is renamed to Project> [Export to Text](#)^[200].

7.101 Button **Actual view area projections** and the corresponding Main menu item are renamed to [Fill projections](#)^[169].

7.102 The **Interface** tab in the Options box is renamed to [Miscellaneous](#)^[333].

7.103 Coaxial cable is renamed to the Signal cable (the Russian version).

UTILITIES

7.104 Utilities for measuring camera and image parameters were separated out from VideoCAD in the separate product - **CCTVCAD Lab Toolkit**.

7.105 Utilities in the **CCTVCAD Lab Toolkit** become more stable in Windows 7.

7.106 The Video analyzer has a possibility of automatic measuring signal/noise ratio of static image or live video on the computer screen, in a window of any third party program.

7.107 In the Image analyzer, showing separate image lines as a oscilloscope can be separated by color.

7.108 In the Spectrum analyzer, a possibility of calculating spectral efficiency of infra-red LEDs of different wavelength for different image sensors was added.

7.109 In the Spectrum analyzer, spectral sensitivity curves of modern CMOS and CCD megapixel image sensors (SONY, Cypress, Micron) were added.

7.110 The [technique of measuring sensitivity](#)^[367] of cameras was refined on the base of practice of measuring the sensitivity of **IP cameras**. A new method of measuring the sensitivity using the Video analyzer was added.

7.111 Procedures for measuring camera [exposure time](#)^[391] and the [row time of rolling shutter](#)^[394] of IP cameras were developed.

MISCELLANEOUS

- 7.112** Possibility to make camera and luminaries icons scalable together with the other constructions on the drawing. In this case the size of icons is specified in meters (feet). This possibility allows setting the exact sizes and positions of icons and names of cameras for exporting and printing.
- 7.113** Possibility of assigning [scalable fonts](#)^[322] to the camera names and specifying displacement of camera names in meters (feet) for scalable icons and in pixels for no scalable icons separately.
- 7.114** Displaying background in the 3D window was improved.
- 7.115** A new possibility of adjusting [resolution](#)^[326] of a vector background (in AutoCAD format) in the 3D window.
- 7.116** In the Options box on the 3D tab a slider was added which allows adjusting [realism of modeling](#)^[325] depth of field, exposure time and rolling shutter.
- 7.117** In the Sensitivity and resolution box a new camera parameter Exposure time at measuring sensitivity was added.
- 7.118** In the [exporting text file](#)^[200] for each camera the following information was added: Horizontal angle of camera, Coordinate X, Coordinate Y, Model, Producer and Cost.
- 7.119** In the [Camera list](#)^[336] box new parameters were added: lens focal length and vertical number of pixel. Now you can copy the camera list to the Windows clipboard to paste in **MS Excel**, **MS Word** and other software.
- 7.120** Help system was considerable improved; a lot of pictures were added.
- 7.121** [Examples of work with VideoCAD](#)^[353] in the Help were updated according to the new features. Several new examples were added.
- 7.122** Program was adapted for modern wide-screen monitors with high resolution.
- 7.123** Program was tested under Windows 7. Detected incompatibilities are eliminated.

RULES OF UPGRADE

7.124 The Rules of upgrade from previous VideoCAD versions to VideoCAD7:

- For the customers who have purchased VideoCAD6 (or upgraded to VideoCAD6) after **01 January 2011** upgrade cost makes a difference between cost of VideoCAD7 and VideoCAD6.
 - For the customers who have purchased VideoCAD6 (or upgraded to VideoCAD6) before **01 January 2011** updating cost makes half of the VideoCAD7 cost.
 - For the customers who has VideoCAD3..VideoCAD5 and didn't upgrade to VideoCAD6, updating cost makes 3/4 of VideoCAD7 cost.
 - Upgrade Lite version to Professional is paid in addition.
 - For the customers, whose original valuable suggestions have found application in VideoCAD 7.0, the additional discount for upgrade is given.
- **VideoCAD 7 Professional** can work **only with USB Senselock dongle**. HID registration with the Professional version is not applied. Senselock dongles from VideoCAD 6.XX are supported. In case of absence of USB Senselock dongle it is necessary to purchase it. Guardant dongles are not supported by VideoCAD 7.0.
 - [VideoCAD 7 Lite](#)^[31] can work with USB Senselock dongle and with the HID registration.
 - [VideoCAD 7 Starter](#)^[49] and [VideoCAD Starter II](#)^[45] are registered only by personal registration code, without dongle, without hardware locking.

6.1 What is new in VideoCAD 6.1

6.1.1 [VideoCAD Lite](#)^[31] is released. VideoCAD_Lite is an inexpensive version of VideoCAD with limited features. VideoCAD_Lite offers only the most useful and easy-to-master tools for CCTV

design.

6.1.2 A new possibility to assign any model to [all selected cameras](#)^[174] simultaneously

6.1.3 A possibility to change the following parameters of [all selected cameras](#)^[251] simultaneously: lens focal length, Image sensor size, installation height, parameters of view area, quality level.

6.1.4 Exposure time range is expanded up to 1 sec. for convenience in modeling modern IP cameras with increased exposure time.

6.1.5 [Line color in the 3D window](#)^[321] is displayed on the [Line type panel](#)^[245].

6.1.6 Changing [Number](#)^[316] and [Model Name](#)^[316] is disabled on the Used models tab in the [Table of camera models](#)^[304]. Earlier such changes resulted in loss of the model from the model list.

6.1.7 If size of video sensor is standard, at closing the [Special sensor size](#)^[267] box, the standard designation of the sensor size is kept.

6.1.8 The Help system is updated.

6.1.9 VideoCAD installer is updated.

6.1.10 Found bugs are fixed: running under a user account, error at starting VideoCAD by double clicking on a project file, an erroneous message ' Your graphics card does not support this tool ', directory path of jpg images saving is not kept, error at editing text on the drawing.

6.1.11 Updating from VideoCAD 6.0 is offered free-of-charge. Updating from earlier versions is performed according to [rules](#)^[138] of updating up to VideoCAD 6.0.

6. What is new in VideoCAD 6.0

IIIUMINATION AND LUMINARIES

6.1 Modeling background scene illumination, considering type and direction of light source, separately for day and nighttime.

6.2 [Luminaries](#)^[166] modeling considering lamp type and light efficiency, including discharge lamps with complex spectrum of radiation.

6.3 Different wavelength Infrared LED illuminators modeling.

6.4 Illuminator calculation box for creating luminaire models and calculating their parameters.

CAMERA, LENS AND DVR PARAMETERS

6.5 Camera parameters modeling (spectral response; number of pixels; resolution; minimum scene illumination at known signal-to-noise ratio, IRE and aperture; maximum signal-to-noise ratio; electronic shutter; AGC; Back Light Compensation; gamma correction).

6.6 Lens parameters modeling (focal length; aperture; Auto Iris DC and Video Drive). Calculating and modeling Depth of field based on calculated aperture.

6.7 Modeling cameras, switching into black and white mode in case of low illuminance: day/night with removable IR filter and easy day/night with permanent IR filter.

6.8 Enhanced modeling of DVR parameters (vertical and horizontal digitization, brightness, contrast, compression, vertical and horizontal sharpness).

6.9 Modeling specific distortions which are arisen as a result of mismatching output image size and number of pixels on camera's video sensor.

6.10 Modeling images based on scene, lens, camera and DVR models. Calculating and modeling signal-to-noise ratio and contrast.

6.11 Image models at different illumination levels are [tested](#)^[367] against **real video cameras**. Very high level of coincidence has been achieved.

UTILITIES

6.12 Image analyzer tool allows measuring signal-to-noise ratio, brightness and brightness amplitude of an image, size and contrast of an object relative to background, building histogram, calculating image size at different compression levels, analyzing certain lines of an image similarly to oscilloscope, as well as modifying certain image parameters. By analyzing saved images using this tool it's possible to calculate sensitivity and resolution of a real camera for precise modeling in VideoCAD.

6.13 Live video analyzer tool allows measuring brightness, average brightness and noise in certain point, as well as screen frame rate in window containing live video created by any program.

6.14 Lamp spectrum analyzer tool allows to determine the spectral efficiency of any light source for various camera types based on spectral power distribution curve. Determined value of spectral efficiency is used in VideoCAD for precise modeling various types of light sources.

CAMERAS

6.15 [Table of camera models](#)^[304] support (over 100 parameters for each model), ability of assigning models for project cameras. It's possible to adjust a view of model table by hiding unnecessary columns. Table of models supports sorting and filtering. Automatic calculation of sums of power consumption and prices. Ability of printing tables and their parts, importing and exporting into Excel, Word, *.txt, *.csv, *.htm.

6.16 **Modern IP cameras** support ([16:9 Aspect Ratio](#)^[267], different image sensor sizes and aspect ratio, high image resolution).

6.17 **Criteria in Quality levels** concerned with limiting image resolution (maximum vertical field of view size, minimal parts of screen occupied by a license plate and a face) are related to the number of pixels for modeling and comparing digital cameras with different resolution. These criteria are now known as: Minimal vertical resolution (pixel/meter), Minimal vertical size of face image (pixels) and Minimal vertical size of license plate image (pixels).

6.18 **Varifocal and ZOOM lens** support. [Adjusting](#)^[256] lens focal length by moving view area bound on a layout within set limits using a mouse.

6.19 Icons for internal, outdoor and PTZ cameras may be [different](#)^[166].

6.20 For each camera icon by various [line types](#)^[166] can be set. Thus, the camera icons can vary in color and line thickness.

6.21 Lens [focal length](#)^[256] range has been widened to 1000mm.

IMPORT AND EXPORT

6.22 A [background](#)^[204] in *.dwg AutoCAD™ 2007 format support, AutoCAD™ PROXY records support, loading speed of complex *.dxf files is improved. Bug fixed. All ANSI code pages support, and other improvements concerned with *.dxf and *.dwg files import.

6.23 [Export](#)^[329] to *.dxf file is improved. It's possible to set camera icons and illuminator size in AutoCAD™ units. Ability of exporting large background files.

3D MODELS AND 3D WINDOW

6.24 Several new [3D models](#)^[190] were added, including dark-skinned person for testing the ability of detecting dark-skinned people at low illumination.

6.25 3D models now can be [scaled](#)^[248] in any direction.

6.26 3D models can be placed in [vertical projection](#)^[190]. Models placed in vertical projection will not be visible in 3D window.

6.27 Convenient [3D model](#)^[164] selection from the tool bar.

6.28 [Raster images](#)^[191] in the 3D window. Usual photos and pictures in *.bmp or *.jpg format can be placed in 3D space. Raster images can be transparent, and can replace difficult-to-make 3D models. Raster images can be scaled, placed at any angle, used for modeling variety of objects, from banknotes and plates to a complex background.

6.29 **Background** can be visible in the 3D window.

6.30 [Redraw 3D image only by clicking](#)^[326] mode is convenient in case of complex scenes and/or slow computers, when image repainting in 3D window takes much time.

6.31 Fixed fuzzy drawing PTZH frame and titles in the 3D window when using certain video cards.

6.32 Image parameter panel with View, Scene, Camera, Processing tabs. Panel can be activated by right-click or double-click on the 3D window.

6.33 Setting visibility of different objects in the 3D window on View panel.

6.34 View, scene and equipment parameters are set individually for each camera. Quality levels no longer include 3D image parameters.

WINDOWS

6.35 Quality level box contains corresponding quality level criteria..

6.36 Sensitivity and resolution box with camera and lens parameters.

6.37 Camera parameter box has been renamed to [Camera geometry](#)^[251]. Inherited from older

versions unnecessary interface elements have been removed. Additionally, this box allows to change [aspect ratio](#)^[257], [image sensor sizes](#)^[267] and view angles.

6.38 Modeling [16:9](#)^[297] format monitors. Switching [day/night](#)^[295] illumination modes on the Monitor window.

6.39 Tab quantity in the [Options box](#)^[319] has been increased.

6.40 Model column has been added to the table in the [Camera list](#)^[336] box. Column width can be adjusted by the mouse. Icon box and Table of camera models button have been added to the Cameras list box.

6.41 Appropriate camera is loaded by double-clicking on the [Camera list](#)^[336] box. To rename camera use appropriate pop-up menu item.

6.42 Camera type box has been added to the [New camera](#)^[166] box. When creating new camera, line type can be chosen for it's icon on the [Line type panel](#)^[245].

REPORTS AS A TABLE

6.43 Interactive adjustable table reports including any camera parameter sets. Various types of tables can be formed by hiding unnecessary columns. Tables support sorting and filtering. Automatic calculation of sums of power consumption, cable lengths and prices. Ability of printing tables and their parts, importing and exporting into Excel, Word, *.txt, *.csv, *.htm. Convenient editing parameters by double-clicking on any cell.

TOOLS

6.44 A New Tool for automatic [name generation](#)^[338] and camera serial numeration on layouts. Various numeration templates and rules.

6.45 A New Tool for [counting length sum](#)^[343] of line segments of specified line type. Thus any line type can be used as a cable.

6.46 A New tools for switching draw order of constructions and cameras: [Cameras over constructions](#)^[216], [Bring to front](#)^[236], [Send to back](#)^[236]. These tools simplify work with complex 3D models of buildings, grass, etc., where another 3D models can be placed above (or inside) them.

6.47 [Show all](#)^[219] tool considers not only cameras, but the background and constructions as well.

6.48 [Change line type](#)^[237] tool can change icon line type of selected cameras.

6.49 In order to model windows and transparent objects, [inclined rectangle](#)^[184] in the 3D window can be transparent by 70%.

6.50 [Edit](#)^[247] button will appear on the Current construction parameters panel when drawing construction is complete. Click this button to edit last drawn construction.

INTERFACE

6.51 Assigning and editing [keyboard Shortcuts](#)^[324] for items in Graphics window main menu.

6.52 [Rotating cameras](#)^[159] in both planes by moving view area bound on the layout using the

mouse.

- 6.53 Adjusting [lens focal length](#)^[163] by moving view area bound on the layout using the mouse.
- 6.54 Loading and saving directories are stored. When recalling same operation stored directory is opened.
- 6.55 Horizontal and vertical **scroll bars** and scaling by + - keys to simplify work on portable computers.
- 6.56 [Tabs](#)^[242] in the Graphics window for fast switching, creating and deleting layouts. Layouts button has been removed from the Tool bar.
- 6.57 A [combo box](#)^[167] on the Tool bar for fast loading of any camera. Using pop-up menu of the combo box it is possible to search the camera on the layout.
- 6.58 A [combo box](#)^[174] on the Tool bar for fast assigning a model to the loaded camera.
- 6.59 Enhanced selecting and loading cameras on the layout using the mouse. Cursor snaps to a camera icon with higher priority, and it's highlighted with red rectangle.
- 6.60 Priority of mouse [selection](#)^[177] of close objects is presetted: 1. Cameras; 2. Constructions; 3. Text; 4. 3D models.
- 6.61 A New algorithm of [selecting constructions](#)^[177], located over each other. In order to select another construction it is necessary to click the same point again.
- 6.62 [Snap sensitivity](#)^[333] can be adjusted for convenient work with different screen resolutions and mouse accuracy. The snap to a camera has a priority.
- 6.63 Following info is displayed at the bottom of the Graphic window on the [Status bar](#)^[243] when moving cursor close to a camera icon: name, model name and basic parameters of the camera.
- 6.64 [Field of view size](#)^[166] on the Status bar in loaded camera edit mode now is displayed when moving the cursor over view area in vertical projection, not only when clicking.
- 6.65 [Move](#)^[180] mode is set after [creating new camera](#)^[166]. It's convenient to place new camera on the layout instantly.
- 6.66 **ESC** key stops current operation. If an operation is not performed, [Select/edit](#)^[177] mode is switched on.
- 6.67 Current [line type](#)^[320] is stored before placing 3D models, cameras and illuminators, and is restored after placing.
- 6.68 In case of editing [height](#)^[247] values on the Current construction parameter panel during drawing, new height value will be kept when drawing is complete. Other parameters of construction located on the Current construction parameters panel are kept as well.
- 6.69 Loaded camera icon's color is changed to red.
- 6.70 View>[All camera cables](#)^[216] and View>[Loaded camera cables](#)^[216] menu item states are not stored individually for each camera; they are stored in common project settings.

INHERITED ELEMENTS

6.71 Fast scaling mode by rotating pressed mouse-wheel is disabled due to inconvenience of work with certain mouse types.

6.72 Title button has been removed from the Tool bar. It is possible to show/hide [titles](#)^[216] using the main menu item.

6.73 Saving Resolution and Edit Image menu items have been removed from the Main menu. Resolution can be changed in the Options box on [Export](#)^[329] tab.

6.74 Measurement format by default box has been removed from the [Options box](#)^[319]. When creating new project, measurement format concurs with measurement format in the current project.

6.75 Layout combo box has been removed from the [New camera](#)^[166] box. The layout of creating camera always concurs with the current layout.

6.76 Camera>Save as item has been removed from the Main menu.

OTHER

6.77 VideoCAD Help system is now in **Html Help** format for compatibility with **Windows Vista**.

6.78 Help system has been redesigned taking into account user's suggestions and new program features. [Examples](#)^[353] have been renovated.

6.79 Many functions are improved, detected errors are corrected.

6.80 VideoCAD 6.0 can read projects, created in VideoCAD 4.xx and VideoCAD 5.XX.

6.81 VideoCAD 6.0 has been tested on **Windows Vista**. All incompatibilities found have been eliminated.

6.82 The [regulations of upgrading](#)^[439] previous VideoCAD versions to VideoCAD 6:

- The cost of upgrading amounts the difference between the costs of previous VideoCAD versions (VideoCAD 3.02, VideoCAD 4.0 or VideoCAD 5.0) and VideoCAD 6.0.
- Considerable discounts are offered to the users, whose valuable suggestions have found application in VideoCAD 6.0.
- At upgrading it is necessary to exchange USB dongle.

5. What is new in VideoCAD 5.0

5.1 [Monitor window](#)^[294] has been added. Monitor window logically finishes the information transfer process in video surveillance system "from a real object to an operator" and thus, allows to model the video surveillance system as a hole.

5.2 The new tool in 3D window - [PTZH frame](#)^[287] allows operating a camera in 3D window similarly to PTZ one and additionally to change camera's installation height. Together with the **Monitor window** this tool offers a [new method](#)^[363] of 3D CCTV design.

- 5.3** There is a new opportunity to carry out [Depth-of-field](#)^[236] 3D modeling.
- 5.4** There is a new opportunity to carry out [3D modeling visibility](#)^[236] limited by rain, snow, fog according to the **Meteorological Visibility**.
- 5.5** [Current construction parameters panel](#)^[247] allows creating and editing constructions by input of parameters.
- 5.6** The **Load camera box** is essentially modified and renamed to the [Camera list box](#)^[167]. The following options are added: 3D image show, search, sorting.
- 5.7** [Snap panel](#)^[229] allows fast switching of snaps during drawing.
- 5.8** An option to set [heights in 3D window](#)^[187] separately for each construction, irrespective to a line type.
- 5.9** The new tool - [Inclined rectangle](#)^[184] allows modeling 3D inclined objects.
- 5.10** The new tool - [Filling](#)^[189] allows creating fillings and hatchings.
- 5.11** [Print preview box](#)^[207] is updated. There is a new option to save exact position of the drawing and adjustment for reprinting. The print area displacement caused by **Line type panel** and **Font type panel** is eliminated.
- 5.12** The new [3D models](#)^[229]: a **boy** and a **truck**.
- 5.13** The new tools: [Combine to block](#)^[237] and [Destroy block](#)^[237].
- 5.14** VideoCAD **5.0** can use files of the following CAD formats as a [background](#)^[204]:
- *.dxf AutoDesk DXF Release 12, 13, 14 , 2000, 2002, 2004, 2005, 2006.
 - *.dwg AutoDesk DWG Release 12, 13, 14 , 2000, 2002, 2004, 2005, 2006.
- 5.15** **DWG and DXF reference images**, SHX fonts, DXF Autocad Table, Hatch gradients, Unicode fonts (important especially for languages based on hieroglyphs - Chinese, Korean, Japanese etc.) are supported in CAD [background](#)^[204].
- 5.16** [Visibility of Camera view area](#)^[174] in **3D window** can be switched independently of [View area visibility](#)^[167] in **Graphics window**.
- 5.17** Displaying [cameras' names](#)^[216] and titles can be switched separately..
- 5.18** Option to switch on/off the [display of view area](#)^[167] and view area projections for all selected cameras simultaneously.
- 5.19** Selected camera changes the color together with it's view area.
- 5.20** Construction of person detection area is carried out more precisely, considering additional inflection of bound.
- 5.21** Option to move constructions and cameras in [Select/Edit](#)^[177] mode, without switching to **Move mode**.

- 5.22** While working only with cameras we have a new option to [lock constructions](#)^[229].
- 5.23** The tool **Find loaded camera** is updated and renamed to [Show loaded camera](#)^[166].
- 5.24** Number of redrawings in **3D window** is reduced for increasing program's speed. For forced redrawing, click the image in **3D window**.
- 5.25** Exact position of the drawing is stored at finishing the work with the program and restored at restart.
- 5.26** Reloading speed of cameras is increased.
- 5.27** The range of drawing scaling is expanded.
- 5.28** The range of focal lengths of lens is expanded.
- 5.29** Many functions are improved, detected errors are corrected.
- 5.30** VideoCAD 5.0 can read projects, created in VideoCAD 4.xx.
- 5.31 The regulations of updating previous VideoCAD versions to VideoCAD 5.0:**
- The cost of updating amounts **the difference between the costs of previous VideoCAD versions (VideoCAD 3.02 or VideoCAD 4.0) and VideoCAD 5.0.**
- For users, whose valuable suggestions have found application in VideoCAD 5.0, updating is **free of charge**.

4. What is new in VideoCAD 4.0

- 4.1** There is a possibility of full value [3D designing](#)^[284] of a video surveillance object with loading prepared [3D models](#)^[229] (a man, car and other) and getting images from cameras in the project.
- 4.2** It has become possible to model the 3D image quality from each camera through the image quality parameters, based on the real videosignal distortions.
- 4.3** [Line type parameters](#)^[320] include minimum, maximum height and color in the 3D window. The number of line types has increased to 100.
- 4.4** There are new [system fonts](#)^[322] and [line types](#)^[320]:
- title font in the 3D window;
 - sharpness area line;
 - focus plane line;
 - hyperfocal distance line;
 - 3D model line.
- 4.5** Test object became 3D parallelepiped. Test object can be seen in the 3D window.
- 4.6** There is the depth-of-field and hyperfocal distance calculation.
- 4.7** There is a support for all *.dwg file formats as a [background](#)^[204]: *.dwg **AutoDesk Release 12, 13, 14 , 2000, 2002, 2004.**

- 4.8** It has become possible [to export](#)^[202] obtained drawing to the file of *.dxf format on several layers. It is convenient to process the obtained file in AutoCAD.
- 4.9** It has become possible to change the [scale factor](#)^[325] of nonscalable elements when exporting.
- 4.10** There is a new function of saving drawing - [Save as background](#)^[199].
- 4.11** It has become possible to [print](#)^[207] and export together with the prepared **frames with Title-Blocks**.
- 4.12** The **scaling range and grid step is expanded**. Now maximum grid step is **500 m**, and maximum area displaying on the screen is **15x20 km** (more than 200 square kilometers).
- 4.13** It has become possible to change the [scale factor](#)^[325] when clicking the button **Zoom in**, **Zoom out** and by **turning the mouse wheel**.
- 4.14** There are new means of navigation [Show all](#)^[219], [Find text](#)^[219] and [Zoom window](#)^[159].
- 4.15** Image refreshing is realized [without blinking](#)^[325] due to the using the graphics buffer.
- 4.16** The speed of image repainting with a big number of video cameras is increased.
- 4.17** The [text](#)^[189] scaling accuracy has become higher. Now Title Blocks and other tables can be filled without a risk of strings getting out of the frames.
- 4.18** It has become possible to select one or more constructions [located](#)^[177] one over another.
- 4.19** The **Main window** is renamed to [The camera parameters box](#)^[251]. When launching VideoCAD first Graphics window loads. For showing the camera parameters box the button [Show Camera parameters box](#)^[176] is used.
- 4.20** [Real view area](#)^[169] filling now is not solid, but as hatching. Due to this it doesn't shade other objects.
- 4.21** Graphics [background files](#)^[204] themselves, not the references to their loading, are included in the project file.
- 4.22** All information on program settings (line types, fonts, etc.) is included in the project.
- 4.23** The current project is saved now in the VideoCAD database and at the next program launching the last project, on which you worked, will be available and exactly in the place, on which you broke the work.
- 4.24** There is a **context help** not only for the menu items, but also for the tools on the tool bars. To get the context help for the button click it by the right mouse button and then by the appeared item **"What's this?"**.
The context help is still available for the menu items and other interface elements. To get the context help for the menu item or the interface element select it and press **F1**.
- 4.25** Now the recommended operating system is **Windows XP**. When working in other operating systems big graphics file displaying errors are possible.

4.26 From the [tool bar](#)^[164] and the [main menu](#)^[197] of the graphics window unnecessary buttons and items are deleted.

4.27 Default parameters of quality levels are changed.

4.28 Examples are remade taking into account new possibilities of the program. The example of the [person identification criteria determination according to the real image](#)^[362] is included.

4.29 Many functions are improved, detected errors are corrected.

4.30 Multilingual version of VideoCAD 4.0 has the possibility of registration with the [dongle](#)^[439].

4.31 VideoCAD MAP is released. VideoCAD MAP is a graphical interface for security systems on the basis of VideoCAD technology. VideoCAD MAP includes all possibilities of VideoCAD and many other additional functions, is partly compatible with VideoCAD by the projects and integrated in the Russian Integrated security system "Intellect".

4.32 The regulations of updating previous VideoCAD versions to VideoCAD 4.0:

- For buyers of **VideoCAD 1.0**, i.e. for **our first buyers**, the updating is **free-of-charge**.
- For the others the cost of updating amounts **the difference between the costs of VideoCAD 3.02 and VideoCAD 4.0**.
- For those, who have bought **more than one VideoCAD licenses at once**, the updating is **chargeable only for one license**. Other licenses can be freely updated.

3. What is new in VideoCAD 3.0

3.1 The opportunity of [loading](#)^[204] the **prepared layouts** as a background in *.bmp, *.jpg, *.emf, *.wmf, *.dwg, *.dxf formats was introduced. To display *.dwg and *.dxf files the **CAD Import** module by **CAD Soft Tools** <http://www.cadsofttools.com> was used.

3.2 The obtained drawing can be [saved](#)^[202] in *.bmp, *.wmf, *.emf formats or [copied](#)^[204] to clipboard in *.bmp, *.emf formats.

3.3 The opportunity of **quality printing**^[207], including the one on several pages to glue them was introduced.

3.4 The opportunity of using [texts](#)^[227] was introduced.

3.5 The opportunity of using various [fonts](#)^[322] and [line types](#)^[320] was introduced.

3.6 New object is a [Mask](#)^[227]. The masks allow to cover any part of a drawing. It is possible to draw new constructions over masks.

3.7 New objects is a [Circle](#)^[225], an [Arc](#)^[188], a [Double line](#)^[185].

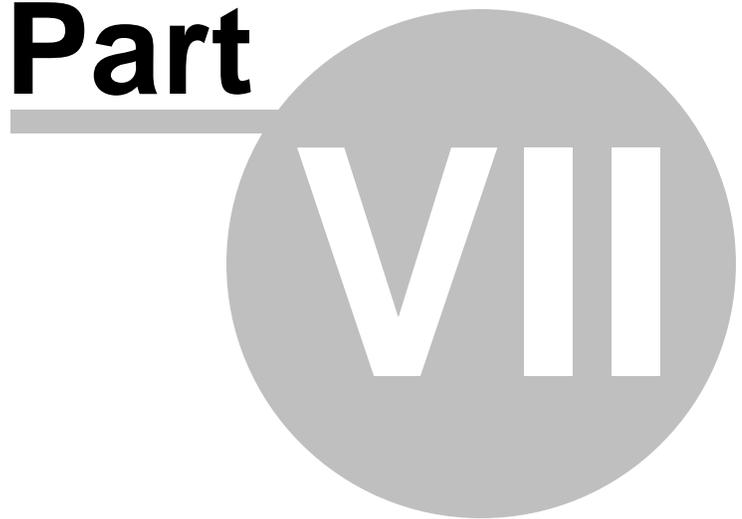
3.8 New operations are [Align](#)^[236], [Move loaded camera name](#)^[202].

3.9 The opportunity to [undo](#)^[196] the last four operations was introduced.

3.10 The opportunity of using a constant [coordinate system](#)^[218], that is not dependent on the loaded camera, was introduced.

- 3.11** The speed of redrawing the drawing containing many constructions and cameras was increased.
- 3.12** The size of a project file was reduced.
- 3.13** The maximal quantity of objects on each plan was increased up to 5000 and the maximal quantity of cable segments of each camera was increased up to 500.
- 3.14** The opportunity of precise scaling using [Ctrl](#)^[249] was introduced.
- 3.15** The opportunity of quick navigation using the mouse wheel was introduced.
- 3.16** The opportunity of operating with inches and feet was introduced.
- 3.17** The opportunity of [changing](#)^[177] the size of a rectangle without distorting its shape was introduced.
- 3.18** The displaying [view area edges](#)^[167], [view area projection bounds](#)^[168] and [view area actual projections](#)^[169] can be switched on/off separately.
- 3.19** The opportunity of copying and [pasting](#)^[180] constructions, cables and texts between projects was introduced.
- 3.20** Many existing functions have been improved, discovered errors have been corrected.

Part



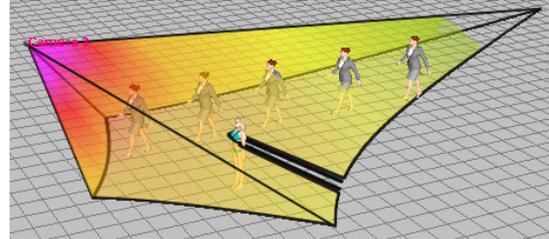
Definitions

7 Definitions

Camera view area

A dimensional figure in shape of a near-pyramid with vertex abutting the **camera lens** and bisector, coinciding with the **main optical axis** of the **camera lens**.

Any object within the view area will be displayed on the screen, if it is not shaded by other objects on the scene.



*View area has the form of a regular pyramid only if [lens distortion](#)^[429] is negligible. The **lens distortion** complicates the form of the **view area**.*

View area projections

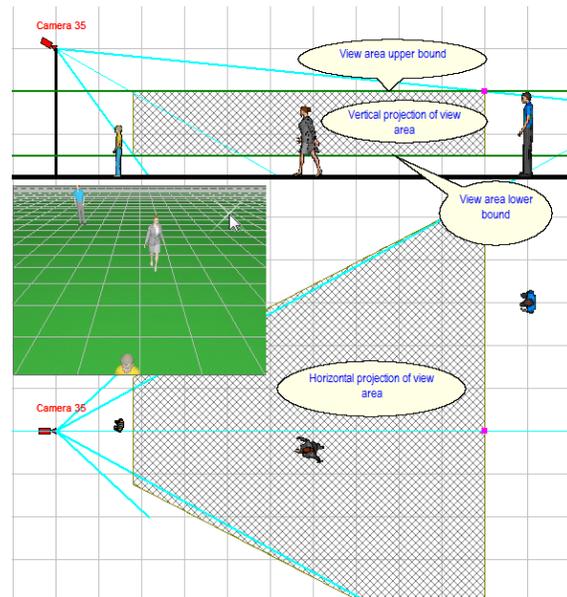
In VideoCAD Lite and VideoCAD Starter horizontal projection of the view area can be displayed as a volume projection (**Projection**) only. Type of displaying for the [active camera](#)^[162] is selected in the pop up menu of the  [View area projection bounds](#)^[168] button.

In the case of the volume projection (**Projection**):

It is displayed as projection to horizontal plane of a view area part, which is residing between the [view area upper](#)^[258] and [lower bounds](#)^[259] specified in [parameters](#)^[253] in the [Camera Geometry box](#)^[251].

View area horizontal projection is calculated according to the rule:

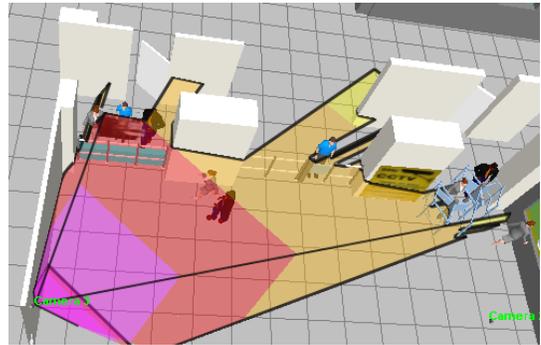
A point on the horizontal projection is considered visible if a vertical segment, formed by this point in the range of heights from the [view area lower bound height](#)^[259] to the [view area upper bound height](#)^[258], is visible wholly.



Camera control area

A complex dimensional figure inside view area. Camera control area forms by subtracting shadows of environment objects (uncontrolled areas) from the camera view area. Any object within the control area will be displayed on the screen.

In the [Graphics window](#)^[158] VideoCAD calculates [Horizontal projection](#)^[148] of the control area.



Control area horizontal projection

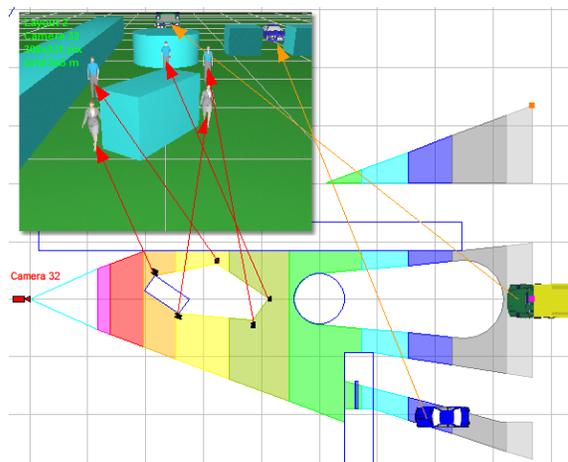
In VideoCAD Lite and VideoCAD Starter horizontal projection of the control area can be displayed as a volume projection (**Within projection**) only. Type of displaying for the [active camera](#)^[162] is selected in the pop up menu of the  [Shadow](#)^[172] button.

In the case of the volume projection (Within projection):

Projection to horizontal plane of a [control area](#)^[147] part, which is residing between the [view area upper](#)^[258] and [lower bounds](#)^[259] specified in [parameters](#)^[253] in the [Camera Geometry box](#)^[251].

Control area horizontal projection is calculated according to the rule:

A point on the horizontal projection is considered visible if a vertical segment, formed by this point in the range of heights from the [view area lower bound height](#)^[259] to the [view area upper bound height](#)^[258], is visible wholly.



Camera Field of View

A flat figure limited by view area bounds and residing in a plane, perpendicular to the **main optical axis** of camera lens.

The **field of view** has rectangular form only if [lens distortion](#)^[429] is negligible. The **lens distortion** complicates the form of the **field of view**.

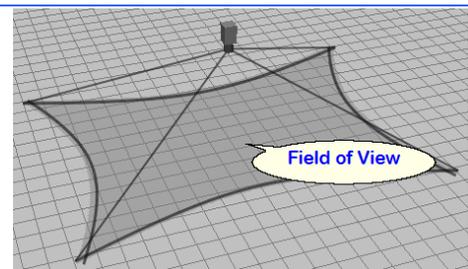


Image sensor size and size of active area of the image sensor

The **Image sensor size** in VideoCAD implies the size of the entire light sensitive area of the

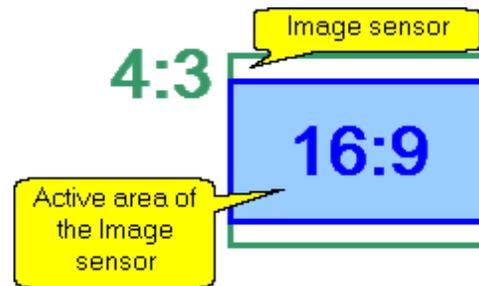
image sensor, which can form an image with the maximum number of pixels horizontally and vertically.

Active area of the image sensor in VideoCAD implies an area of image sensor on which in a given mode of the camera the image is formed. The sizes of the active area may be less than or equal to the **image sensor size**. Active area can differ in different modes of operation of the same camera.

Exactly the **active area size** and **lens focal length**^[256] determines the **angles of view**, and through them influences on the results of camera modeling. Accuracy of specifying the active area size greatly affects the accuracy of modeling the camera.

Aspect ratio of the active area of image sensor is identical with the **aspect ratio of the output image of the camera**, but can differ from the **aspect ratio of the image sensor**.

On the figure on the right you can see the **image sensor size** and the **active area of the image sensor** in case of the image sensor has aspect ratio of 4:3, but the output image from the camera has aspect ratio of 16:9.



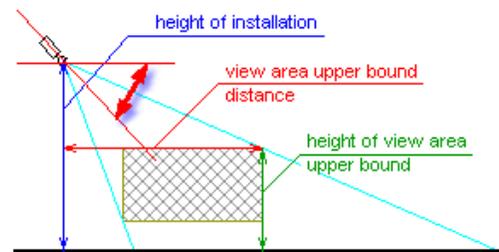
See also: [Specifying active area size of the image sensor](#)^[415]

Camera tilt angle

Camera tilt angle is a calculated parameter and can not be edited directly. The camera tilt angle is an angle between the **main optical axis** of camera lens and a horizontal.

Camera inclination is defined not by the tilt angle but by the three parameters:

- [Height of installation](#)^[257];
- [View area upper bound distance](#)^[260]
- [View area upper bound height](#)^[258]



Background

It is a **prepared horizontal site plan** in any of the following formats:

- *.bmp - a bitmap (e.g., the layout scanned from a paper copy);
- *.dxf - AutoCAD format (created in AutoCAD or other program supporting export to *.dxf);
- *.dwg - AutoCAD format (created in AutoCAD or other program supporting export to *.dwg);
- *.pdf - cross-platform electronic document format from Adobe Systems;
- *.jpg, *.png, *.gif, *.tif - the compressed image (e.g., a digital picture of the plan, scanned image);
- *.wmf, *.emf, *.emf+ - Windows Metafile (export to *.wmf is supported by the majority of the Windows graphics applications).

Over the background, cameras, constructions and 3D models can be drawn.

Compatiability with AutoCAD versions

VideoCAD 8.0 can use files of the following CAD formats as a background:

***.dxf** AutoDesk DXF Release 12, 13, 14 , 2000, 2002, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015.

***.dwg** AutoDesk DWG Release 12, 13, 14 , 2000, 2002, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015.

Software registration by personal registration code (applied for all versions except VideoCAD Professional)

After installing the program you must enter personal pair of the name and the registration code, which is valid on any computer. USB dongle is not required.

If the license provides limited number of workplaces, attempt to run the program on more computers may produce error.

Software registration on USB Dongle basis (applied for VideoCAD Professional)

The program is operable on any computers to which port the dongle is connected. So you can carry the program from computer to computer, modernize computer, etc.

In the past USB dongle was used for VideoCAD6, VideoCAD 7 Lite, VideoCAD 7 Professional. Now it is used for VideoCAD 8 Professional only.

When you purchase a new license of **VideoCAD 8 Professional Kit**, one license of [VideoCAD 8 Lite](#)³¹⁾ can be supplemented free of charge. This minimizes the inconvenience of having to use the USB dongle with VideoCAD Professional.

The dongle should be connected to the USB port of you computer.

Software protection on HID identifiers basis (not used for new licenses)

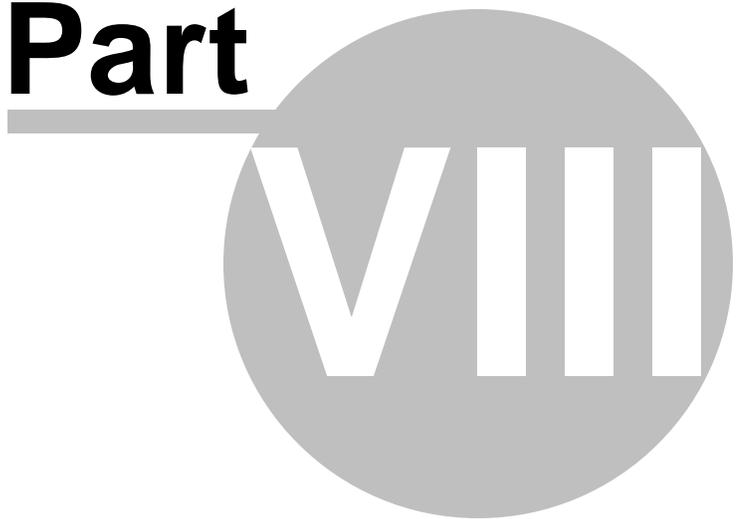
In the past HID protection was used for VideoCAD1..VideoCAD6, VideoCAD 7 Lite. Now it is not used for new licenses.

The registration is realized with the tie to your computer parameters. After computer change, hard disk formatting or other serious upgrade you will need a **reserve registration**.

Although the number of reserve registrations is limited to two, the registration counter cleaning is regularly realized. So you won't lose the purchased program in any case. If you spend all reserve registrations before the registration counter cleaning, you will have to wait for the next registration counter cleaning to continue using the program.

You may exchange the variant on the HID protection to the variant with the dongle protection, paying in addition for the cost of the dongle and delivery.

Part



Getting started

8 Getting started

These illustrated teaching articles with step by step instructions will help you to get started with VideoCAD quickly:

These articles describe working with the Professional version.

[The principles of CCTV design in VideoCAD. Part 1. Camera view area](#) (*.pdf)

[The principles of CCTV design in VideoCAD. Part 2. Person detection area, person identification area, license plate reading area. Spatial resolution.](#) (*.pdf)

[The principles of CCTV design in VideoCAD. Part 3. 3D modeling in VideoCAD](#) (*.pdf)

[The principles of CCTV design in VideoCAD. Part 4. Illumination and camera sensitivity in CCTV](#) (*.pdf)

[The principles of CCTV design in VideoCAD. Part 5. Video surveillance of moving objects.](#) (*.pdf)

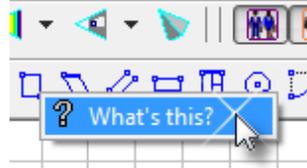
[The principles of CCTV design in VideoCAD. Part 6. Lens distortion in CCTV design.](#) (*.pdf)

See also: [Examples of work with VideoCAD](#)^[353], [CCTVCAD Software on Youtube](#)

VideoCAD employs a **context-sensitive help system**. This means that the program tries to direct you to the portion of the help system that is most likely to answer your question, based on what you are viewing or doing.

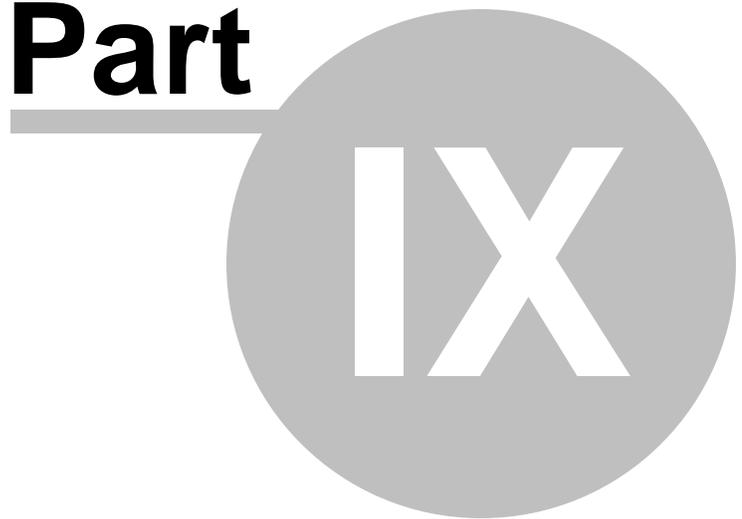
To get detailed information about any component, box or menu item, move the input focus (mouse cursor) to the component and press **F1**.

To get detailed information about any button on the Tool bar, right click on it then choose **What's**



this? pop-up item.

Part



Interface

9 Interface

The VideoCAD Lite interface consists of the [Graphics window](#)^[158] and the additional windows and boxes:

- [Camera Geometry](#)^[251]
- [Sensor and Lens](#)^[267]
- [Spatial resolution](#)^[272]
- [3D Video](#)^[284]
- [3D Models](#)^[291]
- [Monitor window](#)^[294]
- [Table of Camera Models](#)^[304]
- [Options box](#)^[319]
- [Camera list](#)^[336]
- [Serial numeration of cameras](#)^[338]
- [Layouts](#)^[340]
- [Signal cable length calculation box](#)^[341]
- [Power cable electrical parameters and length calculation box](#)^[342]
- [Length calculation of line segments](#)^[343]
- [Image sensor calculator](#)^[349]

You can open any window or box from the Graphics window.

VideoCAD employs a **context-sensitive help system**. This means that the program tries to direct you to the portion of the help system that is most likely to answer your question, based on what you are viewing or doing.

To get detailed information about any component or menu item, move the input focus (mouse cursor) to the component and press **F1**.

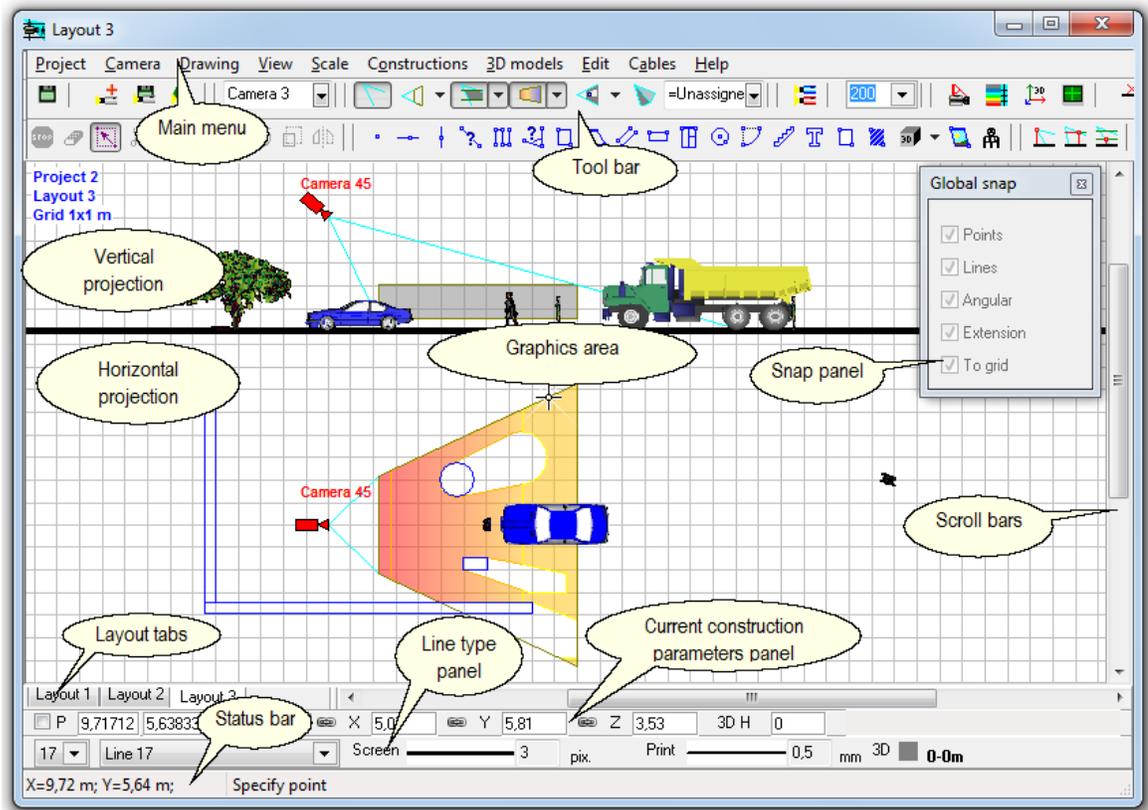
To get detailed information about any button on the Tool bar, right click on it then choose **What's this?** pop-up item.

Mouse:

Any **Wheel Mouse** is particularly convenient when changing parameters and moving along layouts in the **graphics window**.

In all the windows except for the Graphics window the use of mouse is almost the same as when using it with other Windows programs. The use of mouse in the **graphics window** is reviewed in the correspondent [HELP section](#)^[159].

9.1 Graphics window



It is the main window of the program.

The window is designed for the visual cameras' view area representation and analysis, visual choice of lens parameters and camera locations, calculation of cable parameters and a **2D drawing** preparation to be pasted into graphical path of the project.

During [3D modeling](#)^[284], all work of placing and editing 3D models is carried out in the Graphics window too.

The graphics window contains:

- [Graphics area](#)^[159]
- [Main menu](#)^[197]
- [Tool bar](#)^[164]
- [Status bar](#)^[243]
- [Line type panel](#)^[245]
- [Font type panel](#)^[246]
- [Current construction parameters panel](#)^[247]
- [Layout tabs](#)^[242]
- Horizontal and vertical scroll bars
- [Snap panel](#)^[229]
- [Keyboard shortcuts](#)^[249]

9.1.1 Graphics area

See [Graphics area location](#)^[158].

The **graphics area** contains two projections of the current [layout](#)^[340].

A thick black line designating the **ground** in vertical (upper) projection parts these two projections.

You can **hide** any projection using the tools [Hide horizontal projection](#)^[176]  and [Hide vertical projection](#)^[176]  or using the corresponding items of the [Main menu](#)^[197].

Main work is carried out as a rule in the horizontal projection. Vertical projection is used only in some cases.

[Navigation](#)^[159]

[Coordinate systems](#)^[160]

[Types of objects](#)^[160]

[Possible states of objects](#)^[160]

[Normal state](#)^[160]

[Selected state](#)^[161]

[Editing state \(active state of cameras \)](#)^[161]

[Hidden state](#)^[163]

Navigation

Wheel Mouse is particularly convenient when working in the **graphics window**. Using the **Wheel mouse** you can change drawing scale with the simultaneous zooming in the drawing sections pointed by the cursor. 

If **Ctrl is not pressed** at **changing the scale**, then the scale changes roughly which is convenient at navigation.

If **Ctrl is pressed**, the scale changes with the less step which is convenient for the precise drawing positioning before [printing](#)^[207] or [saving](#)^[202].

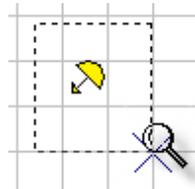
The Step and direction of scaling can be changed in wide range via [Scale factor](#)^[333] in the Options box.

You can **move the drawing** by pressing and holding down the **mouse wheel** (or the middle button). If **Ctrl** is not pressed, the entire drawing is dragged, if **Ctrl** is pressed, the horizontal projection is dragged only.

You can move drawing using horizontal and vertical scroll bars.

When [Alt is pressed](#)^[249], it is possible to move drawing in the Graphics window using arrow keys and change scale using plus and minus keys irrespective of the input focus.

To increase any screen area press in the corner of the area and hold the right mouse button then move the mouse with the right button pressed. At the same time you will see zoom window. After releasing the button, the area inside the zoom window will be shown on the full screen.



There is an opportunity of quick navigation with the help of [text markers](#)^[219].

Since all the constructions in VideoCAD are made by **two clicks**, but not by pressing and release the mouse button (as in most CAD programs), so it is very convenient to combine constructions

with quick navigation.

To show all cameras and constructions, use item of the **Main menu** or **Pop-up menu**: Scale>
[Show all](#)^[219].

Coordinate systems

The **graphics area** allows to use 2 [coordinate systems](#)^[218]:

- **Fixed coordinate system**
- **Float coordinate system attached to the [Active camera](#)**^[162]

In case of **Fixed coordinate system**, the **origin of coordinates** does not vary when changing the active camera. The origin of coordinates is displayed by **two icons**  in horizontal and vertical projections. You can change a point of origin after choosing the menu item **View > [Set origin](#)**^[218].

In case of the **coordinate system attached to the active camera**, the origin always coincides with the active camera location. It is convenient when studying its view area.

A [grid](#)^[176] is fixed to the **origin of coordinates**, and the counting of the **cursor current coordinates** in the [status bar](#)^[243] starts from the origin.

Types of objects

The **graphics area** may contain the following **objects**:

- **Cameras**
- [Constructions](#)^[181]
- [3D objects](#)^[229]
- [Backgrounds](#)^[204]
- [Cables](#)^[238]
- [Texts](#)^[189]
- [Titles](#)^[216]

Possible states of objects

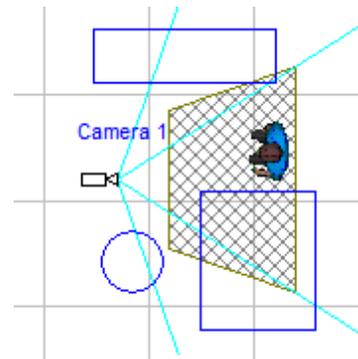
All the **objects** except for the **backgrounds** and **titles** can take one of the following states:

- [Normal](#)^[160];
- [Selected](#)^[161];
- [Editing](#)^[161] (active state of camera);
- [Hidden](#)^[163];

You can change object's state with the help of the [Select/Edit](#)^[177]  tool.
To hide objects use the [Hide](#)^[236] Main menu item.

Normal state

An object is displayed in its usual color. Editing and moving is not possible.



Selected state

An object is displayed in **pink color**. It is possible to **delete, drag, move, rotate, change draw order, scale, mirror and copy** the **object**.

Several objects can be selected at a time.

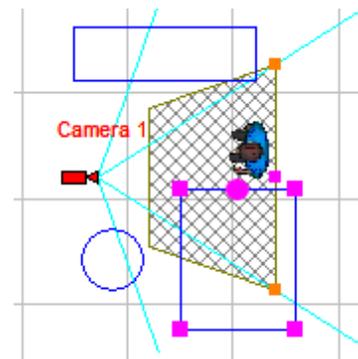
You can select objects by clicking or by capturing by the **selection window** in the [Select/Edit](#) mode.

See [Select/Edit](#) for details.



Editing state (active state of cameras)

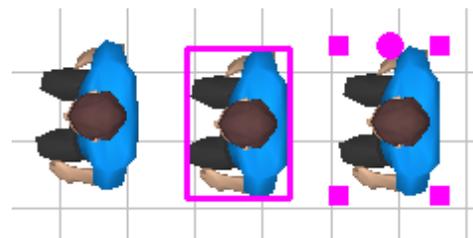
Object's **base points** are marked with **pink grips**, **camera name and icon** are marked with **red color**, **texts** are displayed in **pop-up frame**.



In the editing state, [3D models](#) are displayed with square grips and pink circle.

The editing state can be taken only by one of the objects and one camera at a time. One of the cameras is always Active.

Switching an object to the editing state is performed by **double clicking** the object in the [Select/Edit](#) mode.



To switch [circle](#) into the **editing state** you need to double-click on **its center** or on the **point on its radius** that appears during the process of construction.

To switch [arc](#)^[226] into the editing state you need to double-click on **its center** or on **either of its two ends**.

How to edit objects

You can change the shape and geometrical sizes of the objects and **edit the texts**. The [line types](#)^[245] of the objects and the [fonts](#)^[246] of the **texts** can be changed, too.

To edit an object click beside a **base point** with a grip and move the cursor. After clicking for the second time, the changed object will be saved.

When on one side of a construction a circle appears, the construction can be rotated around its axis by gripping the circle by the mouse.

When editing a [rectangle](#)^[184] or a [mask](#)^[189], then several points will move at a time, the **rectangle** or the **mask** remaining square.

If **Ctrl** is pressed when editing a **rectangle** or a **mask**, then **one point** will move only.

When editing the [Double line](#)^[185] or [Wall](#)^[186], the **whole Double line or Wall** will be moved.

If **Ctrl** is pressed when editing the **double line or wall**, **only one line** will be moved.

When clicking the [text](#)^[189] twice the **pop-up frame** appears allowing to edit **text** in it. When clicking the right mouse button the **pop-up menu** of text editing appears in the frame.

You can rotate the 3D model by the mouse using the circle, scale 3D model on X and Y axis using the square grips. You can move the 3D model by pressing the left mouse button on the 3D model, as well as in the selected state.. Sizes of 3D models can be edited with the help of the [Current construction parameter](#)^[247] panel or by changing [line type](#)^[245].

It is possible to change object's parameters in editing state on the [current construction parameters panel](#)^[247] which automatically appears in the bottom of graphics window.

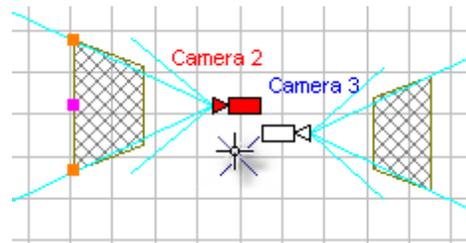
You can edit the object by changing parameters on the panel.

Active camera

Pay attention that the icon of one of cameras is **highlighted in red**, and icons of other cameras are colorless. One of cameras is always **active**.

The **active camera** parameters are displayed in the [Camera Geometry box](#)^[251], [Spatial resolution](#)^[272].

The **active camera** itself is displayed on the foreground in the **Graphics window**.

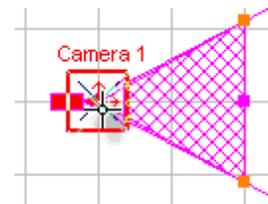


In the [3D Video](#)^[284] there is an image from the active camera.

To switch camera to **active state** double-click on the center of its lens.

You can fast activate any camera in the project using the [Active camera](#)^[167] combo box on the **Tool bar**. To activate a camera, just choose its name in the list.

To find the active camera on the layout, right click on the combo

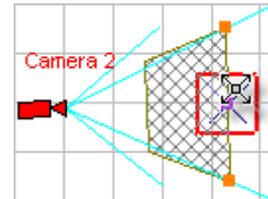


box then choose **Find camera** item.

The active camera **parameters** can be changed both using the **boxes** and graphically with the tools of the [Active camera group](#)^[195]. With the help of the [View](#)^[167] button group you can change the appearance of **view area projections** of the **active camera**.

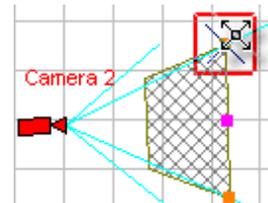
For tilting and panning the active camera on the layout in [Select /edit](#)^[177] mode:

- Move the cursor to the pink grip in the middle of the view area bound. Thereupon, the point will be outlined by red square;
- Click on it by mouse;
- Move the cursor;
- To stop tilting or panning click once again on a point where the middle of the view area bound is to be located.



To change lens focal length^[256] of the active camera on the layout in [Select /edit](#)^[177] mode:

- Move the cursor to any orange grip on the ends of view area bound. Thereupon, the point will be outlined by red square;
- Click on it by mouse;
- Move the cursor;
- To stop changing focal length click once again on a point where the end of view area bound is to be located.



☐ Hidden state

An object is displayed on the background in **light grey** color. **3D objects** are displayed as grey frames. The rest characteristics are similar to those of **normal state**.

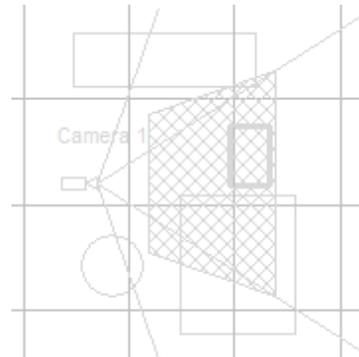
The **hidden state** is used to conceal the temporarily interfering objects.

Constructions in the **hidden state** is not exported to [AutoCAD formats](#)^[202].

The snap [Extension](#)^[229] is disabled for **hidden objects**.

Several objects can be hidden at a time.

To hide an object use [Select/Edit](#)^[177] and [Hide](#)^[236] tools.



9.1.2 Tool bar



See [Tool bar location](#)^[158].

Visibility of buttons on the Tool bar can be adjusted on the [Toolbar](#)^[332] tab of the **Options box**.

- **'Project' button group**^[166]
 - [Save project](#)^[166]
- **"Camera" button group**^[166]
 - [New](#)^[166]
 - [Save to project](#)^[167]
 - [Camera list](#)^[167]
 - Combo box [Active camera](#)^[167]
- **"View" button group**^[167]
 - [View area edges](#)^[167]
 - [View area projection bounds](#)^[168]
 - [Fill projections](#)^[169]
 - [Spatial resolution](#)^[170]
 - [Shadow](#)^[172]
 - [3D view area](#)^[174]
 - Combo box [Model of active camera](#)^[174]
 - [Table of camera models](#)^[175]
 - Combo box [Lens focal length](#)^[175]
 - [Camera Geometry](#)^[176]
 - [Spatial resolution](#)^[176]
 - [3D Video](#)^[176]
 - [Monitor window](#)^[176]
 - [Hide vertical projection](#)^[176]
 - [Hide horizontal projection](#)^[176]
- **"Grid" control element group**^[176]
 - [Grid selected step box](#)^[176]
 - [ON/OFF mode of automatic grid step selection](#)^[177]
- **"Edit" button group**^[177]
 - [Stop operation](#)^[177]
 - [Erase](#)^[177]
 - [Select/Edit](#)^[177]
 - [Cut](#)^[179]
 - [Copy](#)^[180]
 - [Paste](#)^[180]
 - [Move](#)^[180]
 - [Rotate](#)^[180]
 - [Scale](#)^[181]
 - [Mirror](#)^[181]
- **"Construction" button group**^[181]
 - [Point](#)^[182]
 - [Horizontal line](#)^[182]
 - [Vertical line](#)^[182]
 - [Line segment](#)^[183]
 - [Polyline](#)^[183]
 - [Angle](#)^[183]
 - [Rectangle](#)^[184]
 - [Inclined rectangle](#)^[184]
 - [Double line](#)^[185]
 - [Wall](#)^[186]
 - [Aperture in Wall](#)^[187]
 - [Circle](#)^[187]
 - [Arc](#)^[188]
- [Text](#)^[189]
- [Mask](#)^[189]
- [Filling](#)^[189]
- [3D model](#)^[190]
- [3D image](#)^[191]
- [Rotakin](#)^[192]
- [Signal cable](#)^[193]
- [Power cable](#)^[193]
- [Global snaps](#)^[194]
- **"Active camera" control element group**^[195]
 - [Change installation height](#)^[195]
 - [Change view area upper bound](#)^[195]
 - [Change view area lower bound](#)^[195]
- **"Scale" button group**^[195]
 - [Move drawing](#)^[195]
 - [Zoom in/zoom out](#)^[195]
- **'Undo' button group**^[196]
 - [Undo](#)^[196]
 - [Redo](#)^[196]

 [ON/OFF grid displaying](#)


9.1.2.1 Tools



See [Tool bar location](#)^[158].

Visibility of buttons on the Tool bar can be adjusted on the [Toolbar](#)^[332] tab of the **Options box**.

'Project' button group

Save project

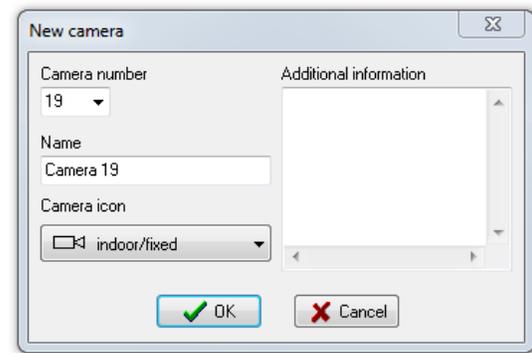
Save working project to a file.

"Camera" button group

New

Create **new camera** with default parameters.

In the dialog box appeared you can change **camera number**, **name**, type of the camera which determines the kind of icon by which it will be displayed. If necessary, you can enter **additional information** on the created camera (for example: purpose, a place and features of installation).



Later it is possible to change name, number, type of the camera and the additional information in the [Camera list](#)^[336] box.

Cameras can be numerated sequentially with the help of the [Numerate cameras](#)^[201] tool.

Cameras are displayed by different icons only if the Display camera type box in the [Options box](#)^[319] is marked.

On the [Line type panel](#)^[245] it is possible to choose [line type](#)^[320] by which the icon of the camera and [View area projection bounds](#)^[168] will be drawn. When displaying [spatial resolution](#)^[170] is disabled, projection will be [filled](#)^[169] (hatched) by the color of assigned line type. Later it is possible to change line type using [Change line type](#)^[237] tool.

[Hatch style](#)^[169] is determined by style of a [line type](#)^[320], assigned to the camera (solid, dash, dot, dash dot etc.).

After entering all necessary data click **OK**, to cancel the operation click **Cancel**.

If there is already a camera with chosen number in the current project, VideoCAD will ask to specify, whether you would like to rewrite it.

After camera creation specify by clicking a place for the new camera on the layout.

Just after camera creation the moving mode will be switched on. When placing will be completed,

click  [Select/Edit](#)^[177] button or press **ESC**.

It is convenient to create new cameras with already set parameters by [copying](#)^[180] and [pasting](#)^[180] existing ones.

Save to project

All the **specified** and **calculated parameters** of the [Active camera](#)^[162] and layout are saved to the current project.

Saving is performed automatically at many operations.

Camera list

Clicking this button opens **Camera list box**, in which camera list of current project is displayed. [Active camera](#)^[162] is highlighted by **red frame**. Any camera can be activated, removed, renamed, found on layouts, it is possible to show 3D image from any camera. It is also possible to sort cameras in the list. For carrying out any manipulations with the camera first select its name in the list by single clicking.

See more: [Camera list](#)^[336]

Active camera combo box

Using the combo box, you can fast activate any camera in the project. To activate a camera, just choose its name in the list.

To find the active camera on the layout, right click on the combo box then choose **Find camera** item.

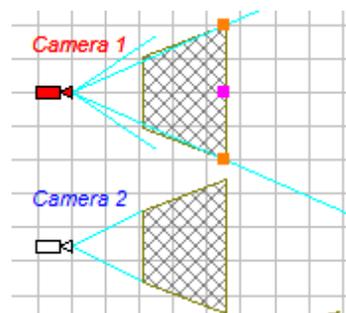
"View" button group

View area edges

Show the Active camera view area edges, calculated according to [parameters](#)^[253] in the **Camera Geometry box**.

Line type can be changed in the [options box](#)^[320].

When [View area projection bounds](#)^[168] is disabled, but [Shadows](#)^[172] is enabled, the [View area edges](#)^[168] is shown simplified in the form of two rays.



If the [line type of camera](#)^[166] coincides with default line type for camera icons, specified in the Options box, then for this camera the line type of View area edges is taken from the Options box>Lines>System line types>[Bounds](#)^[320]. This line type is assigned to new cameras by default (Camera 32 on the figure).

Default line type for cameras is Line 21.

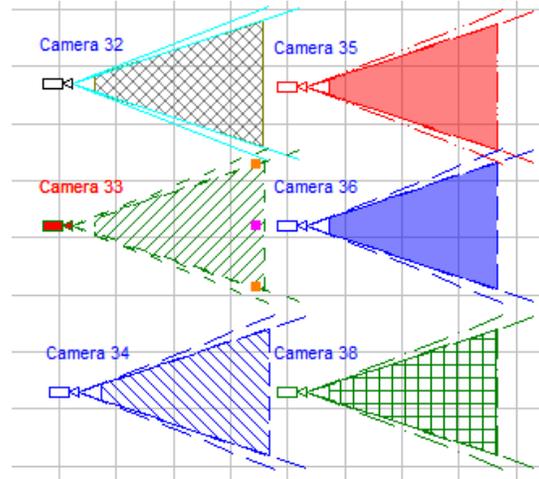
If another line type was assigned to the camera, the View area edges of this camera is drawn by this line type assigned to the camera, as well as the [View area projection bounds](#)^[169] and camera icon. (Camera 33...38).

Thus you can draw different cameras and their view areas by different colors, thickness and line style.

In VideoCAD Lite the View area edges are visible in the [3D Video](#)^[284] window as lines when [3D view areas](#)^[174] is enabled and the [3D view areas](#)^[288] menu item is marked.

*A button state at the moment of camera saving determines whether the **view area edges** of the given camera will be displayed when this camera is inactive.*

If selected cameras exist on the current layout, except the active camera, this button changes view  and operates the visibility of **View area edges** of all selected cameras simultaneously.



View area projection bounds

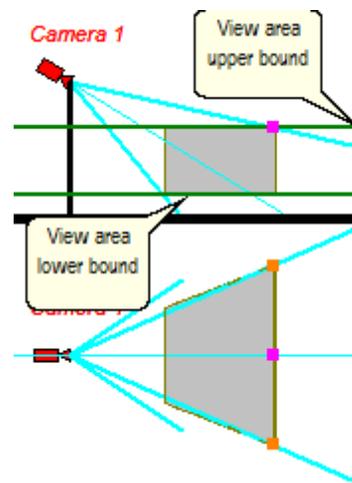
Show the bounds of the Active camera view area projections calculated according to [parameters](#)^[253] in the Camera Geometry box.

Submenu of the button:

1.  **Projection** - show View area projection bounds of the active camera.

Projection is calculated according to a simple rule:

A point on the horizontal projection is considered visible if a vertical segment, formed by this point in the range of heights from the [view area lower bound height](#)^[259] to the [view area upper bound height](#)^[258], is visible wholly.



*Difference between the **View area projection bounds** and [Shadows](#)^[172] buttons is that the **View***

area projection bounds are built without obstacles on the scene but the **Shadows** are built considering obstacles. Both buttons can be used simultaneously in various combinations.

2. **Off** - don't show.

When **View area projection bounds** is disabled, but **Shadows**^[172] is enabled, the **View area edges**^[168] is shown simplified in the form of two rays.

If the **line type of camera**^[166] coincides with default line type for camera icons, specified in the **Options box**^[327], then for this camera the line type of **View area projection bounds** is taken from the **Options box>Lines>System line types>Bounds**^[320]. This line type is assigned to new cameras by default.

If another line type was assigned to the camera, the **View area projection bounds** of this camera is drawn by this line type assigned to the camera, as well as the **View area edges**^[168] and camera icon.

A button state at the moment of camera saving determines whether the bounds of the given camera view area projections will be displayed when this camera is inactive.

If selected cameras exist on the current layout, except the active camera, this button changes view  and operates the visibility of **View area projection bounds** of all selected cameras simultaneously.

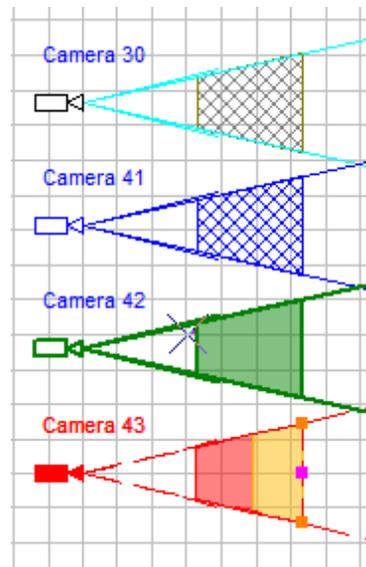
Fill projections

Hatch or fill by blend color view area projections of **active camera**^[162] (if these projections exist) calculated according to parameters in the **Camera Geometry**^[253] box.

If the **line type of camera**^[166] coincides with default line type for camera icons, specified in the **Options box**^[327], then hatching (filling) projections of this camera is performed by grey color by default (Camera 30 on the figure).

If another line type was assigned to the camera, then hatching (filling) projections of this camera is performed by a color of this line type assigned to the camera. (Camera 41,42).

If the **Spatial resolution**^[170] is enabled, then colors of hatching (filling) projections is determined by Spatial resolution parameters (Camera 43).



Drop-down menu:

-  **Hatching** - hatch projections.
-  **Filling** - fill projections by blend semitransparent color.

If the **Hatching** item is chosen, but in the drop-down menu of the [Spatial resolution](#)^[170] button the **Gradient** item is chosen, then the projections will be hatched by a bold style of hatch without gradient.

Transparence of filling in the Graphics window and the [3D Video](#)^[288] can be adjusted in the Options box.

3. Off - don't hatch and fill view area projections.

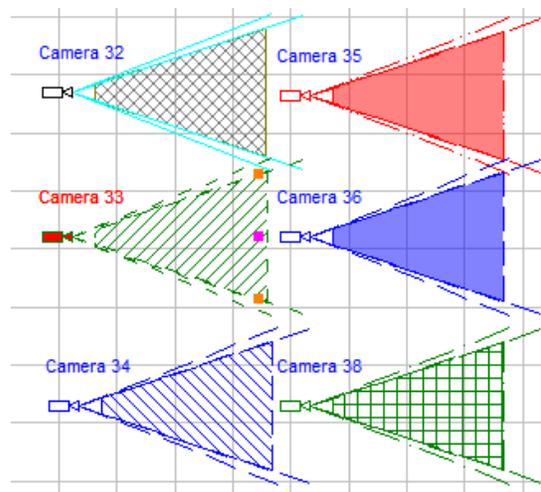
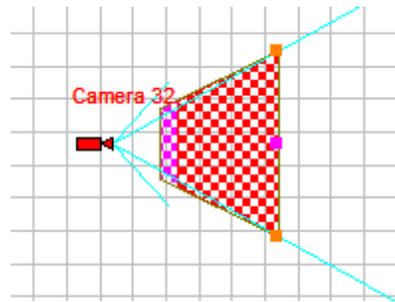
If **Off** is chosen in the **Fill projections** and [Shadows](#)^[172], then filling view area faces in the [3D Video](#)^[288] is not shown.

If the [line type of camera](#)^[166] coincides with default line type for camera icons, specified in the Options box, then for this camera Filling is performed by Gray color and Hatching by **DiagCross** style. (Camera 32)

Default line type for cameras is Line 21.

If another line type was assigned to the camera, then for this camera filling is performed by a color determined by **color** of the line type and hatch style is determined by **style** of the line type (Camera 33...38).

Thus you can fill and hatch projections of different cameras by different colors and hatch styles.



A button state at the moment of camera saving determines whether the filling or hatching of the view area projections of the camera will be displayed when this camera is inactive.

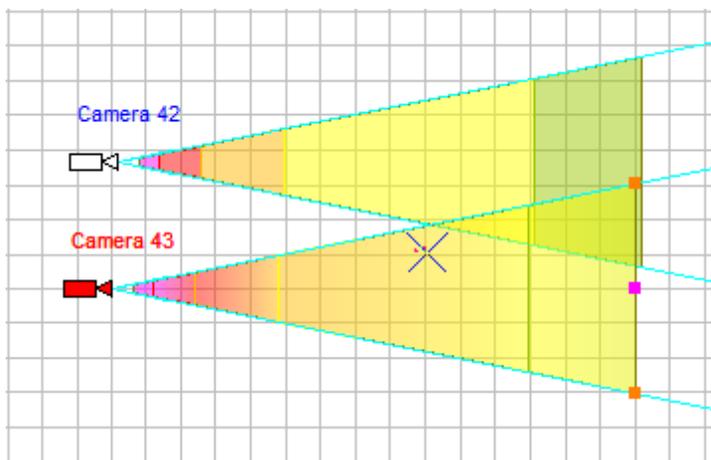
If selected cameras exist on the layout, except the active camera, this button changes view  and operates the visibility of filling (hatching) projections of all selected cameras simultaneously.

Spatial resolution

Fill in different colors **regions** on the **view area projections of the active camera**, depending on the **spatial resolution** within these regions.

Colors of the regions and the boundary values of the spatial resolution are determined by the **spatial resolution pattern** assigned to the camera.

In the [Spatial resolution box](#)^[272] you can edit the patterns and assign them to cameras.



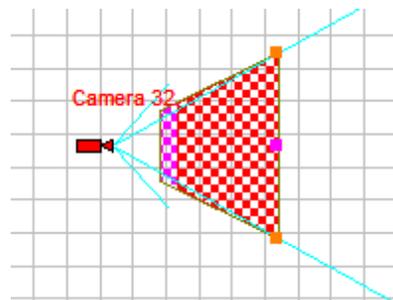
Drop-down menu:

1.  **Discrete colors** - fill the regions in discrete colors in accordance with a spatial resolution at the far bounds of the regions.
2.  **Gradient** - fill the view area projection in gradient color according to the spatial resolution at each point on the projection.

*In case of gradient color is chosen, the colors at the **far region bounds** equal to the colors of the **spatial resolution pattern**, but between the bounds color changes smoothly, as well as real spatial resolution.*

Gradient reflects the spatial resolution more accurately and looks impressive, but discrete colors are more intuitive and easy to use..

*If the **Gradient** item is chosen, but in the drop-down menu of the [Fill projections](#)^[169] button the **Hatching** item is chosen, then the projections will be hatched by a bold style of hatch without gradient.*

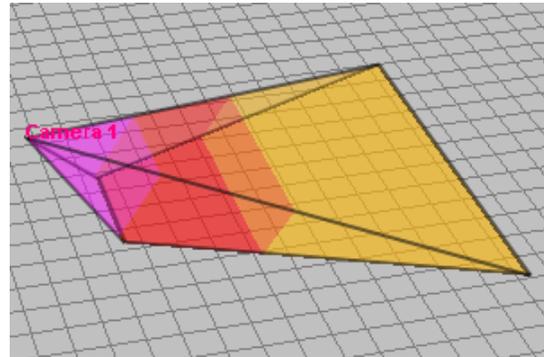


Calculation of gradient demands a lot of resources and increases redraw time.

3. **Off.** - don't display spatial resolution

*In the [Dome](#)^[172] mode the **Spatial resolution** is calculated without taking into account pan and tilt angles of camera. It is assumed that the camera can pan and tilt freely, and spatial resolution is calculated at the center of the field of view.*

The *Spatial resolution* button controls displaying spatial resolution on [3D View areas](#) ^[174] in the [3D Video](#) ^[288].



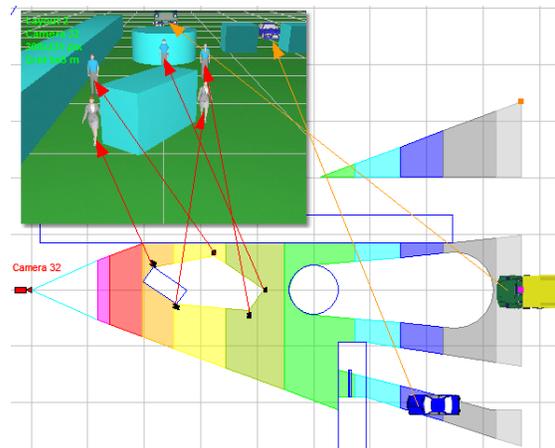
A button state at the moment of camera saving determines whether the spatial resolution of the camera will be displayed when this camera is inactive.

If selected cameras exist on the layout, except the [Active camera](#) ^[162], this button changes view  and operates the visibility of spatial resolution of all selected cameras simultaneously.

See also: [Spatial resolution box](#) ^[272], [Visualization of the camera control area projections and spatial resolution within them](#) ^[381].

Shadow

Display horizontal projection of the view area of **the active camera** taking into account shading from [constructions](#) ^[181].



Shadows - a powerful yet easy-to-use tool of VideoCAD. Shadows are calculated for all positions of cameras, shading objects can be located at any point of space. You should only enable calculation of shadows with the help of this button.

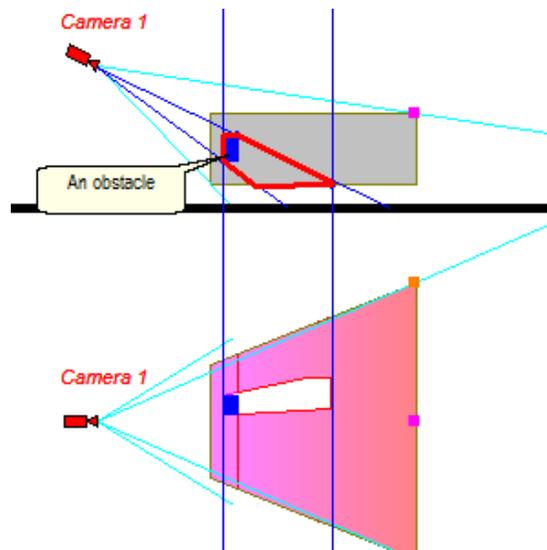
Shading takes into account the camera installation height and all 3 coordinate of constructions (including heights).

Drop-down menu:

1.  **Within projection** - display view area projection taking into account shadows. Shading is calculated according to a rule:

A point on the horizontal projection is considered visible if a vertical segment, formed by this point in the range of heights from the [view area lower bound height](#)^[259] to the [view area upper bound height](#)^[258], is visible wholly.

By the same rule the [horizontal projections](#)^[168] of view area are calculated. Changing the height of the lower and upper bounds of view area could change conditions of calculation of shading.



2.  **Dome** - display projection of the territory controlled by the camera in 360 degrees, without view area borders, but only taking into account the shadowing.

When the **Dome** item is chosen, actually the **control area** of a **dome (PTZ)** camera is displayed.

The **Dome** mode is also useful for choosing the best installation place for fixed cameras to make required areas reachable for the cameras.

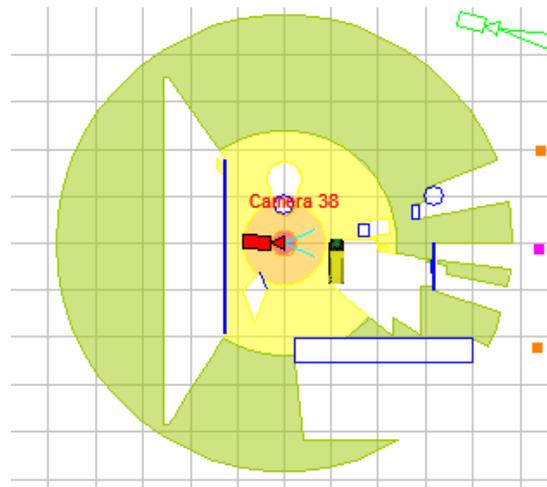
In the **Dome** mode all shaded areas from the specified camera position become visible.

In the **Dome** mode the [Spatial resolution](#)^[170] is calculated without taking into account pan and tilt angles of camera. It is assumed that the camera can pan and tilt freely, and spatial resolution is calculated at the center of the field of view

In the Graphics window calculation of shadows in the Dome mode is performed like in the [Within projection](#)^[173] mode, ie according to the rule:

A point on the horizontal projection is considered visible if a vertical segment, formed by this point in the range of heights from the [view area lower bound height](#)^[259] to the [view area upper bound height](#)^[258], is visible wholly.

3. **Off** - disable shadow calculation and displaying.



Difference between the **Shadows** and [View area projection bounds](#)^[168] buttons is that the **View area projection bounds** are built without obstacles on the scene but the **Shadows** are built

considering obstacles. Both buttons can be used simultaneously in various combinations.

The **Shadow button** works in conjunction with the [Spatial resolution](#)^[170]  and the [Fill projections](#)^[169]  buttons. Depending on the state of these buttons, shadows can be displayed in different ways: as filling, as shading, as a border lines, with mapping spatial resolution or not.

The calculation of shading - resource-intensive operation. During the shadow calculation on the **Shadow button** **red frame flashes** .

Automatic shadow calculation is performed only for the [active](#)^[163] camera. To recalculate shading for a particular camera - activate this camera. To recalculate shading for all selected cameras, click [Main Menu>View>Recalculate shadows](#)^[215].

To temporarily disable the automatic calculation of shading (keeping already calculated shadows visible) clear the item [Main menu>View>Calculate shadows for active camera](#)^[215].

Whether or not a specific construction takes into account in the calculation of shading determines by the [Shadow](#)^[320] checkbox of the line **type used** for the construction.

A button state at the moment of camera saving determines whether the shadows of the camera will be displayed when this camera is inactive.

If selected cameras exist on the layout, except the [Active camera](#)^[162], this button changes view  and operates the visibility of shadows of all selected cameras simultaneously.

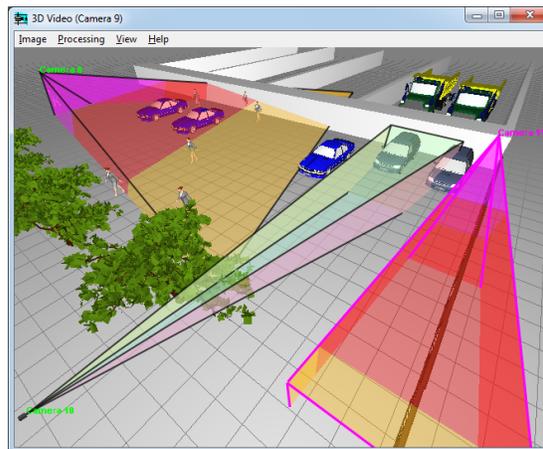
See also: [Shadows](#)^[172], [Main menu>View>Calculate shadows for active camera](#)^[215], [Main Menu>View>Recalculate shadows](#)^[215], [Line type>Shadow](#)^[320], [Options box>Miscellaneous>Shadow](#)^[333], [Choosing the best place for PTZ \(dome\) camera](#)^[384], [Visualization of the camera control area projections and spatial resolution within them](#)^[387]

3D view area

Show 3D transparent view area in the **3D Video** window.

The **3D Video>Main menu>View>3D View areas** menu item must be marked.

See details: [3D Video>Main menu>View>3D View areas](#)^[288]



Button state at the moment of camera saving determines whether the 3D view area of the given camera will be displayed when this camera is inactive.

If selected cameras exist on the current layout, except the [Active camera](#)^[162], this button changes view  and operates the visibility of **3D view areas** of all selected cameras simultaneously.

Model of active camera

Using this combo box, you can choose a model for the [Active camera](#)^[162].
The list consists of two parts:

Under **=Used models =** header there are camera models listed which are already used in the project . All parameters of these models can be seen on **Used models** tab in the [Table of camera models](#)^[304].

Under **=All models = header** there are **all** camera models listed which are available in the database of models. Parameters of these models can be seen and edited on **All models** tab in the Table of camera models.

To assign a model, just choose its name in the list.

As a result of model assignment to the active camera, model parameter values will be assigned to parameters of the active camera. After that changing some parameters will be locked.

There is **=Unassigned = string** in the bottom of the list. Choose this string if it is necessary to remove model assignment from the active camera. As a result of removing model assignment all parameters of the active camera will be unlocked and can be changed.

*You can change model **of all selected cameras simultaneously**. For this purpose:*

- [Select](#)^[177] necessary cameras on the layout
- Right click on this combo box, then click on the **Assign to selected cameras** pop up item.

See more: [Table of camera models](#)^[304]

Table of camera models

Show **Table of camera models**. In this table it is possible to adjust parameters of camera models and assign any model to the [Active camera](#)^[162]. The table can be exported to *.txt, *.csv, *.htm, *.rtf, *.xls formats.

See more: [Table of camera models](#)^[304]

Lens focal length combo box

The box duplicates a corresponding [box](#)^[256] in the **Camera Geometry** box to enhance the convenience when using the **graphics window**.

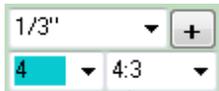
When moving the cursor to the box with a lens focal length the information on the **lens view angles** appears.

If a [model](#)^[304] is assigned to the camera, and the model has [fixed](#)^[316] focal length lens, then you can not change the focal length.

If a model is assigned to the camera, and the model has a lens with [limited](#)^[317] variable focal length, then you can change focal length within the limits only. When approach to the limit values, the box will become crimson.

You can change focal length in wide range of 0.5-1000mm of cameras, which have not assigned model or the assigned model have not specified limits of the lens focal length.

If the active camera is [panoramic](#)^[269] then the lens focal length box is colored by aqua-green.



You can change lens focal length **of all selected cameras simultaneously**. For this purpose:

- [Select](#)^[177] necessary cameras on the layout
- Right click on this combo box, then click on the **Assign to selected cameras** pop up item.

See more: [Lens focal length](#)^[256]

Camera geometry

Clicking this button will open [Camera Geometry box](#)^[251]. This box includes geometric parameters of the camera, lens and installation parameters of the camera.

See more: [Camera geometry box](#)^[251]

Spatial resolution

Show or hide the [Spatial resolution box](#)^[272]. In this box it is possible to create and edit patterns of spatial resolution and field of view size visualization. In the box there are prepared spatial resolution patterns according to the following criteria: Home Office Scientific Development Branch, Home Office Guidelines for identification, P 78.36.008-99, Australian Standard AS4806: Closed Circuit Television, European Standard EN 50132-7, ISO/IEC 19794 Biometric data interchange formats. Also in the box there are examples of images are automatically displayed for each region of spatial resolution.

See more. [Spatial resolution box](#)^[272], [Spatial resolution button](#)^[170].

3D Video

Show or hide the **3D Video** window. The **3D Video** displays the image from the [Active camera](#)^[162].

During the image generation in the 3D Video window on the **3D Video button red frame flashes**



See more: [3D Video](#)^[284].

Monitor window

Show or hide **Monitor window**. In the Monitor window images from any quantity of cameras are displayed simultaneously. Monitor window allows modeling monitors of video surveillance system.

See more: [Monitor window](#)^[294].

Hide vertical projection

If this button is pressed, the **horizontal projection** is only present in the **graphics area**.

To display a **vertical projection** click this button again.

Hide horizontal projection

If this button is pressed, the **vertical projection** is only present in the **graphics area**. To display a **horizontal projection** click this button again.

"Grid" control element group

The [graphics area](#)^[159] includes **2 grids** with the coinciding horizontal coordinates: a **grid in the vertical projection** and a **grid in the horizontal projection**. The grid origin coincides with the chosen [origin of coordinates](#)^[218].

Grid selected step box

To change a grid step click the box and choose the required step from the pop-up list.
 If the **automatic step selection** mode is active when changing the step value in the box this mode is deactivated.

See also: ["Grid" control element group](#)^[176]

ON/OFF the automatic grid step selection mode

Switch on/off the mode of **automatic grid step selection** according to a drawing scale.

See also: ["Grid" control element group](#)^[176]

ON/OFF displaying grid

Switch on/off displaying grid.

Choosing **NO** in the **grid step selection box** can also deactivate grid displaying.

See also: ["Grid" control element group](#)^[176]

"Edit" button group

Buttons of this group are used for the editing [constructions](#)^[181], [3D objects](#)^[229], [cables](#)^[193], [texts](#)^[189] and **cameras**. In this case the [status bar](#)^[243] in the bottom of the Graphics window displays hints.

When editing an object the **projections** should be taken into account. Different projections are different views, though connected ones. Moving objects correctly between projections has no sense and is impossible to perform.

To start the editing [select](#)^[177] the desired **objects**. An object can be inaccessible for selection if it belongs to a not enabled layer

Choosing the items from the pop-up menu that appears when clicking the [graphics area](#)^[159] by the right mouse button performs the commands of this group as well.

Stop operation

Stop the current operation. Use also **Esc**.

Erase

Erase the [selected objects](#)^[161]. To select objects use the button [Select/Edit](#)^[177].

If there are no **selected objects** this button is disabled.

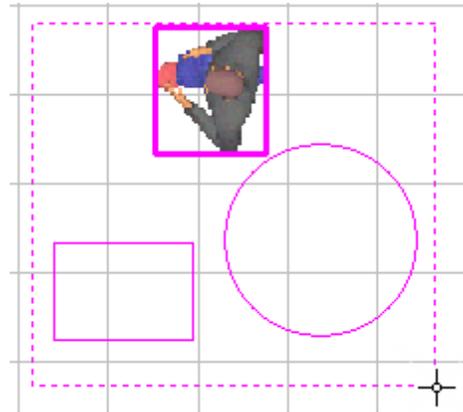
Use also **Del**.

You can not erase the [Active camera](#)^[162].

Select/Edit

With this button chosen the first corner of **selection window** appears when clicking any empty place of **graphics area**^[159] once. Clicking it again completes the designation of **selection window**.

All the **objects**, which hit in the **selection window** and reside on the **projection** coinciding with one being clicked for the first time, will be **selected**^[161]. However, the earlier **selected objects** not hitting in the **selection window** will revert to **normal state**^[160].



If **Ctrl** is pressed at clicking, the **objects** within the **selection window** are inverted, on the contrary, state of those not hitting in the **selection window** remains the same.

It is possible to **select objects by one** by clicking their image once, thus enabling the earlier selected **objects** to revert to normal state.

If **Ctrl** is pressed at clicking, the **objects** are inverted, and the state of the rest remains the same.

During construction **3D scenes**^[284] it is often necessary to place some constructions one over another at a different height, made by means of different **line types**^[320].

To **select one or more construction, located one over another**, made by means of different line types:

- make the **line type panel**^[245] visible, for example by double clicking any construction;
 - choose on the panel the line type of construction you want to select;
- select the construction by clicking.

Just repeat clicking at the same place without moving the cursor. Thus objects under the cursor will be selected sequentially.

To move objects on the foreground or background use menu items: **Bring to front**^[236], **Send to back**^[236].

Selected objects can be moved. To move the selected objects, bring the cursor to the selected one, press the left mouse button and move the selected objects. After finishing the moving, release left mouse button.

To cancel selection click this button again.

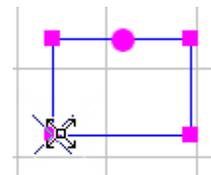
To **select all objects** on the current layout use **Ctrl+A** shortcut.

For switching to Select / Edit mode from any mode use also **Esc** button.

See also: **Selected state**^[161]

Editing state of objects

To translate an object into **editing state**^[161] double-click its image. After that **pink grips** appear on the object base points. When moving the cursor over this point its image changes.



To edit an object click beside a base point with a grip and move the cursor. After clicking for the second time, the changed object is set up.

If on one side of a construction a **circle** is displayed, the construction can be rotated around its

axis by gripping the circle by mouse.

To switch the [circle](#)^[225] into the editing state you need to double-click on its center or on the point on its radius that appears during the process of construction.

To switch the [arc](#)^[226] into the editing state you need to double-click on its center or on either of its two ends.

When editing a [rectangle](#)^[184] or a [mask](#)^[189], then several points will move at a time, the rectangle or the mask remaining square.

If **Ctrl** is pressed when editing a rectangle or a mask, then one point will move only.

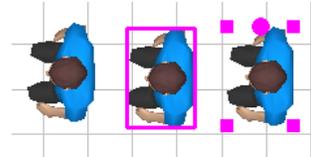
When editing a [Double line](#)^[185] or [Wall](#)^[186], the whole Double line or Wall will be moved.

If **Ctrl** is pressed when editing the double line or wall, only one line will be moved.

When clicking the [text](#)^[189] twice the pop-up frame appears allowing to edit text in it. When clicking the right mouse button the pop-up menu of text editing appears in the frame.

In the editing state, [3D models](#)^[190] are displayed with square grips and pink circle.

You can rotate the 3D model by the mouse using the circle, scale 3D model on X and Y axis using the square grips. You can move the 3D model by pressing the left mouse button on the 3D model, as well as in the selected state.



It is possible to change object's parameters in editing state on the [current construction parameters panel](#)^[247] which automatically appears in the bottom of graphics window.

See also: [Editing state](#)^[167]

☐ **Activate cameras**

When double-clicking the camera lens the following actions are performed:

- the [Active camera](#)^[162] is saved.
- the camera being double-clicked will become active.

It is convenient to pan and tilt the active camera by moving the grip in the middle of the view area upper bound.

In a similar way by moving grips on the ends of the view area upper bound it is possible to change [lens focal length](#)^[256] of the camera.

If a [model](#)^[304] is assigned to the camera, the focal length changing is possible only in the limits specified in [model parameters](#)^[317].

See also: [Active camera](#)^[162]

See also: ["Edit" button group](#)^[177]

✂ **Cut**

Cut the [selected objects](#)^[167] into the VideoCAD internal clipboard.

It is possible to cut **objects** of different projections at a time, and to cut any quantity of [constructions](#)^[187], [3D objects](#)^[229], **cameras**

Copy

Copy the [selected objects](#)^[161] into the VideoCAD internal clipboard.

It is possible to copy **objects** of different projections at a time, and to copy any quantity of [constructions](#)^[181], [3D objects](#)^[229], [texts](#)^[189] and **cables**.

See also: [Copy with base point](#)^[234].

Paste

Paste the **objects** from the VideoCAD internal clipboard.

After clicking this button specify the **base point** of paste in the projection being clicked when **cutting** or **copying**.

It is possible to paste into different [layouts](#)^[340], paste **cables** of one camera while another camera is active (in this case the pasted cables belong to a camera which is active during paste), and to paste any quantity of [constructions](#)^[181], [3D objects](#)^[229], **cameras**, [texts](#)^[189] and **cables** at a time.

It is available to **copy** and **paste constructions, cables** and **texts between the projects**. To this effect make a copy in one project, then open another project or create a new one and paste what you have copied.

Be careful when copying and pasting **cables**. You can copy only **cables of Active camera**^[162], and when pasting, these cables will belong to the **camera which is active during pasting**.

*If a camera is being pasted a **new camera** with parameters of the pasted camera is created automatically. **This is an alternative way to create new cameras.***

[Shadows](#)^[172] in the [Graphics window](#)^[159] are calculated for the [active camera](#)^[162], but pasted camera doesn't become active. Therefore the view area of the pasted camera is displayed without shadows. To calculate shadows - [activate](#)^[162] the camera after pasting.

Move

Move the [selected objects](#)^[161].

After clicking this button the first click in a [graphics area](#)^[159] designates the starting moving point, the second click - the final one.

*When moving take into account the **projection** to which the objects are attached. A simultaneous moving objects in different projections vertically is locked as being incorrect.*

[Selected](#)^[161] objects or cameras can be moved in [Select / edit](#)^[177] mode. In order to move place the cursor above the selected object, press left mouse button, move, after moving is finished release the left mouse button.

[Shadows](#)^[172] in the [Graphics window](#)^[159] are calculated for the [active camera](#)^[162], but moved camera can be not active. If the camera is not active, the view area of the moved camera is displayed with old shadows. To recalculate shadows - [activate](#)^[162] the camera after moving.

Rotate

Rotate the [selected objects](#)^[161].

After clicking this button the first click in a [graphics area](#)^[159] designates the rotation **center**, the second click specifies the initial rotating point, and the third click specifies the final rotating point.

*When rotating take into account the **projection** to which the objects are attached. The selected objects, attached to the projection with a rotation center designated, can rotate only.*

The [scalable](#)^[322] fonts can rotate only. If a font is not scalable then its **initial point** rotates only, **the text remaining horizontal**.

The [Active camera](#)^[162] can be rotated in [Select / edit](#)^[177] mode by moving the grip in the middle of the view area upper bound.

[Shadows](#)^[172] in the [Graphics window](#)^[158] are calculated for the [active camera](#)^[162], but rotated camera can be not active. If the camera is not active, the view area of the rotated camera is displayed with old shadows. To recalculate shadows - [activate](#)^[162] the camera after rotating.

Scale

Change scale of [selected](#)^[161] constructions relative to the center of scaling.

After clicking on this button, the first click on the [graphics area](#)^[159] specifies the **center of scaling**.

Then moving the cursor up increases sizes of selected constructions, moving the cursor down decreases sizes of selected constructions.

In the [Status bar](#)^[243] the current scale factor is displayed.

When required sizes will be achieved, click for the second time to complete scaling operation. To cancel the scaling press **ESC**.

This tool does not scale [3D models](#)^[190]. 3D models can be scaled in [editing state](#)^[161] with the help of the [Current construction parameter panel](#)^[248].

Mirror

Mirror the [selected](#)^[161] constructions relative to the horizontal or vertical line passing through the specified point.

After clicking on this button, the first click on the [graphics area](#)^[159] specifies the point through which a mirror line must be passed.

Then moving the cursor changes position of the mirror line.

When required position of the mirroring objects will be achieved, click for the second time to complete mirroring operation. To cancel mirroring press **ESC**.

"Constructions" button group

*Buttons of this group are used to perform **measurements** and **constructions**. The [status bar](#)^[243] in the bottom of the Graphics window and the [Current construction parameter panel](#)^[247] display the **results** of measurements. The **constructions** can be used for 3D modeling the video surveillance object, for specifying the **required view areas, objects, obstacles, etc.***

*Each **construction** is attached to the projection containing its **initial point**. The constructions can be **moved, deleted, rotated, edited, copied, mirrored, scaled, changed draw order, hidden** using the buttons of [Edit](#)^[177] group.*

Constructions made in the horizontal projection are also displayed in the [3D Video](#)^[284]. At this, the line corresponds to a vertical rectangle, the point - to a vertical segment, the rectangle - to a parallelepiped, circle - to a cylinder, etc.

Constructions are stretched throughout the height and become 3D objects.

Minimal and maximal height of each object is determined by parameters of [line type](#)^[320], by which the construction is made. The heights can be set separately for each object, during constructing

and editing by means of [current construction parameters panel](#)^[247]. Heights of constructions are calculated relative to base height of a layer to which the construction belongs. Color of constructions is determined only by [line type](#)^[320], which is used at constructing.

To enhance speed and convenience of drawing, VideoCAD uses global and local [snaps](#)^[229].

The **construction coordinates** are displayed relatively to the chosen [origin of coordinates](#)^[218]. The coordinates of constructions **belonging to one camera only** ([focal plane](#)^[166], [optical axis](#)^[166], [field-of-view size](#)^[166], [test object](#)^[166], [change view area upper bound](#)^[195]) are always displayed **relatively to the Active camera**^[162].

When choosing a button of this group a [line type panel](#)^[245] or a [font type panel](#)^[246] appear, allowing to change the [line](#)^[320] or [font](#)^[322] types.

When double-clicking the panels the [options box](#)^[319] appears.

Above these panels the [current construction parameters panel](#)^[247] appears, by means of which it is possible to create construction, by setting its parameters.

▪ Point

When this button is pressed, clicking on the graphics area places a point.

The [status bar](#)^[243] displays the coordinates of this **point** relatively to the [origin of coordinates](#)^[218].

In the [3D Video](#)^[284] the vertical segment will be displayed in the points place.

Default minimal and maximal heights of the segment are determined by the [line type](#)^[320], which constructs the point. The heights can be set separately for each point by means of the [current construction parameters panel](#)^[247], on which it is also possible to set coordinates of the point in numeric values.

See also: ["Constructions" button group](#)^[187]

← Horizontal line

When this button is pressed, clicking on the [graphics area](#)^[159] specifies a point through which a **horizontal line** is passes.

The [status bar](#)^[243] displays the line **height** or its **shift** from the [origin of coordinates](#)^[218] according to the projection being clicked.

In the [3D Video](#)^[284] at the place of the horizontal line 2 horizontal lines will be displayed.

Default minimal and maximal heights of the lines are determined by the [line type](#)^[320], which constructs the horizontal line. The heights can be set separately for each horizontal line by means of [current construction parameters panel](#)^[247], on which it is also possible to set coordinates of the horizontal line in numeric values.

See also: ["Constructions" button group](#)^[187]

‡ Vertical line

When this button is pressed, clicking on the [graphics area](#)^[159] specifies a point through which a **vertical line** is passes.

The [status bar](#)^[243] displays the **distance** from the [origin of coordinates](#)^[218].

In the [3D Video](#)^[284] at the place of the vertical line 2 horizontal lines will be displayed.

Default minimal and maximal heights of the lines are determined by the [line type](#)^[320], which constructs the vertical line. The heights can be set separately for each vertical line by means of the [current construction parameters panel](#)^[247], on which it is also possible to set coordinates of the vertical line in numeric values.

See also: ["Constructions" button group](#)^[187]

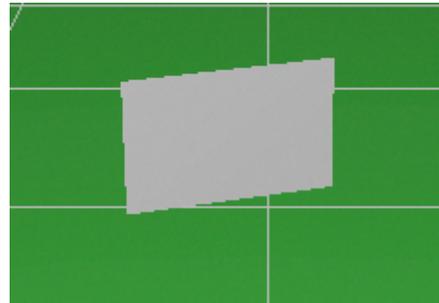
Line segment

When this button is pressed, the first clicking on the [graphics area](#)^[159] specifies the start point of a **line segment**. Second clicking specifies the end point of the **line segment**.

The [status bar](#)^[243] displays the segments length and its projection to distance and height. Both clicks are to be made in the same projection. If the projections are different the measured values are incorrect, therefore when constructing a segment with its ends in different projections the values are not displayed in the **status bar**. In this case when changing a drawing the segment is attached to the projection with its **initial point** in it.

In the [3D Video](#)^[284] a vertical rectangle will be displayed at the segment place.

Default minimal and maximal heights of the rectangle are determined by the [line type](#)^[320], which constructs the line segment. The heights can be set separately for each line segment by means of [current construction parameters panel](#)^[247], on which it is also possible to set coordinates of the line segment in numeric values.



Color of the rectangle is determined only by [line type](#)^[320], which is used at constructing.

On the **current construction parameters panel** it is possible to set and fix **parameters of the segment**: coordinates of the first and second points, length, angle.

*A segment can be also used to **measure distances** on layouts without clicking for the second time in this case.*

*Line segments can be used for modeling cables with subsequent cable length calculation. Use separate **line types** to draw each cable type. For length calculation use the [Length calculation of line segments](#)^[343] tool.*

See also: ["Constructions" button group](#)^[187]

Polyline

This tool allows to draw line segments continuously. The end of each segment is the start of the next one. To stop drawing lines, press **ESC**.

In other respects this tool equals to the [Line segment](#)^[183] (see. above).

See also: ["Constructions" button group](#)^[187]

Angle

When this button is pressed, the first clicking on the [graphics area](#)^[159] specifies the **vertex** of an **angle**. Second and third clicking specify its **arms**.

The [status bar](#)^[243] displays the angle value in **degrees**.

If the angle **vertex** and **arms** are constructed in **different projections**, when changing drawing the angle is attached to the projection with its vertex.

In the [3D Video](#)^[284] 2 vertical rectangles will be displayed at the angle place.

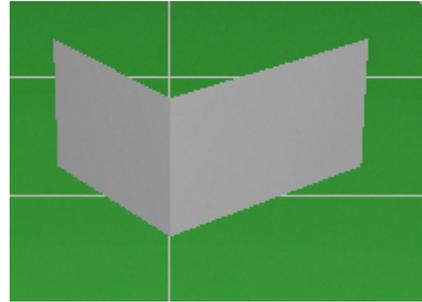
Default minimal and maximal heights of the rectangles are determined by the [line type](#)^[320], which constructs the Angle. The heights can be set separately for each Angle by means of [current construction parameters panel](#)^[247], on which it is also possible to set coordinates of the line segment in numeric values.

Color of the rectangles is determined only by [line type](#)^[320], which is used at constructing.

On the **current construction parameters panel** it is possible to set and fix **parameters of the angle**: coordinates of the first, second, third points, length, angle value in degree.

*The **angle** tool is also used to measure angles on layouts.*

See also: ["Constructions" button group](#)^[181]



□ Rectangle

When this button is pressed, the first clicking on the [graphics area](#)^[159] specifies the first corner of a rectangle. Second clicking completes the rectangle construction.

The [status bar](#)^[243] displays the information on the rectangle sizes and location.

In the [3D Video](#)^[284] a parallelepiped will be displayed at the rectangle place.

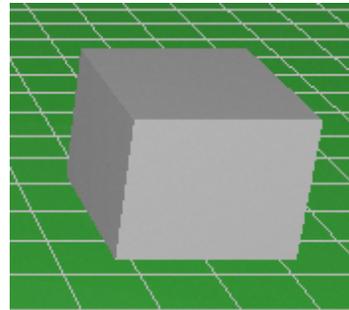
Default minimal and maximal heights of the parallelepiped are determined by the [line type](#)^[320], which constructs the rectangle. The heights can be set separately for each rectangle by means of [current construction parameters panel](#)^[247], on which it is also possible to set coordinates of the rectangle in numeric values.

Color of the parallelepiped is determined only by [line type](#)^[320], which is used at constructing.

On the **current construction parameters panel** it is possible to set and fix **parameters of the rectangle**: coordinates of the first points, height, width.

*Rectangles are also used for creating rectangular **horizontal planes** in the **3D Video**, for example a ceiling or floor.*

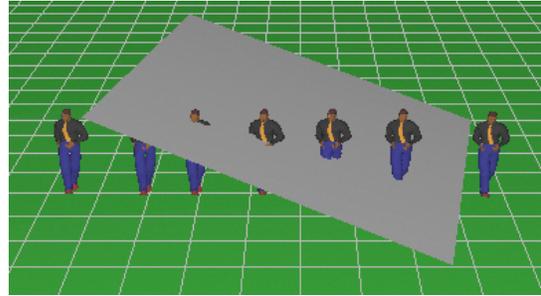
See also: ["Constructions" button group](#)^[181]



▤ Inclined rectangle

When this button is pressed, clicking on the [graphics area](#)^[159] specifies first corner of an inclined rectangle.

Inclined rectangle is similar to a [rectangle](#)^[184] and differs from it that in [3D Video](#)^[284] it is displayed in the form of **inclined rectangle**. The **minimal height of rectangle** corresponds to the **lower side** of this rectangle, and the **maximal height** - to the **upper one**.



In the **Graphics window** the upper side of inclined rectangle is displayed by **thick line**.

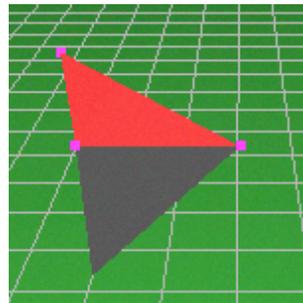
For modeling complex objects it is possible to [edit](#)^[177] inclined rectangle by points, moving its vertexes.

*When moving separate vertexes press **Ctrl**.*

Inclined rectangle can be made transparent by 70 %. For this purpose it is necessary to mark the **Transparence** checkbox on the [Current construction parameter panel](#)^[247].

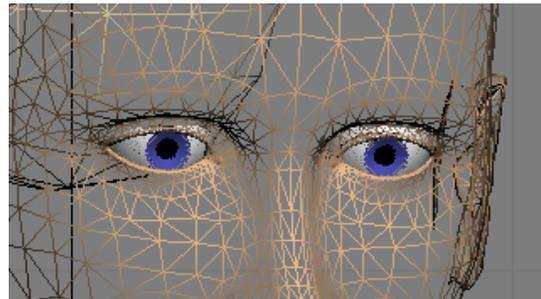
Inclined rectangle is very universal tool. Using the inclined rectangles it is possible to model any 3D objects.

It can be useful to combine inclined rectangles in pairs thus to get triangles with independent vertexes in the 3D space. Meanwhile two vertexes of each inclined rectangle must coincide. The rest two vertexes of first inclined rectangle must coincide with the other two vertexes of second inclined rectangle.



Using obtained triangles you can theoretically build any 3D surfaces, although it can be not simple in practice.

For example, all 3D models in VideoCAD consist of triangular mesh only.



See also: ["Constructions" button group](#)^[187]

Double line

When this button is pressed, the first clicking on the [graphics area](#)^[159] specifies the start point of a **double line**. Second clicking specifies the end point of the **double line**.

The **length** and the **width** of the double line appear in the [status bar](#)^[243].

In [line type panel](#)^[245] that appeared below **graphics area** there is a box in which it is possible to choose from the list or enter from keyboard the distance between lines of the double line.

Two buttons allow switching the **orientation of the second line** relatively to the first one

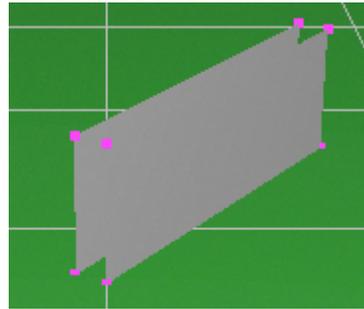


You can also switch the orientation quickly by pressing the **Space bar**.

In the [3D Video](#)^[284] 2 vertical rectangles will be displayed at the double line place.

Default minimal and maximal heights of the rectangles are determined by the [line type](#)^[320], which constructs the double line. The heights can be set separately for each double line by means of [current construction parameters panel](#)^[247], on which it is also possible to set coordinates of the double line in numeric values.

Color of the rectangles is determined only by [line type](#)^[320], which is used at constructing.



On the **current construction parameters panel** it is possible to set and fix **parameters of the double line**: coordinates of the first, second points, length, angle.

See also: ["Constructions" button group](#)^[187]

Wall

The Wall tool is intended for drawing walls with specified thickness and height. In these walls you can make [apertures](#)^[187] of any shape, for example for doors and windows..

When this button is pressed, the first clicking on the [graphics area](#)^[159] specifies the start point of a **Wall**. Second clicking specifies the end point of the **Wall**.

The **length** and the **width** of the wall appear in the [status bar](#)^[243].

In [line type panel](#)^[245] that appeared below **graphics area** there is a box in which it is possible to choose from the list or enter from keyboard the thickness of the wall.

Two buttons allow switching the **orientation** of the second wall side relatively to the first one

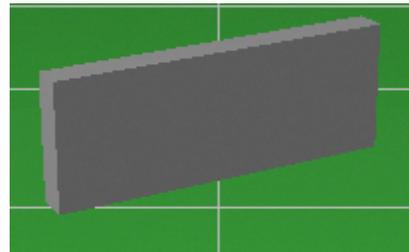


You can also switch the orientation quickly by pressing the **Space bar**.

In the [3D Video](#)^[284] a parallelepiped will be displayed at the wall place.

Default minimal and maximal heights of the wall are determined by the [line type](#)^[320], which constructs the wall. The heights can be set separately for each wall by means of the [current construction parameters panel](#)^[247], on which it is also possible to set coordinates of the wall in numeric values.

Color of the parallelepiped is determined only by [line type](#)^[320], which is used at constructing.



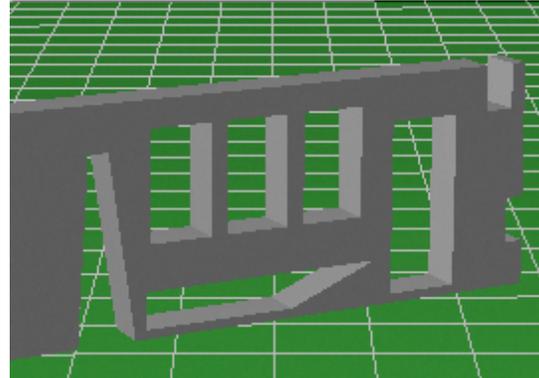
On the **current construction parameters panel** it is possible to set and fix **parameters of the wall**: coordinates of the first, second points, length, angle.

In walls it is possible to make apertures for doors and windows using the [Aperture in Wall](#)^[187] tool.

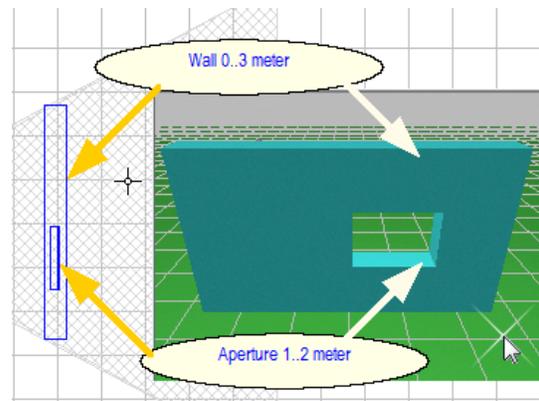
See also: ["Constructions" button group](#)^[187]

Aperture in Wall

The Aperture in Wall tool designed to easily create apertures (openings) of various shapes in the walls, built by the [Wall^{\[186\]}](#) tool.



In order to an aperture will appear in the 3D space, it must intersect the horizontal projection of the wall.



The Aperture in Wall tool is similar to the [Inclined rectangle^{\[184\]}](#) tool. But the **Inclined rectangle** creates a **flat rectangle** in 3D space, but the **Aperture in Wall** placed inside the **Wall**, cuts an aperture in the wall. This aperture equals to the projection of the same **flat rectangle** on the plane of the wall.

The **minimal height of aperture** corresponds to the **lower side** of this rectangle, and the **maximal height** - to the **upper one**.

In the **Graphics window** the upper side of aperture is displayed by **thick line**.

In [line type panel^{\[245\]}](#) that appeared below **graphics area** there is a box in which it is possible to choose from the list or enter from keyboard the thickness of the aperture.

The Thickness of the wall affects only the shape of aperture projection in the Graphics window. In the 3D Video the apertures always cut through a wall at its full thickness.

Two buttons allow switching the **orientation** of the second aperture side relatively to the first one



You can also switch the orientation quickly by pressing the **Space bar**.

For modeling complex apertures it is possible to [edit^{\[177\]}](#) the Apertures by points, moving its vertexes.

*When moving separate vertexes press **Ctrl**.*

You can create complex apertures using several intersecting apertures.

See also: [Wall^{\[186\]}](#), ["Constructions" button group^{\[181\]}](#)

Circle

When this button is pressed, the first clicking on the [graphics area](#)^[159] specifies the **center of a circle**. Second clicking completes the **circle** construction.

The [status bar](#)^[243] displays the information on the sizes and location of the circle.

To switch the **circle** into the **editing state** you need to double-click on **its center** or on the **point on its radius** that appears during the process of construction.

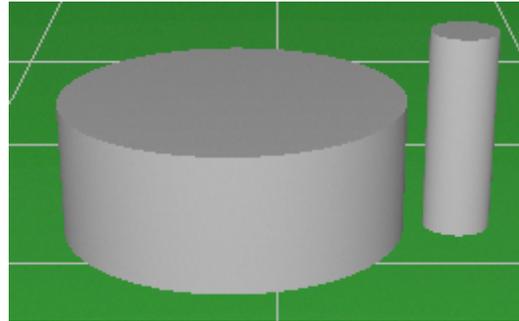
In the [3D Video](#)^[284] a cylinder will be displayed in the circle place.

Default minimal and maximal heights of the cylinder are determined by the [line type](#)^[320], which constructs the circle. The heights can be set separately for each circle by means of [current construction parameters panel](#)^[247], on which it is also possible to set coordinates of the circle in numeric values.

Color of the cylinder is determined only by [line type](#)^[320], which is used at constructing.

On the **current construction parameters panel** it is possible to set and fix **parameters of the circle**: coordinates of the center and second point, radius, angle.

See also: ["Constructions" button group](#)^[181]



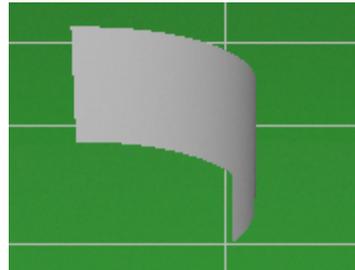
Arc

When this button is pressed, the first clicking on the [graphics area](#)^[159] specifies the **center of an arc**. Second and third clicking specify its **ends**.

To switch the arc into the **editing state** you need to double-click on **its center** or on either of its two ends.

In the [3D Video](#)^[284] the arc stretches, creating a cylindrical surface.

Default minimal and maximal heights of the cylindrical surface are determined by the [line type](#)^[320], which constructs the arc. The heights can be set separately for each arc by means of [current construction parameters panel](#)^[247], on which it is also possible to set coordinates of the arc in numeric values.



Color of the arc is determined only by [line type](#)^[320], which is used at constructing.

On the **current construction parameters panel** it is possible to set and fix **parameters of the arc**: coordinates of the center, first and second points, radius, angle.

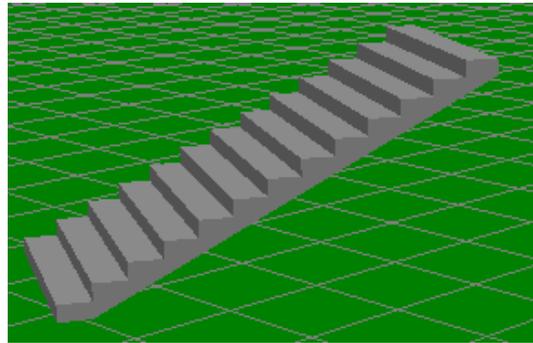
See also: ["Constructions" button group](#)^[181]

Stairs

Stairs is similar to the [Inclined rectangle](#)^[184] and differs from it that in the [3D Video and](#)^[284] 3D World windows it is shown in the form of stairs

On the **current construction parameters panel** the minimum height corresponds to the pedestal of the stairs, maximum height corresponds to the top of the stairs.

In the **Graphics window** the upper side of stairs is displayed by **thick line**.



The number of steps is calculated automatically from the height of one step equals to 15 cm.

See also: ["Constructions" button group](#)^[181]

Text

When this button is pressed, clicking on the [graphics area](#)^[159] specifies the place for a text string. At this point a **pop-up frame** with cursor will appear.

The necessary text is to be entered within a frame. To separate the lines use **Enter**.

The [font type panel](#)^[246] appears below in the graphics area allowing to change the [font type](#)^[322]. A **pop-up menu** is available within a frame, appearing at clicking the right mouse button.

The entered text is a text marker and can be quickly found using the [Find text](#)^[219] tool. This is a very convenient and quick means for navigation on big layouts.

See also: ["Constructions" button group](#)^[181], [Find text](#)^[219]

Mask

When this button is pressed, the first clicking on the [graphics area](#)^[159] specifies the first vertex of **rectangular mask**. Second clicking completes the mask construction.

The [status bar](#)^[243] displays the information on the mask sizes and location.

Using **masks** allows to cover any image parts. [Constructions](#)^[181] and [texts](#)^[189] can be drawn over masks.

To cover **separate construction fragments** you can also use **line of white color**.

In the [3D Video](#)^[284] masks are not shown.

See also: ["Constructions" button group](#)^[181]

Filling

Filling is similar to a [mask](#)^[189], but can be of any color, and also in the form of **different hatch type**. Color of filling is defined by the **color of line type**, by which the filling is made, and **type of hatching** or its absence - by **style of this line type**.

Fillings, as well as other objects, could be [edited](#)^[177] *by moving separate vertexes, and thus could be stretched on various objects.*

In the [3D Video](#)^[284] fillings are not shown.

See also: ["Constructions" button group](#)^[187]

3D model

The button opens submenu, in which there are **3D models** which are present in the program library.

When any item in the submenu is chosen, clicking in the [graphics area](#)^[159] specifies the place for a **3D model**.

3D models placement is possible in the horizontal and vertical projections, however only **3D models** placed in **the horizontal projection** will be visible in the [3D Video](#)^[284].



In the horizontal projection the **3D models** are displayed in the **top view**, in the vertical projection - in the **side view**, and in the [3D Video](#)^[284] models are as **3D objects**.

Horizontal and vertical [projections](#)^[292] for displaying in the **Graphics window** can be created in the [3D Models](#)^[297] window.

3D models can be **moved, rotated, copied**, changed [draw order](#)^[236] as other VideoCAD objects.

The default **height of the 3D models** above the ground is determined by the **maximal height of the line type**^[320] which was chosen when the **3D model** was being placed. The height can be set separately for each **3D model** using the [current construction parameters panel](#)^[247].

To change 3D model height above the ground, [select](#)^[232] the 3D model, then [change line type](#)^[237] or switch the 3D model to editing state by double clicking on it and change value in the **3D H** box on the **Current construction parameters panel**.

By default the **3D models** are on the ground and constructed by the **line type** with the number, specified on the [Lines](#)^[320] tab of the [Options box](#)^[319]. This line type has the **maximum height equal to 0**.

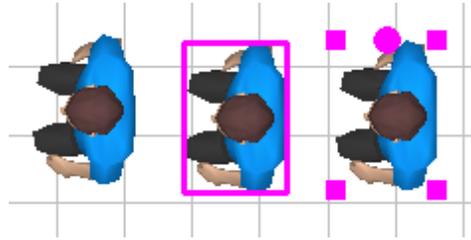
*Heights can also take on **negative values**, in this case **3D model plunges under ground**.*

*For example, **to place a 3D model on a surface**: construct the surface by the [rectangle](#)^[184] tool using **line type** with the required maximum height, place the 3D model on it, and then change 3D model **line type** to the line type of the surface.*

[In the Editing state](#)^[167] using the **Current construction parameters panel** you can resize 3D models separately on axes.

To do this, enter new values into X, Y, Z boxes during 3D model editing. If the  box is marked, change of any size leads to proportional change of other sizes, thus model proportions are not broken. 3D model **height above the ground** is displayed and can be changed in **3D H** box.

In the [editing state](#)^[167], 3D models are displayed with square grips and pink circle. You can rotate the 3D model by the mouse using the circle, scale 3D model on X and Y axis using the square grips. You can move the 3D model by pressing the left mouse button on the 3D model, as well as in the selected state.



License plate of cars

Let's consider 3D models - cars with license plates. License plate type, the same for all car models, is determined by the file **number.bmp** file in the directory **\Models**, and the **plate size** - by the corresponding settings in the **Options box** on the [3D modeling](#)^[325] tab. This opportunity allows using the same models in different countries with different license plates.

To make cars appear in the 3D Video with the license plate of your country:

- create a ***.bmp** file with the image of you license plate;
- !! *The size of file sides, in pixels, must be equal to powers of two:*
16,32,64,128,256,512,1024,2048
- replace the file **number.bmp** by your file;
- specify the sizes of your license plate in the **Options box**.

Adding new 3D models, manage 3D models

You can add new 3D models to the library using [Add 3D Model](#)^[237] menu item.

You can add, delete, duplicate 3D models, distribute 3D models by directories in menu, get projections of 3D models for the Graphics window using the [3D Models](#)^[297] window.

Files of 3D models in ***.vcm** format can be exported from **SketchUP** and **3ds max** using plugins. Custom 3D models for VideoCAD can be created in **SketchUP** and **3ds max**.

See more: [Importing 3D models from SketchUp and Autodesk 3ds Max](#)^[397]

See also: [3D Video](#)^[284], [3D Models](#)^[297], [Options box>Lines](#)^[320], [Options box>3D modeling](#)^[325].

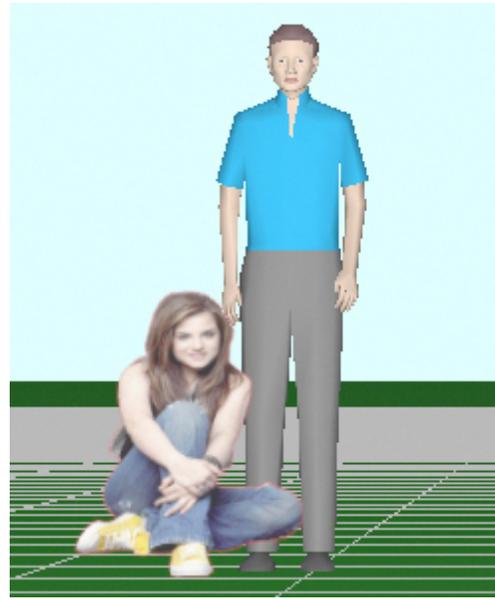
3D image

This tool is similar to [Inclined rectangle](#)^[184]. As well as the **inclined rectangle** it allows to place a rectangle in three-dimensional space at any angle.

But this rectangle can be "covered" by any raster image in *.bmp , *.jpg, *.gif, *.tiff, *.png formats. The image can be a photo or a figure. In *.bmp and *.jpg files, pixels of the image can be transparent if they have a color **coincided** with the **color of the left bottom pixel**. Thus the image border can take any form.

In *.png files transparent pixels will be displayed transparent.

In many cases raster images can replace [3D models](#)^[190] which are difficult to make. They can be used for modeling many objects from banknotes and plates up to a complex background.



After choosing this button the **Loading 3D image** dialog box appears. After choosing a file in *.bmp,*.jpg,*.jpeg,*.png,*.gif,*.tif or *.tiff format place **3D image** in the same way as Inclined rectangle.

On the [Current construction parameter panel](#)^[247] the minimal height corresponds to the bottom bound of this rectangle and the maximal height - to the top bound.

In the **Graphics window** the top of 3D images is displayed by **thick line**.

Later **3D image** can be [edited](#)^[177] by moving its grips. It is possible to change **3D image** sizes on the Current construction parameter panel, delete and change the image file using buttons  and  on the **Current construction parameter panel**.

To make transparent pixels with color **coincided** with **color of left bottom pixel** (or transparent pixels of *.png file), check **Transparence checkbox** on the **Current construction parameter panel**.

*To get the transparence of *.bmp or *.jpg file, the image file has to be specially prepared by means of any graphic editor, for example **Paint**. **Pixels that should become transparent have to be filled by color that coincides with the color of left bottom pixel.***

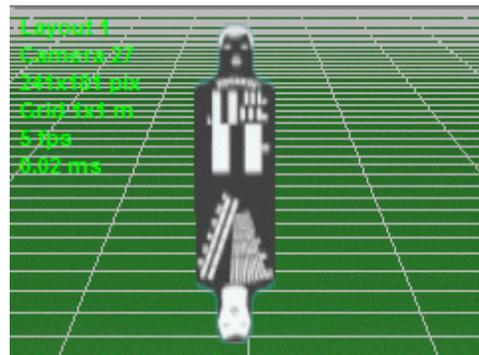
See also: ["Constructions" button group](#)^[187]

Rotakin

Rotakin - an animated rotating test target for visual estimation of spatial resolution and motion distortions on the 3D images.

In the **horizontal plane** the Rotakin automatically turns towards the [Active camera](#)^[162].

In the **vertical plane** the Rotakin rotates with a specified speed about an axis passing through its center (in Professional version only).



To place the Rotakin specify a place for the Rotakin by clicking.

On the **current construction parameters panel** it is possible to set minimal and maximal heights of the Rotakin.

*Rotating test target named **Rotakin** is used in field testing of video surveillance systems by the techniques developed by the **Home Office Scientific Development Branch 'Performance Testing of CCTV Perimeter Surveillance Systems (Using the Rotakin Standard Test Target)'**. The Rotakin model meets the requirements of the document.*

See also: ["Constructions" button group](#)^[181]

⇄ Signal cable

When this button pressed, you can draw the **signal cable** of the [Active camera](#)^[162] by successive clicks in the **graphics area**. The end of each segment is the start of the next one. To stop drawing cable, press **ESC**.

The [status bar](#)^[243] displays the segment length and its projection to distance and height.

Both clicks are to be made in the **same projection**. If the projections are different the measured values are incorrect, therefore when constructing a segment with its ends in different projections the values are not displayed in the **status bar**. In this case when changing the drawing the segment is attached to the projection with its **initial point**.

A cable consists of **segments**, allowing to draw it in different projections and layouts, representing an actual scheme of laying accurately.

When [copying](#)^[180] the **cable segments** between **cameras** and [layouts](#)^[340] a process of cable drawing is accelerated considerably even in complex CCTV systems.

When drawing a cable the menu item [Cable laying](#)^[239] might be used. When choosing it a float panel of the same name appears enabling to choose a shift of segment ends for a level parallel cable drawing along the walls, columns etc.

The type and parameters of **line designating the Signal cable** can be changed in the [options box](#)^[320].

VideoCAD summarizes the lengths of all the segments, considers the **reserves** and calculates the **total length of cable**. To change the default parameters and obtain the calculation results double-click the image of any cable segment or click **Signal cable** again.

A dialog box of the same name appears after that.

The results of the cables' calculation on each individual camera and on the project as a whole are included into the text file obtained by [Text report](#)^[200] and [Cable report](#)^[240].

In multi-layer drawings, cables belong to the same layer as a camera to which the cables belong.

It is possible to use [Line segments](#)^[183] for cable modeling with subsequent cable length calculation. Use separate [line types](#)^[320] for drawing a cable of each type. For length calculation use the [Length calculation of line segments](#)^[343] tool and the [Cable report](#)^[240].

See also: ["Constructions" button group](#)^[181], [View>Active camera cables](#)^[216], [View>All camera cables](#)^[216], [Cable laying](#)^[239], [Length calculation of line segments](#)^[343], [Cable report](#)^[240].

— Power cable

When this button pressed, you can draw the **power cable** of the [Active camera](#)^[162] by successive clicks in the **graphics area**. The end of each segment is the start of the next one. To stop drawing cable, press **ESC**.

The [status bar](#)^[243] displays the segment length and its projection to distance and height.

Both clicks are to be made in the **same projection**. If the projections are different the measured values are incorrect, therefore when constructing a segment with its ends in different projections the values are not displayed in the **status bar**. In this case when changing a drawing the segment is attached to the projection with its **initial point**.

A cable consists of **segments**, allowing to draw it in different projections and layouts, representing an actual scheme of laying accurately.

When [copying](#)^[180] the **cable segments** between **cameras** and [layouts](#)^[340] a process of cable drawing is accelerated considerably even in complex CCTV systems.

When drawing a cable the menu item [Cable laying](#)^[239] might be used. When choosing it a float panel of the same name appears enabling to choose a shift of segment ends for a level parallel cable drawing along the walls, columns etc.

The type and parameters of **line designating the power cable** can be changed in the [options box](#)^[320].

VideoCAD summarizes the lengths of all the segments, considers the **reserves** and calculates the **total length of cable**. To change the default parameters and obtain the calculation results double-click the image of any cable segment or click **Power cable** again.

A dialog box of the same name appears after that enabling to choose a **cross-section area of power cable** to fit the requirements of **camera voltage supply**. It is assumed that the conductor material is **copper** and the conductor temperature is **+ 50° C**

The results of the cables' calculation on each individual camera, each individual section area and on the project as a whole are included into the text file obtained by [Text report](#)^[200] and [Cable report](#)^[240].

In multi-layer drawings, cables belong to the same layer as a camera to which the cables belong.

It is possible to use [Line segments](#)^[183] for cable modeling with subsequent cable length calculation. Use separate [line types](#)^[320] for drawing a cable of each type. For length calculation use the [Length calculation of line segments](#)^[343] tool, [Cable report](#)^[240].

See also: "[Constructions](#)" button group^[187], [View>Active camera cables](#)^[216], [View>All camera cables](#)^[216], [Cable laying](#)^[239], [Length calculation of line segments](#)^[343], [Cable report](#)^[240].

* Global snaps

This button is used to promptly switch [global snaps](#)^[229] on/off.

Snaps enhance the convenience in drawing. As a result of the snaps' functioning the cursor "sticks" to the certain **points, lines** or **directions**.

- **Points** - the cursor sticks to base object points.
- **Lines** - the cursor sticks to objects lines.
- **Angular** snap functions at construction of line segments, angles, cables, and at moving and rotating as well. After that the subsequent construction points are leveled from the previous points horizontally and vertically.
- **Extension** - the cursor sticks to the virtual horizontal and vertical lines passing through base objects points.

The snap Extension is disabled for [hidden](#)^[236] objects and in the [Select/Edit](#)^[177] mode.

- **At grid** - the cursor sticks to grid nodes.

In the pop-up menu you can choose permanent opened **snap panel**, with the help of which it is convenient fast switch the snaps during drawings.

*In the [Options box](#)^[333] you can change **snap sensitivity**.*

You can disable snaps for any layer using parameter of layers - Snap.

"Active camera" control element group

Change installation height

When this button is pressed, clicking in a **vertical projection** specifies a new **height of the Active camera** ^[162] installation.

The value of **camera installation height** ^[257] in the **Camera Geometry box** ^[253] changes according to the clicked point height.

Change view area upper bound

When this button is pressed clicking in a **vertical projection** specifies a new **height of the view area upper bound** ^[258] and new **distance up to the view area upper bound** ^[260].

Clicking in the **horizontal projection** specifies a **distance up to the view area upper bound** only. The values of correspondent parameters in the **Camera Geometry box** ^[251] change to clicked point coordinates.

*You can change view area upper bound in the **Select / Edit** ^[177] mode, by moving the grip in the middle of the view area upper bound.*

Change view area lower bound

When this button is pressed clicking in a **vertical projection** specifies a new **height of the view area lower bound**. The values of **view area lower bound height** ^[259] in the **Camera Geometry box** ^[251] change according to a clicked point height.

"Scale" button group

Move drawing

When this button is pressed you can move a drawing within the **graphics area** ^[159] using the mouse.

To do that press and hold down the **left mouse button** at any spot of drawing and then move the mouse holding the button down. To stop moving the drawing release the mouse button.

If your mouse is an **Intellimouse** or other **Wheel mouse** you can move the drawing at any time by pressing and holding the **middle button** down.

When **Alt is pressed** ^[249], it is possible to move drawing in the Graphics window using arrow keys and change scale using plus and minus keys irrespective of the input focus.

Zoom IN/Zoom OUT

Clicking these buttons increases or reduces a **drawing scale** correspondingly.

Using the **Intellimouse** or other **Wheel mouse** you can change the **drawing scale** with the simultaneous zooming in the drawing sections pointed by the cursor.

If **Ctrl is not pressed** at changing the scale, then **the scale changes roughly** which is

convenient at navigation. If **Ctrl is pressed, the scale changes with the less step** which is convenient for the precise drawing positioning before printing, saving or exporting.

If input focus is on the graphics area, scale can be changed by + and - buttons on the keyboard.

When [Alt is pressed](#)^[249], it is possible to move drawing in the Graphics window using arrow keys and change scale using plus and minus keys irrespective of the input focus.

"Undo" button group

UNDO

Undo the last operation.

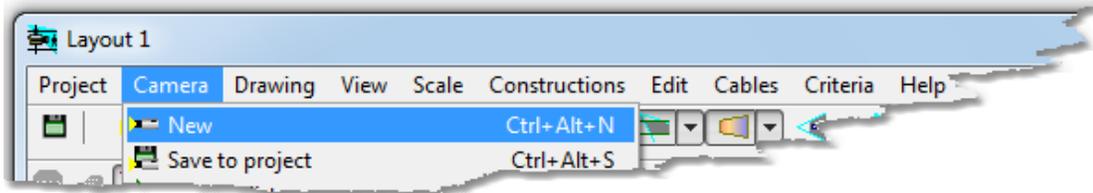
VideoCAD stores several **last operations including Undo operation**. When clicking this button successively VideoCAD retraces to the last states and a state before the button **Undo** was clicked for the first time.

The quantity of the stored operations can be adjusted in the Options box>Miscellaneous>[UNDO depth](#)^[334].

REDO

Redo the last operation undone by the [UNDO](#)^[196] tool.

9.1.3 Main menu



See [Main menu location](#)^[158].

Menu items substantially duplicate the buttons of the [tool bar](#)^[164]; however, there are certain advanced tools.

[Keyboard shortcuts](#)^[324]^[250] can be assigned to each menu item.

• Project

[New](#)^[199]
[Open](#)^[199]
[Save](#)^[199]
[Save as](#)^[199]
[Import from VideoCAD3..6](#)^[199]
[Export to VideoCAD3..6](#)^[199]
[Text report](#)^[200]
[PDF Report](#)^[200]
[Exit](#)^[200]

• Camera

[New](#)^[200]
[Save to project](#)^[201]
[Camera list](#)^[201]
[Numerate cameras](#)^[201]
[Table of camera models](#)^[202]
[Change installation height](#)^[202]
[Change view area upper bound](#)^[202]
[Change view area lower bound](#)^[202]
[Move active camera name](#)^[202]

• Drawing

• View

[View area edges](#)^[209]
[View area projections bounds](#)^[210]
[Fill projections](#)^[210]
[Spatial resolution](#)^[212]
[Shadow](#)^[213]
[Calculate shadows for active camera](#)^[215]
[Recalculate Shadows](#)^[215]
[3D view area](#)^[216]
[Titles](#)^[216]
[Camera names](#)^[216]
[Active camera cables](#)^[216]
[All cameras' cables](#)^[216]
[Cameras over constructions](#)^[216]
[High resolution on top](#)^[199]
[Camera Geometry](#)^[217]
[Spatial resolution](#)^[217]
[3D Video](#)^[217]
[Monitor window](#)^[217]
[Hide vertical projection](#)^[217]
[Hide horizontal projection](#)^[217]

• Constructions

[Point](#)^[220]
[Horizontal line](#)^[220]
[Vertical line](#)^[220]
[Line segment](#)^[220]
[Polyline](#)^[221]
[Angle](#)^[221]
[Rectangle](#)^[222]
[Inclined rectangle](#)^[222]
[Double line](#)^[223]
[Wall](#)^[224]
[Aperture in Wall](#)^[224]
[Circle](#)^[225]
[Arc](#)^[226]
[Stairs](#)^[226]
[Text](#)^[227]
[Mask](#)^[227]
[Filling](#)^[227]
[3D image](#)^[227]
[Rotakin](#)^[228]
[Global snaps](#)^[229]
[Lock constructions](#)^[229]

• 3D Models

[3D model](#)^[229]
[3D Models window](#)^[231]
[Add 3D model](#)^[231]

• Edit

[Select all](#)^[232]
[Select/Edit](#)^[232]

• Edit

[Bring to front](#)^[236]
[Send to back](#)^[236]
[Hide](#)^[236]
[Align](#)^[236]
[Change Line type](#)^[237]
[Combine to block](#)^[237]
[Merge contour](#)^[237]
[Destroy](#)^[237]
[Undo](#)^[237]
[Redo](#)^[237]
[Erase](#)^[238]
[Erase all](#)^[238]

• Cables

[Signal cable](#)^[238]
[Power cable](#)^[239]
[Cable laying](#)^[239]
[Length calculation of line segments](#)^[239]
[Cable report](#)^[240]

• Help

[About VideoCAD](#)^[240]
[Help Contents](#)^[240]
[Language](#)^[240]
[Homepage](#)^[241]
[Order](#)^[241]
[User forum](#)^[241]
[Contact us](#)^[241]
[Change registration code](#)

[Save as](#) [202]
[Copy to clipboard](#) [204]
[Load background](#) [204]
[Adjust background](#) [205]
[Move background](#) [206]
[Hide background](#) [206]
[Delete background](#) [206]
[Background only](#) [207]
[Layouts](#) [207]
[Printer setup](#) [207]
[Print](#) [207]

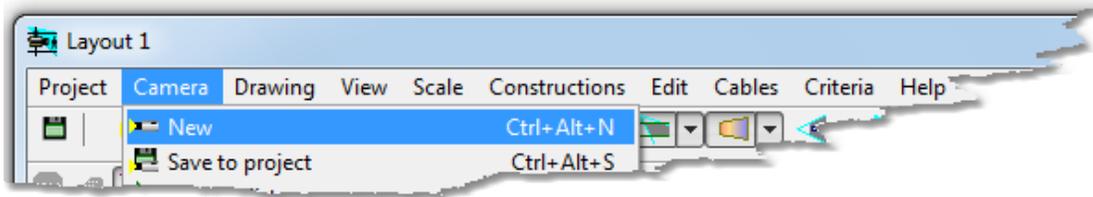
[Grid](#) [217]
[Origin](#) [218]
[Set origin](#) [218]
[Black-and-white](#) [218]
[Options](#) [218]

• **Scale**

[Zoom in](#) [218]
[Zoom out](#) [219]
[Move drawing](#) [199]
[Show all](#) [219]
[Find text](#) [219]

[Cut](#) [234] [241]
[Copy](#) [234]
[Cut with base point](#) [234]
[Copy with base point](#) [234]
[Paste](#) [234]
[Move](#) [235]
[Rotate](#) [235]
[Scale](#) [235]
[Mirror](#) [236]

9.1.3.1 Menu items



See [Main menu location](#)^[158].

Menu items substantially duplicate the buttons of the [tool bar](#)^[164]; however, there are certain advanced tools.

[Keyboard shortcuts](#)^[324]^[250] can be assigned to each menu item.

Project > New

Create new project.

A project may contain unlimited number of cameras and up to **10 layouts**^[207].

In the New project dialog box type the **new project name**.

You can change the **format of measurements** in new project when necessary: **Metric** (meters, millimetres) or **Imperial** (feet, inches).

Project > Open

Open earlier saved project.

Choose a project file. If the current project was not saved, VideoCAD offers to save it.

Project > Save

Save project to a file.

If a project is saved for the first time, the dialog box **Save as** appears enabling to change a project **filename** and a saving directory when needed.

Project > Save as

Save project to a file under another name or in another directory.

In the appearing dialog box choose a filename and a directory to save it.

The project includes all information on the program settings (line types, fonts, etc.).

Project > Import from VideoCAD3..6

Import of the previous project format ***.vmp**, supported by VideoCAD versions from 3 to 6.. In the appearing dialog box choose a filename with ***.vmp** extension.

If after importing project seems incorrectly, - restart VideoCAD.

Project > Export to VideoCAD3..6

Export current project to the previous project format ***.vmp**, supported by VideoCAD versions from 3 to 6.. In the appearing dialog box choose a filename with ***.vmp** extension.

*.vmp file can contain no more than 100 cameras and no more than 5000 constructions on each layout. All that exceeds these limits, will be lost. Also new tools which appeared in VideoCAD7 and VideoCAD8 will not be saved.

Project > Text report

Export the data on most of the **specified** and **calculated** parameters of cameras and **cables** included into the current project to a text file.

Enter a filename. A default filename coincides with the **project name**.

When clicking **OK**, the text document obtained is automatically loaded into a **text editor** for viewing and editing.

You can copy and paste the text obtained into a project explanatory note.

You can get a report in [PDF format](#)^[200].

See also: [PDF report](#)^[200], [Cable report](#)^[240]

Project > PDF report

Export the data on most of the **specified** and **calculated** parameters of cameras and **cables** included into the current project to a PDF file.

Unlike the [Text report](#)^[200], the **PDF Report** can include images from the cameras, fragments of layouts with camera placed, a cover with logo. Report parameters and the structure of information in the report is configurable.

After choosing this menu item, a dialog box for configuring the report parameters will appear. After the setting, click **OK** in the dialog.

See more details about PDF report configuration: [PDF Report](#)^[345]

Generating a report in PDF format can take a lot of time, while generating the image in the Graphics window may vary, the [3D Video](#)^[284] window can appear. Be patient, do not touch the mouse and keyboard.

See also: [PDF Report](#)^[345], [Text report](#)^[200], [Cable report](#)^[240]

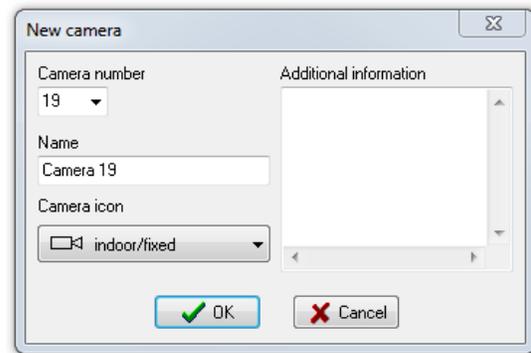
Project > Exit

Exit the program.

Camera > New

Create **new camera** with default parameters.

In the dialog box appeared you can change **camera number, name**, type of the camera which determines the kind of icon by which it will be displayed. If necessary, you can enter **additional information** on the created camera (for example: purpose, a place and features of installation).



Later it is possible to change name, number, type of the camera and the additional information in the [Camera list](#)^[336] box.

Cameras can be numerated sequentially with the help of the [Numerate cameras](#)^[201] tool.

Cameras are displayed by different icons only if the Display camera type box in the [Options box](#)^[319] is marked.

On the [Line type panel](#)^[245] it is possible to choose [line type](#)^[320] by which the icon of the camera and [View area projection bounds](#)^[168] will be drawn. When displaying [spatial resolution](#)^[170] is disabled, projection will be [filled](#)^[169] (hatched) by the color of assigned line type. Later it is possible to change line type using [Change line type](#)^[237] tool.

[Hatch style](#)^[169] is determined by style of a [line type](#)^[320], assigned to the camera (solid, dash, dot, dash dot etc.).

After entering all necessary data click **OK**, to cancel the operation click **Cancel**.

If there is already a camera with chosen number in the current project, VideoCAD will ask to specify, whether you would like to rewrite it.

After camera creation specify by clicking a place for the new camera on the layout.

Just after camera creation the moving mode will be switched on. When placing will be completed, click [Select/Edit](#)^[177] button or press **ESC**.

It is convenient to create new cameras with already set parameters by [copying](#)^[180] and [pasting](#)^[180] existing ones.

Camera > Save to project

All the **specified** and **calculated parameters** of the active camera and layout are saved to the current project.

Saving is performed automatically at many operations.

Camera > Camera list

Clicking this button opens **Camera list box**, in which camera list of current project is displayed. **Active camera** is highlighted by **red frame**. Any camera can be activated, removed, renamed, found on layouts, it is possible to show 3D image from any camera. It is also possible to sort cameras in the list. For carrying out any manipulations with the camera first select its name in the list by single clicking.

See more: [Camera list](#)^[336]

Camera > Numerate cameras

Open the [Numerate cameras](#)^[338] tool. This tool allows renaming and serial numeration any quantity of cameras simultaneously.

See more: [Numerate cameras](#)^[338]

Camera > Table of camera models

Show **Table of camera models**. In the table it is possible to set parameters to models and assign any model to the active camera. The table can be exported to *.txt, *.csv, *.htm, *.rtf, *.xls formats.

See more: [Table of camera models](#)^[304]

Camera > Change installation height

When this button is pressed clicking in a **vertical projection** specifies a new **height of the Active camera**^[162] installation.

The values of [camera installation height](#)^[257] in the [Camera Geometry box](#)^[253] change according to a clicked point height.

Camera > Change view area upper bound

When this button is pressed clicking in a **vertical projection** specifies a new [height of the view area upper bound](#)^[258] and new [distance up to the view area upper bound](#)^[260].

Clicking in a **horizontal projection** specifies a **distance up to the view area upper bound**. The values of correspondent parameters in the [Camera Geometry box](#)^[251] change to clicked point coordinates.

You can change view area upper bound in [Select / Edit](#)^[177] mode, by moving the the grip in the middle of the view area upper bound.

Camera > Change view area lower bound

When this button is pressed clicking in a **vertical projection** specifies a new **height of the view area lower bound**. The values of [view area lower bound height](#)^[259] in the [Camera Geometry box](#)^[251] change according to a clicked point height.

Camera > Move active camera name

When this item chosen, clicking in the [graphics area](#)^[159] specifies **new location of the active camera name** relatively to its icon **in the projection which you clicked**.

If the Options box>Camera icon>Camera Icon>[Scalable](#)^[327] **is not checked**, then the size of the camera icon is not scalable so the distance up to the name also cannot be scalable. The distance is saved in pixels.

If the **Scalable is checked**, then the size of the camera icon is scalable so the distance up to the name is scalable too. The distance is saved in meters(foot).

Scalable and unscalable positions are stored separately, so switching the Scalable box will not lead to losing of the saved positions of the camera name.

Drawing > Save as

The item opens a submenu in which a **format of saving drawing file** can be chosen. You may save the drawing in any of the following formats: ***.dxf, *.wmf, *.emf, *.emf+, *.gif, *.tif, *.png, *.pdf (raster), *.bmp, *.jpg**.

To the ***.png, *.pdf (raster), *.bmp, *.emf+ (vector)** formats, a copy of the image in the Graphics window is exported practically without artefacts. The default export is performed with the same resolution as on the screen. You can increase the resolution of the drawing on the [Export](#)^[330] tab in the **Options box**. Therein you can also configure other export parameters.

In **VideoCAD Lite** export to DXF is performed by simplified way as well as in previous versions VideoCAD4-VideoCAD7.

All cameras and constructions splits into separate lines, parts of cameras are not combined into blocks, the structure of the background is broken. Filling of the view areas is not saved, it can be saved as hatching. When the [shadows](#)^[213] is enabled, view areas with shadows are not saved.

Simplified export is possible to DXF format only. Resolution is limited by the value in the [Resolution](#)^[330] combo box.

While simplified export, the export file will be multi-layers. In obtained *.dxf file there will be the following layers:

- Background;
- Constructions;
- Cameras;
- Additional (grid, titles, horizontal);
- Frame for printing (if it is enabled).

Raster objects (projections of [3D models](#)^[229]) are saved in the form of rectangles.

More about export options to AutoCAD: [Options box>Export>DXF](#)^[329]

**.wmf format is very outdated, it does not support images of 3D models, semitransparent (blend) and gradient filling projections. *.emf format does not support gradient and blend filling.*

*An alternative way to export to *.pdf is to [print](#)^[199] to a virtual printer, which produces printing result as a PDF file. In this method, the weight and color of [lines](#)^[320], [fonts](#)^[322] will match the values specified for printing.*

While saving to ***.gif**, color distortions are possible, while saving to ***.jpg** compression artefacts can be visible .

While saving to other formats, mentioned above and other distortions are possible.

Clicking a sub-item with extension name will open the [Export](#)^[329] tab in the [Options box](#)^[319]. It is possible on the tab to adjust export parameters: exporting drawing scale, camera icon and illuminator icon sizes, size of nonscalable fonts, step of dash line and step of hatches.

After closing the Options box the dialog box **Save drawing as** appears enabling to choose a **filename** and a **saving directory**.

The file name coincides with the layout name by default.

You can save the drawing with a frame and tittle-block. To do this chose [Print](#)^[207], chose frame with a tittle-block then save the drawing.

If export module of VideoCAD can not export drawing with a complex background in AutoCAD format, try the following:

1. Hide the background;
2. Export;
3. Combine the obtained dxf file with the original background in AutoCAD or any other program that can do it.

Shift and rotation between background and drawing are possible when exporting drawing with a background in AutoCAD format with the active **User Coordinate System (UCS)**. The shift can be corrected in AutoCAD. To prevent the shift do not use as a background files with the active User Coordinate System. Use the files in the **World Coordinate System (WCS)**. Before loading a file with **UCS** as a background, open it in AutoCAD and use the **PLAN** command.

See also: [Work with background in AutoCAD format](#)^[413], [Options box>Export](#)^[329], [PDF Report](#)^[200]

Drawing > Copy to clipboard

Copy drawing to **Windows clipboard**.

Choosing this item opens a submenu allowing to choose the **format** in which the drawing will be copied to the clipboard.

After that the drawing can be pasted into any document, e.g. into a project explanatory note. A drawing is copied in a displayed size.

Drawing > Load background

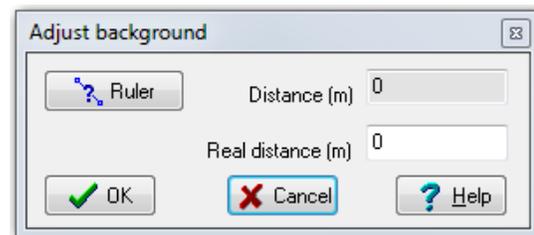
This item opens a submenu allowing to choose a **projection** to load a background.

After choosing item a **dialog box for choosing background file** appears. Graphic files of the following formats can be used as a **background**: *.bmp, *.jpg, AutoCAD *.dxf, *.dwg, *.wmf, *.emf, *.emf+, *.gif, *.tif, *.png, *.pdf.

Choose the necessary file in the dialog box and click **OK**.

The **background** will appear in the chosen projection along with the dialog box [Adjust background](#)^[205]. Using its tools is necessary to bring an **image scale** on the background in correspondence with the **general VideoCAD scale**.

- Click the  **Ruler** button
- Specify by clicking **2 points on the background image**, the distance between which is known to you (e.g., the length of a building, a wall, etc.). In the **Distance** box the measured distance at the current scale will appear.
- Enter the known distance into the **Real distance** box and click **OK**.



The background will be automatically scaled so that the **distance specified by you** will be equal to the **entered value of real distance**.

If the loaded background is in PDF format, the Adjust background dialog includes fields for selecting page in the PDF document and to set resolution of the PDF document. If the loaded background is in DXF or DWG format, the dialog includes tools to select a layout and to control visibility of layers of the background, as well as a checkbox to hide texts.

If the background is **already loaded**, and you load a background without [removing](#)^[206] the previous

one, then the size, scale and location of a new background will remain the same as of a previous one. In this case, the proportion between the sides of a new background might be distorted. If you **remove an old background beforehand**, then the new one will be automatically placed according to the size of a file and the current scale on the screen.

The project includes background files themselves, therefore when moving the project file don't worry about the background files moving.

If VideoCAD can not read a file in AutoCAD format or reads it incorrectly, proceed as follows:

1. Open your file in AutoCAD, check the scale, check the presence of remote from the main construction details, check for other abnormal details. If necessary, correct the detected errors.
2. Create a new blank file in AutoCAD
3. Copy from your file only those constructions that are necessary to accommodate the cameras.
4. Save the file as dxf version no later than 2015.
5. Load this file in VideoCAD as a background.

See also: [Adjust background](#)^[205], [Move background](#)^[206], [Hide background](#)^[206], [Delete background](#)^[206], [Thin lines of raster background](#)^[334].

Drawing > Adjust background

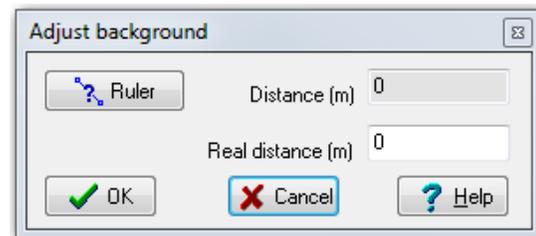
This item opens a submenu allowing to choose a projection to **adjust** background.

After choosing item the dialog box **Adjust Background** appears. Using its tools is necessary to bring an **image scale on the background** in correspondence with the **general VideoCAD scale**.

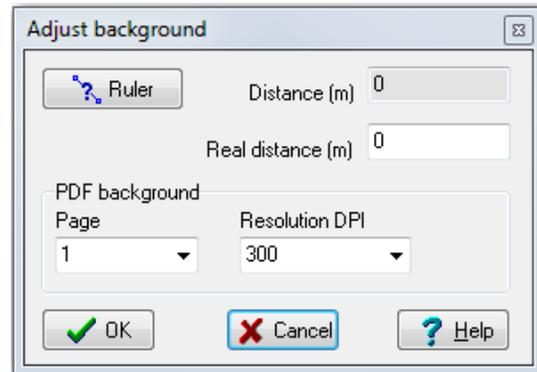
Sequence of actions:

- Click the  **Ruler** button
- Specify by clicking **2 points on the background image**, the distance between which is known to you (e.g., the length of a building, a wall, etc.). In the **Distance** box the measured distance at the current scale will appear.
- Enter the known distance into the **Real distance** box and click **OK**.

The background will be automatically scaled so that the **distance specified by you** will be equal to the **entered value of real distance**.



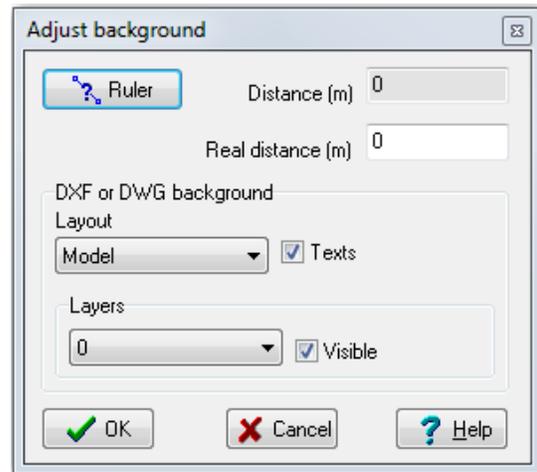
If the loaded background is in PDF format, the Adjust background dialog includes fields for selecting page in the PDF document and to set resolution of the PDF document.



If the loaded background is in DXF or DWG format, the dialog includes tools to select a layout and to control visibility of layers of the background, as well as a checkbox to hide texts.

To enable/disable layers: choose layers name in the **Layers** list, then mark or clear the **Visible** checkbox.

See also: [Work with background in AutoCAD format](#)^[413], [Import DXF/DWG background](#)^[199]



Drawing > Move background

This item opens a submenu allowing to choose a projection to **move** background.

After choosing item clicking in the [graphics area](#)^[159] specifies **new location of the background in the corresponding projection**.

Drawing > Hide background

This item opens a submenu allowing to choose a projection to **hide** background.

The **hidden background** and all its parameters are stored in memory, but the background is not displayed. It is convenient for increasing speed on weak computer or in some other cases.

If export module of VideoCAD can not export drawing with a complex background in AutoCAD format, try the following:

1. Hide the background;
2. Export;
3. Combine the obtained dxf file with the original background in AutoCAD or any other program that can do it.

Drawing > Delete background

This item opens a submenu allowing to choose a projection to remove background.

Choosing item from the submenu removes **background** and all its parameters from the project.

If the background is **already loaded**, and you [load](#)^[204] a background **without removing the previous one**, then the size, scale and location of a new background will remain the same as of a previous one. In this case, the proportion between the sides of a new background might be distorted.

If you **remove an old background beforehand**, then the new one will be automatically placed according to the size of a file and the current scale on the screen.

Drawing > Background only

After choosing this item the background only will be displayed in the [graphics area](#)^[159].

VideoCAD turns to a handy **program for graphic files viewing and printing**.

For all the rest to be displayed choose this item again.

Drawing > Layouts

Choosing this item opens a box with the list of current project **layouts**.

The project may contain up to **10** layouts. Originally one layout is created into project.

See more. [Layout box](#)^[340]

To switch between layouts, create, delete, rename layouts in the Graphics window it is convenient to use the [Layouts tabs](#)^[242] in the lower left corner and the pop-up menu of these tabs.

Drawing > Printer setup

Choosing this item opens a standard dialog box of current printer setup in Windows.

Drawing > Print

After choosing this item the **borders of pages for printing** and the **Preview** box appear in the **graphics area**.

In the box you can choose the **number of pages horizontally and vertically** to print out current drawing. The obtained pages can be glued together forming a drawing of a larger format.

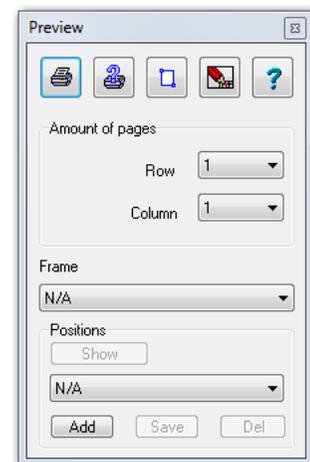
Using the mouse, **position** and **scale** the drawing as needed. If **Ctrl** is not pressed at changing the scale, then the scale changes roughly which is convenient at navigation. If **Ctrl** is pressed, the scale changes with the less step which is convenient for the precise drawing positioning before printing or saving.

To exclude the certain areas of a drawing at printing, use the **Mask**  button that duplicates the [same button](#)^[189] on the **Tool bar**.

To change **settings of the current printer** click the **Printer Setup**  button.

After the drawing preparation is completed click the button **Print** .

In case if any problem with printing try to choose [printing options in the Options box](#)^[334].



Frames and Title blocks

To get the standard drawing sheet with the **frame** and the **Title-Block** choose the required frame in the **Frame** combo box. The frame should be created beforehand.

Frames are a files of **AutoCAD *.dxf** format. They can be created or edited using the **AutoCAD** or other program exporting to ***.dxf**. VideoCAD can be used too. Frame files are saved in the **\Frames** directory in the VideoCAD installation directory.

You may use the prepared frames with the filled Title Blocks, or you may fill the **Title Block** before printing.

To fill the **Title Block**:

- Click the **Fill Title-Block**  button. As a result the frame becomes fixed to other constructions and at navigation is moved and scaled together with them. Current drawing location and scale are memorized;
- With the help of the mouse enlarge the Title-Block area and fill the fields with the [text](#)^[227];
- Click the button **Title-Block** again. The drawing and frame will return to the memorized position.

Store positions of drawing

In the lower part of the panel there is the **Positions** area. By means of tools in this area it is possible to store the adjustments and positions of the drawing, and then quickly return to the stored positions. This option is useful in case of repeated printing the same view after editing is carried out.

After adjustment of the drawing's position and frame, before print, click the **Add** button and enter any name of the position.

At printing the same view for returning to the stored position it is enough to select only the position's name in the combo box.

To return to position in the combo box after displacement click **Show** button.

To store new position under the name selected from the positions' list click **Save** button.

To delete the selected position click **Del** button.

Printing on a virtual printer

An alternative way to export to PDF is printing on a virtual printer, which produces printing result as a PDF file. In this method, the thickness and color of [lines](#)^[320], [fonts](#)^[322] will match the values specified for printing.

However, not all virtual and hardware printers support printing transparent, gradient fills, hatches, transparent images. When printing on these printers, you can use an option **Printing>Use buffer**^[334] in the Options box.

When using a raster buffer, initial printing is carried out on the buffer, and then raster buffer is sent to the printer.

Without using the buffer, an image is sent to the printer in vector form, as a set of drawing commands and if the printer does not support all commands, errors are possible on the printed image.

However not all printers can work with the **Use buffer** mode in all cases. In case of issues

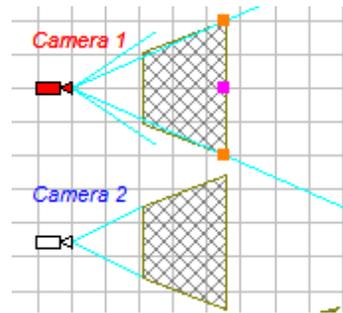
clear the [Use buffer](#)^[334] checkbox. Try also to decrease printer DPI resolution, hide raster background. Try another virtual printer.

View > View area edges

Show the Active camera view area edges, calculated according to [parameters](#)^[253] in the **Camera Geometry box**.

Line type can be changed in the [options box](#)^[320].

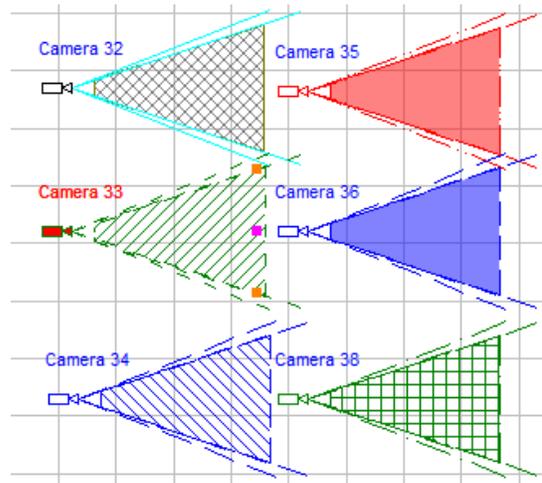
When [View area projection bounds](#)^[168] is disabled, but [Shadows](#)^[172] is enabled, the [View area edges](#)^[168] is shown simplified in the form of two rays.



If the [line type of camera](#)^[166] coincides with default line type for camera icons, specified in the Options box, then for this camera the line type of View area edges is taken from the Options box>Lines>System line types>[Bounds](#)^[320]. This line type is assigned to new cameras by default (Camera 32 on the figure).

Default line type for cameras is Line 21.

If another line type was assigned to the camera, the View area edges of this camera is drawn by this line type assigned to the camera, as well as the [View area projection bounds](#)^[169] and camera icon. (Camera 33...38).



Thus you can draw different cameras and their view areas by different colors, thickness and line style.

In VideoCAD Lite the View area edges are visible in the [3D Video](#)^[284] window as lines when [3D view areas](#)^[174] is enabled and the [3D view areas](#)^[288] menu item is marked.

*A button state at the moment of camera saving determines whether the **view area edges** of the given camera will be displayed when this camera is inactive.*

If selected cameras exist on the current layout, except the active camera, this button changes view  and operates the visibility of **View area edges** of all selected cameras simultaneously.

View > View area projection bounds

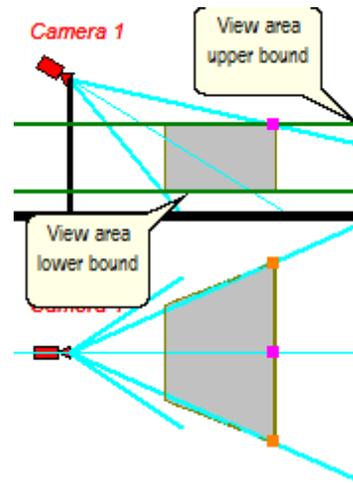
Show the bounds of the Active camera view area projections calculated according to [parameters](#) [\[253\]](#) in the Camera Geometry box.

Submenu of the button:

1.  **Projection** - show View area projection bounds of the active camera.

Projection is calculated according to a simple rule:

A point on the horizontal projection is considered visible if a vertical segment, formed by this point in the range of heights from the [view area lower bound height](#) [\[259\]](#) to the [view area upper bound height](#) [\[258\]](#), is visible wholly.



Difference between the **View area projection bounds** and [Shadows](#) [\[172\]](#) buttons is that the **View area projection bounds** are built without obstacles on the scene but the **Shadows** are built considering obstacles. Both buttons can be used simultaneously in various combinations.

2. **Off.** - don't show.

When **View area projection bounds** is disabled, but [Shadows](#) [\[172\]](#) is enabled, the [View area edges](#) [\[168\]](#) is shown simplified in the form of two rays.

If the [line type of camera](#) [\[166\]](#) coincides with default line type for camera icons, specified in the [Options box](#) [\[327\]](#), then for this camera the line type of **View area projection bounds** is taken from the [Options box](#) > Lines > System line types > [Bounds](#) [\[320\]](#). This line type is assigned to new cameras by default.

If another line type was assigned to the camera, the **View area projection bounds** of this camera is drawn by this line type assigned to the camera, as well as the [View area edges](#) [\[168\]](#) and camera icon.

A button state at the moment of camera saving determines whether the bounds of the given camera view area projections will be displayed when this camera is inactive.

If selected cameras exist on the current layout, except the active camera, this button changes view  and operates the visibility of **View area projection bounds** of all selected cameras simultaneously.

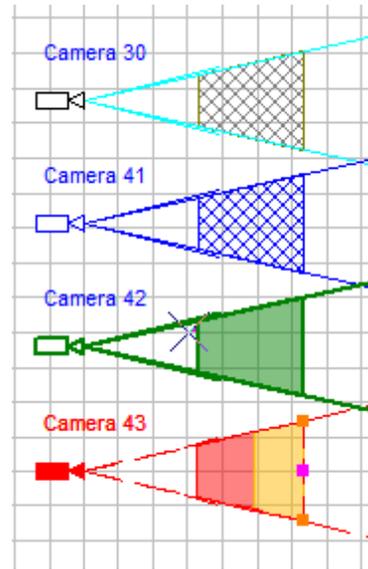
View > Fill projections

Hatch or fill by blend color view area projections of [active camera](#) [\[162\]](#) (if these projections exist) calculated according to parameters in the [Camera Geometry](#) [\[253\]](#) box.

If the [line type of camera](#)^[166] coincides with default line type for camera icons, specified in the [Options box](#)^[327], then hatching (filling) projections of this camera is performed by grey color by default (Camera 30 on the figure).

If another line type was assigned to the camera, then hatching (filling) projections of this camera is performed by a color of this line type assigned to the camera. (Camera 41,42).

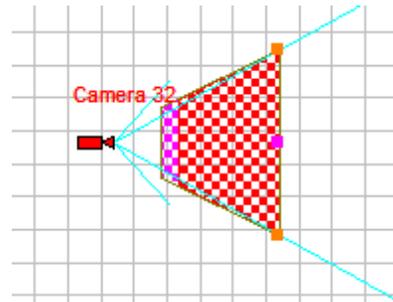
If the [Spatial resolution](#)^[170] is enabled, then colors of hatching (filling) projections is determined by Spatial resolution parameters (Camera 43).



Drop-down menu:

1.  **Hatching** - hatch projections.
2.  **Filling** - fill projections by blend semitransparent color.

If the **Hatching** item is chosen, but in the drop-down menu of the [Spatial resolution](#)^[170] button the **Gradient** item is chosen, then the projections will be hatched by a bold style of hatch without gradient.



Transparence of filling in the Graphics window and the [3D Video](#)^[288] can be adjusted in the [Options box](#).

3. **Off** - don't hatch and fill view area projections.

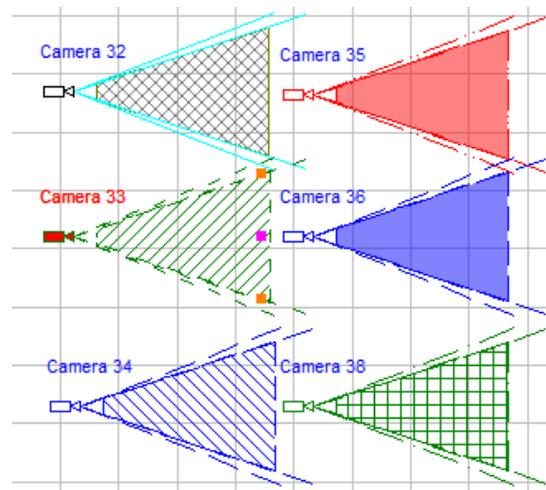
If **Off** is chosen in the **Fill projections** and [Shadows](#)^[172], then filling view area faces in the [3D Video](#)^[288] is not shown.

If the [line type of camera](#)^[166] coincides with default line type for camera icons, specified in the [Options box](#), then for this camera Filling is performed by Gray color and Hatching by **DiagCross** style. (Camera 32)

Default line type for cameras is Line 21.

If another line type was assigned to the camera, then for this camera filling is performed by a color determined by **color** of the line type and hatch style is determined by **style** of the line type (Camera 33...38).

Thus you can fill and hatch projections of different cameras by different colors and hatch



styles.

A button state at the moment of camera saving determines whether the filling or hatching of the view area projections of the camera will be displayed when this camera is inactive.

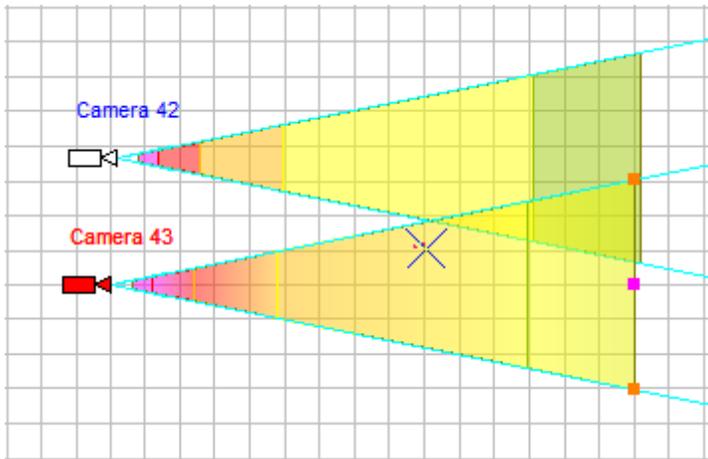
If selected cameras exist on the layout, except the active camera, this button changes view  and operates the visibility of filling (hatching) projections of all selected cameras simultaneously.

View > Spatial resolution

Fill in different colors **regions** on the **view area projections of the active camera**, depending on the **spatial resolution** within these regions.

Colors of the regions and the boundary values of the spatial resolution are determined by the **spatial resolution pattern** assigned to the camera.

In the [Spatial resolution box](#)^[272] you can edit the patterns and assign them to cameras.



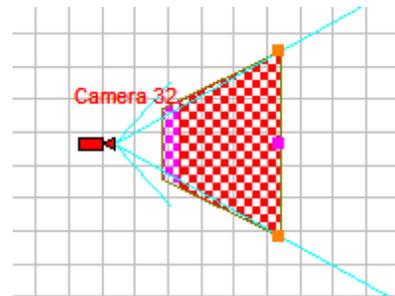
Drop-down menu:

1.  **Discrete colors** - fill the regions in discrete colors in accordance with a spatial resolution at the far bounds of the regions.
2.  **Gradient** - fill the view area projection in gradient color according to the spatial resolution at each point on the projection.

*In case of gradient color is chosen, the colors at the **far region bounds** equal to the colors of the **spatial resolution pattern**, but between the bounds color changes smoothly, as well as real spatial resolution.*

Gradient reflects the spatial resolution more accurately and looks impressive, but discrete colors are more intuitive and easy to use..

*If the **Gradient** item is chosen, but in the drop-down menu of the [Fill projections](#)^[169] button the **Hatching** item is chosen, then the projections will be hatched by a bold style of hatch without gradient.*

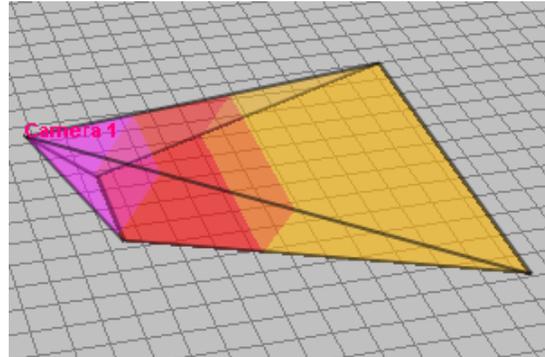


Calculation of gradient demands a lot of resources and increases redraw time.

3. Off. - don't display spatial resolution

In the [Dome](#)^[172] mode the **Spatial resolution** is calculated without taking into account pan and tilt angles of camera. It is assumed that the camera can pan and tilt freely, and spatial resolution is calculated at the center of the field of view.

The **Spatial resolution** button controls displaying spatial resolution on [3D View areas](#)^[174] in the [3D Video](#)^[288].



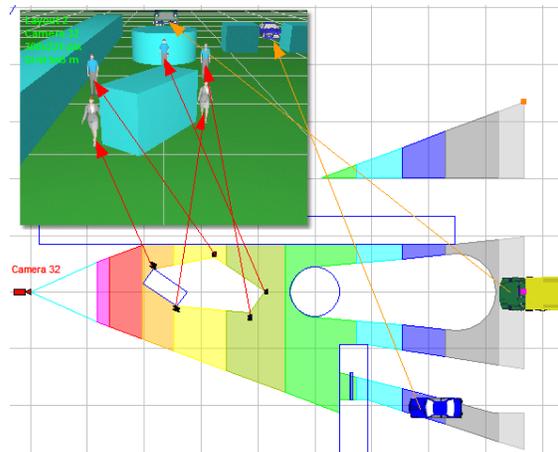
A button state at the moment of camera saving determines whether the spatial resolution of the camera will be displayed when this camera is inactive.

If selected cameras exist on the layout, except the [Active camera](#)^[162], this button changes view () and operates the visibility of spatial resolution of all selected cameras simultaneously.

See also: [Spatial resolution box](#)^[272], [Visualization of the camera control area projections and spatial resolution within them](#)^[381].

View > Shadow

Display horizontal projection of the view area of **the active camera** taking into account shading from [constructions](#)^[181].



Shadows - a powerful yet easy-to-use tool of VideoCAD. Shadows are calculated for all positions of cameras, shading objects can be located at any point of space. You should only enable calculation of shadows with the help of this button.

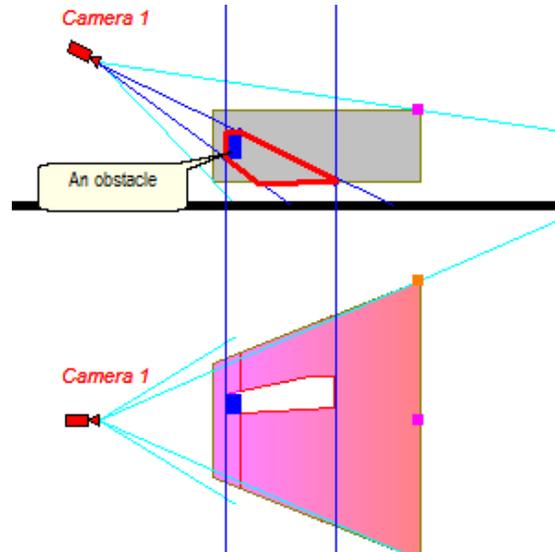
Shading takes into account the camera installation height and all 3 coordinate of constructions (including heights).

Drop-down menu:

1.  **Within projection** - display view area projection taking into account shadows. Shading is calculated according to a rule:

A point on the horizontal projection is considered visible if a vertical segment, formed by this point in the range of heights from the [view area lower bound height](#)^[259] to the [view area upper bound height](#)^[258], is visible wholly.

By the same rule the [horizontal projections](#)^[168] of view area are calculated. Changing the height of the lower and upper bounds of view area could change conditions of calculation of shading.



2.  **Dome** - display projection of the territory controlled by the camera in 360 degrees, without view area borders, but only taking into account the shadowing.

When the **Dome** item is chosen, actually the **control area** of a **dome (PTZ)** camera is displayed.

The **Dome** mode is also useful for choosing the best installation place for fixed cameras to make required areas reachable for the cameras.

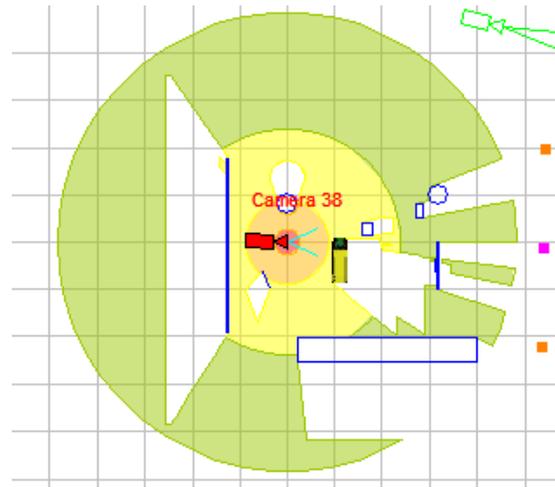
In the **Dome** mode all shaded areas from the specified camera position become visible.

In the **Dome** mode the [Spatial resolution](#)^[170] is calculated without taking into account pan and tilt angles of camera. It is assumed that the camera can pan and tilt freely, and spatial resolution is calculated at the center of the field of view

In the Graphics window calculation of shadows in the Dome mode is performed like in the [Within projection](#)^[173] mode, ie according to the rule:

A point on the horizontal projection is considered visible if a vertical segment, formed by this point in the range of heights from the [view area lower bound height](#)^[259] to the [view area upper bound height](#)^[258], is visible wholly.

3. **Off** - disable shadow calculation and displaying.



*Difference between the **Shadows** and [View area projection bounds](#)^[168] buttons is that the **View area projection bounds** are built without obstacles on the scene but the **Shadows** are built*

considering obstacles. Both buttons can be used simultaneously in various combinations.

The **Shadow button** works in conjunction with the [Spatial resolution](#)^[170]  and the [Fill projections](#)^[169]  buttons. Depending on the state of these buttons, shadows can be displayed in different ways: as filling, as shading, as a border lines, with mapping spatial resolution or not.

The calculation of shading - resource-intensive operation. During the shadow calculation on the **Shadow button** **red frame flashes** .

Automatic shadow calculation is performed only for the [active](#)^[163] camera. To recalculate shading for a particular camera - activate this camera. To recalculate shading for all selected cameras, click [Main Menu>View>Recalculate shadows](#)^[215].

To temporarily disable the automatic calculation of shading (keeping already calculated shadows visible) clear the item [Main menu>View>Calculate shadows for active camera](#)^[215].

Whether or not a specific construction takes into account in the calculation of shading determines by the [Shadow](#)^[320] checkbox of the line **type used** for the construction.

A button state at the moment of camera saving determines whether the shadows of the camera will be displayed when this camera is inactive.

If selected cameras exist on the layout, except the [Active camera](#)^[162], this button changes view  () and operates the visibility of shadows of all selected cameras simultaneously.

See also: [Shadows](#)^[172], [Main menu>View>Calculate shadows for active camera](#)^[215], [Main Menu>View>Recalculate shadows](#)^[215], [Line type>Shadow](#)^[320], [Options box>Miscellaneous>Shadow](#)^[333], [Choosing the best place for PTZ \(dome\) camera](#)^[384], [Visualization of the camera control area projections and spatial resolution within them](#)^[381]

View > Calculate shadows for active camera

Enable/ disable calculating shadows.

Automatic calculating shadows is performed for the [active camera](#)^[161] only.

To temporary disable automatic calculating shadows (with keeping already calculated shadows) clear this menu item.

This item controls shadow calculation in the Graphics window only, it doesn't affect shadows in the 3D World.

See also: [Shadows](#)^[172], [Main menu>View>Calculate shadows for active camera](#)^[215], [Main Menu>View>Recalculate shadows](#)^[215], [Line type>Shadow](#)^[320], [Layers>Shadow](#), [Options box>Miscellaneous>Shadow](#)^[333], [Options box>Calculate shadows from 3D models](#)^[333], [Current construction parameter panel>3D model>Shadows](#)^[248], [3D Models window>Shadows](#), [Choosing the best place for PTZ \(dome\) camera](#)^[384], [Visualization of the camera control area projections and spatial resolution within them](#)^[381]

View > Recalculate shadows

Recalculate shadows for all [selected](#)^[161] cameras

Calculating shadows is a **resource-intensive operation**. Automatic calculating shadows is performed for the [active camera](#)^[161] only. To recalculate shadows for all [selected](#)^[161] cameras, click this item.

See also: [Shadows](#)^[172], [Main menu>View>Calculate shadows for active camera](#)^[215], [Main Menu>View>Recalculate shadows](#)^[215], [Line type>Shadow](#)^[320], [Layers>Shadow](#), [Options box>Miscellaneous>Shadow](#)^[333], [Options box>Calculate shadows from 3D models](#)^[333], [Current](#)

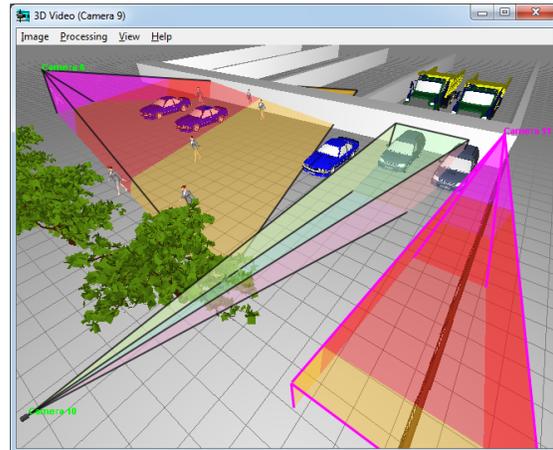
[construction parameter panel>3D model>Shadows](#)^[248], 3D Models window>Shadows, [Choosing the best place for PTZ \(dome\) camera](#)^[384], [Visualization of the camera control area projections and spatial resolution within them](#)^[381]

View > 3D view area

Show 3D transparent view area in the **3D Video** window.

The **3D Video>Main menu>View>3D View areas** menu item must be marked.

See details: [3D Video>Main menu>View>3D View areas](#)^[288]



Button state at the moment of camera saving determines whether the 3D view area of the given camera will be displayed when this camera is inactive.

If selected cameras exist on the current layout, except the [Active camera](#)^[162], this button changes view  and operates the visibility of **3D view areas** of all selected cameras simultaneously.

View > Titles

Show on the top left corner: **names of project and layout** and the **grid step** on the drawing.

Font type can be changed in the [Options box](#)^[322].

View > Camera names

Switch on/off the displaying cameras' names near their icons in the Graphics window and in the 3D Video.

Font type can be changed in the [Options box](#)^[322].

View > Active camera cables

Show/Hide [cables](#)^[238] of the **active camera**.

View > All cameras' cables

Show/Hide the [cables](#)^[238] of all the cameras.

*Only cables of the **active camera** can be edited.*

View > Cameras over constructions

When this item is checked, cameras icons and view areas are displayed over constructions, i.e. the constructions do not cover the cameras. This mode is convenient at operation with complex 3D

models of rooms.

When the item is not checked, the constructions are displayed over cameras (by default).

See also: [High resolution on top](#)^[199].

View > Camera geometry

Clicking this item will open [Camera Geometry box](#)^[251]. This box includes geometric parameters of the camera, lens and installation parameters of the camera.

See more: [Camera geometry box](#)^[251]

View > Spatial resolution

Show or hide the [Spatial resolution box](#)^[272]. In this box it is possible to create and edit patterns of spatial resolution and field of view size visualization. In the box there are prepared spatial resolution patterns according to the following criteria: Home Office Scientific Development Branch, Home Office Guidelines for identification, P 78.36.008-99, Australian Standard AS4806: Closed Circuit Television, European Standard EN 50132-7, ISO/IEC 19794 Biometric data interchange formats.. Also in the box there are examples of images of group of people are automatically displayed for each region of spatial resolution.

See more. [Spatial resolution box](#)^[272], [Spatial resolution button](#)^[170].

View > 3D Video

Show or hide the **3D Video** window. The **3D Video** displays the image from the active camera.

See more: [3D Video](#)^[284]

View > Monitor window

Show or hide the **Monitor window**. In the Monitor window images from any quantity of cameras are displayed simultaneously. Monitor window allows modeling monitors of video surveillance system.

See more: [Monitor window](#)^[294]

View > Hide vertical projection

With this item chosen a **horizontal projection** is only present in the [graphics area](#)^[159]. To display a **vertical projection** click this item again.

View > Hide horizontal projection

With this item chosen a **vertical projection** is only present in the [graphics area](#)^[159]. To display a **horizontal projection** click this item again.

View > Grid

Choosing this item opens a submenu of **grid displaying control**. The submenu enables to set a certain grid step up, switch a mode of **automatic grid step selection** on/off and switch the grid displaying off.

See also: ["Grid" control element group](#)^[176]

View > Origin

This item opens the submenu of **origin selection**.

The [graphics area](#)^[159] allows to use **2 coordinate systems**:

- **Fixed coordinate system**
- **Float coordinate system attached to the active camera**

In case of **the fixed coordinate system**, the **origin of coordinates** does not vary when changing the active camera. The origin is displayed as two icons  in horizontal and vertical projections. It is possible to change a point of origin after choosing the menu item **View > Set origin**^[218].

In case of the **coordinate system attached to the active camera**, the **origin of coordinates** always coincides with the active camera location. It is convenient when studying its view area.

A [grid](#)^[176] is fixed to the **origin of coordinates**, and the counting of the cursor current coordinates in the [status bar](#)^[243] starts from the origin.

View > Set Origin

After choosing this item clicking on the **horizontal projection** sets up a new **origin**  **of the Fixed coordinate system**^[160].

In the vertical projection horizontally the Origin coincides with the one set in the horizontal projection, and vertically it coincides with the ground.

View > Black-and-white

Switch **black-and-white** drawing mode on/off.

This mode is useful when printing a drawing out on black-and-white printer.

View > Options

Choosing this item opens a dialog box of the [program options](#)^[319].

See more: [Options box](#)^[319]

Scale > Zoom in

Clicking this item increases a drawing **scale**.

Using the **Intellimouse** you can change the drawing **scale** with the simultaneous zooming in the image sections pointed by the cursor.

If **Ctrl is not pressed** at changing the scale, then **the scale changes roughly** which is convenient at navigation. If **Ctrl is pressed**, **the scale changes with the less step** which is convenient for the precise drawing positioning before printing or saving.

If input focus is on the graphics area, scale can be changed by + and - buttons on the keyboard.

When [Alt is pressed](#)^[249], it is possible to move drawing in the Graphics window using arrow keys and change scale using plus and minus keys irrespective of the input focus.

Choosing an item of the pop-up menu appearing when clicking the [graphics area](#)^[159] with the right

mouse button performs the command as well.

Scale > Zoom out

Clicking this item reduces a drawing **scale**.

Using the **Intellimouse** you can change the drawing **scale** with the simultaneous zooming in the image sections pointed by the cursor.

If **Ctrl is not pressed** at changing the scale, then **the scale changes roughly** which is convenient at navigation. If **Ctrl is pressed, the scale changes with the less step** which is convenient for the precise drawing positioning before printing or saving.

If input focus is on the graphics area, scale can be changed by + and - buttons on the keyboard.

When **Alt is pressed**^[249], it is possible to move drawing in the Graphics window using arrow keys and change scale using plus and minus keys irrespective of the input focus.

Choosing an item of the pop-up menu appearing when clicking the [graphics area](#)^[159] with the right mouse button performs the command as well.

Scale > Move drawing

With this item chosen you can move a drawing within the [graphics area](#)^[159] using the mouse.

To do that press and hold down the **left mouse button** at any spot of drawing and then move the mouse holding the button down. To stop moving the drawing release the mouse button.

If your mouse is an **Intellimouse** or other **Wheel mouse** you can move the drawing at any time by pressing and holding the **middle button** down.

When **Alt is pressed**^[249], it is possible to move drawing in the Graphics window using arrow keys and change scale using plus and minus keys irrespective of the input focus.

Scale > Show all

Show all cameras and other constructions on the current layout. At this the scale and view are chosen automatically.

Scale > Find text

After choosing this item the **Find text box** will appear. In the box **any text can be entered**.

After clicking the button **OK, all cameras and text markers**^[227] **on the current layout**, in which designation the entered text is included, will become **visible** and **selected**^[167]. At this the scale and view are chosen automatically.

Even only one letter can be entered, and at this all cameras and text markers on the current layout, in which designation the entered letter is included will become visible.

It is convenient to mark the upper left and the lower right corner of the required areas with **text markers**. After that as the result of searching the marked area will be displayed on the full screen.

When clicking the button **Save** the entered text string will be saved, and it will be enough later on just to choose it from the list to find the corresponding objects.

Text strings are saved in the project in separate lists for each layout, i.e. are saved between computer rebooting and project moves.

When clicking the button **Delete** the displayed text string will be deleted from the project.

Constructions > Point

When this button is pressed, clicking on the graphics area places a point.

The [status bar](#)^[243] displays the coordinates of this **point** relatively to the [origin of coordinates](#)^[218].

In the [3D Video](#)^[284] the vertical segment will be displayed in the points place.

Default minimal and maximal heights of the segment are determined by the [line type](#)^[320], which constructs the point. The heights can be set separately for each point by means of the [current construction parameters panel](#)^[247], on which it is also possible to set coordinates of the point in numeric values.

See also: ["Constructions" button group](#)^[181]

Constructions > Horizontal line

When this button is pressed, clicking on the [graphics area](#)^[159] specifies a point through which a **horizontal line** is passes.

The [status bar](#)^[243] displays the line **height** or its **shift** from the [origin of coordinates](#)^[218] according to the projection being clicked.

In the [3D Video](#)^[284] at the place of the horizontal line 2 horizontal lines will be displayed.

Default minimal and maximal heights of the lines are determined by the [line type](#)^[320], which constructs the horizontal line. The heights can be set separately for each horizontal line by means of [current construction parameters panel](#)^[247], on which it is also possible to set coordinates of the horizontal line in numeric values.

See also: ["Constructions" button group](#)^[181]

Constructions > Vertical line

When this button is pressed, clicking on the [graphics area](#)^[159] specifies a point through which a **vertical line** is passes.

The [status bar](#)^[243] displays the **distance** from the [origin of coordinates](#)^[218].

In the [3D Video](#)^[284] at the place of the vertical line 2 horizontal lines will be displayed.

Default minimal and maximal heights of the lines are determined by the [line type](#)^[320], which constructs the vertical line. The heights can be set separately for each vertical line by means of the [current construction parameters panel](#)^[247], on which it is also possible to set coordinates of the vertical line in numeric values.

See also: ["Constructions" button group](#)^[181]

Constructions > Line segment

When this button is pressed, the first clicking on the [graphics area](#)^[159] specifies the start point of a **line segment**. Second clicking specifies the end point of the **line segment**.

The [status bar](#)^[243] displays the segments length and its projection to distance and height.

Both clicks are to be made in the same projection. If the projections are different the measured values are incorrect, therefore when constructing a segment with its ends in different projections the values are not displayed in the **status bar**. In this case when changing a drawing the segment is attached to the projection with its **initial point**.

In the [3D Video](#)^[284] a vertical rectangle will be displayed at the segment place.

Default minimal and maximal heights of the rectangle are determined by the [line type](#)^[320], which constructs the line segment. The heights can be set separately for each line segment by means of [current construction parameters panel](#)^[247], on which it is also possible to set coordinates of the line segment in numeric values.

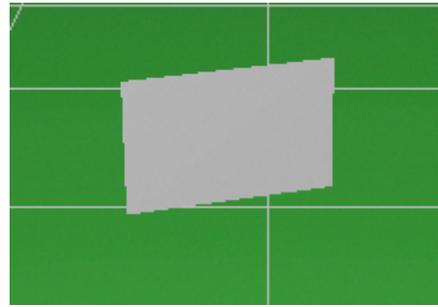
Color of the rectangle is determined only by [line type](#)^[320], which is used at constructing.

On the **current construction parameters panel** it is possible to set and fix **parameters of the segment**: coordinates of the first and second points, length, angle.

*A segment can be also used to **measure distances** on layouts without clicking for the second time in this case.*

*Line segments can be used for modeling cables with subsequent cable length calculation. Use separate **line types** to draw each cable type. For length calculation use the [Length calculation of line segments](#)^[343] tool.*

See also: ["Constructions" button group](#)^[181]



Constructions > Polyline

This tool allows to draw line segments continuously. The end of each segment is the start of the next one. To stop drawing lines, press **ESC**.

In other respects this tool equals to the [Line segment](#)^[183] (see. above).

See also: ["Constructions" button group](#)^[181]

Constructions > Angle

When this button is pressed, the first clicking on the [graphics area](#)^[159] specifies the **vertex** of an **angle**. Second and third clicking specify its **arms**.

The [status bar](#)^[243] displays the angle value in **degrees**.

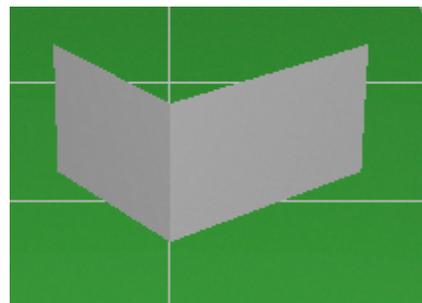
If the angle **vertex** and **arms** are constructed in **different projections**, when changing drawing the angle is attached to the projection with its vertex.

In the [3D Video](#)^[284] 2 vertical rectangles will be displayed at the angle place.

Default minimal and maximal heights of the rectangles are determined by the [line type](#)^[320], which constructs the Angle. The heights can be set separately for each Angle by means of [current construction parameters panel](#)^[247], on which it is also possible to set coordinates of the line segment in numeric values.

Color of the rectangles is determined only by [line type](#)^[320], which is used at constructing.

On the **current construction parameters panel** it is possible to set and fix **parameters of the angle**: coordinates of the first, second, third points, length, angle value in degree.



The **angle** tool is also used to measure angles on layouts.

See also: ["Constructions" button group](#)^[181]

Constructions > Rectangle

When this button is pressed, the first clicking on the [graphics area](#)^[159] specifies the first corner of a rectangle. Second clicking completes the rectangle construction.

The [status bar](#)^[243] displays the information on the rectangle sizes and location.

In the [3D Video](#)^[284] a parallelepiped will be displayed at the rectangle place.

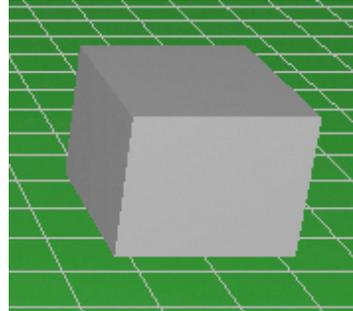
Default minimal and maximal heights of the parallelepiped are determined by the [line type](#)^[320], which constructs the rectangle. The heights can be set separately for each rectangle by means of [current construction parameters panel](#)^[247], on which it is also possible to set coordinates of the rectangle in numeric values.

Color of the parallelepiped is determined only by [line type](#)^[320], which is used at constructing.

On the **current construction parameters panel** it is possible to set and fix **parameters of the rectangle**: coordinates of the first points, height, width.

Rectangles are also used for creating rectangular **horizontal planes** in the **3D Video**, for example a ceiling or floor.

See also: ["Constructions" button group](#)^[181]

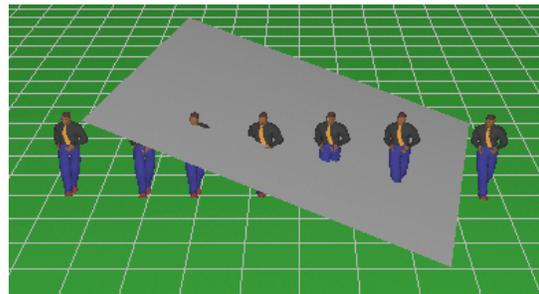


Constructions > Inclined rectangle

When this button is pressed, clicking on the [graphics area](#)^[159] specifies first corner of an inclined rectangle.

Inclined rectangle is similar to a [rectangle](#)^[184] and differs from it that in [3D Video](#)^[284] it is displayed in the form of **inclined rectangle**. The **minimal height of rectangle** corresponds to the **lower side** of this rectangle, and the **maximal height** - to the **upper one**.

In the **Graphics window** the upper side of inclined rectangle is displayed by **thick line**.



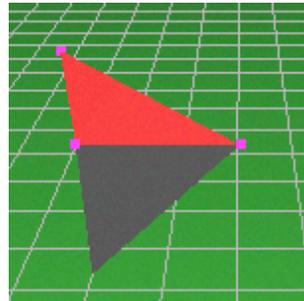
For modeling complex objects it is possible to [edit](#)^[177] inclined rectangle by points, moving its vertexes.

When moving separate vertexes press **Ctrl**.

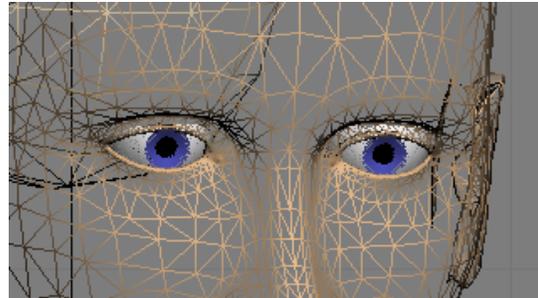
Inclined rectangle can be made transparent by 70 %. For this purpose it is necessary to mark the **Transparence** checkbox on the [Current construction parameter panel](#)^[247].

Inclined rectangle is very universal tool. Using the inclined rectangles it is possible to model any 3D objects.

It can be useful to combine inclined rectangles in pairs thus to get triangles with independent vertexes in the 3D space. Meanwhile two vertexes of each inclined rectangle must coincide. The rest two vertexes of first inclined rectangle must coincide with the other two vertexes of second inclined rectangle.



Using obtained triangles you can theoretically build any 3D surfaces, although it can be not simple in practice. For example, all 3D models in VideoCAD consist of triangular mesh only.



See also: ["Constructions" button group](#)^[181]

Constructions > Double line

When this button is pressed, the first clicking on the [graphics area](#)^[159] specifies the start point of a **double line**. Second clicking specifies the end point of the **double line**.

The **length** and the **width** of the double line appear in the [status bar](#)^[243].

In [line type panel](#)^[245] that appeared below **graphics area** there is a box in which it is possible to choose from the list or enter from keyboard the distance between lines of the double line.

Two buttons allow switching the **orientation of the second line** relatively to the first one



You can also switch the orientation quickly by pressing the **Space bar**.

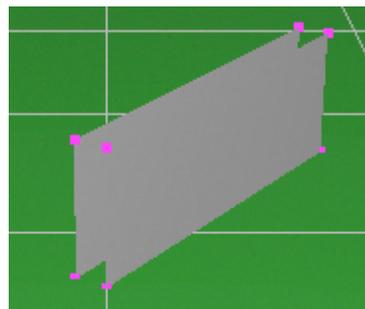
In the [3D Video](#)^[284] 2 vertical rectangles will be displayed at the double line place.

Default minimal and maximal heights of the rectangles are determined by the [line type](#)^[320], which constructs the double line. The heights can be set separately for each double line by means of [current construction parameters panel](#)^[247], on which it is also possible to set coordinates of the double line in numeric values.

Color of the rectangles is determined only by [line type](#)^[320], which is used at constructing.

On the **current construction parameters panel** it is possible to set and fix **parameters of the double line**: coordinates of the first, second points, length, angle.

See also: ["Constructions" button group](#)^[181]



Constructions > Wall

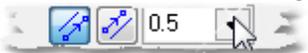
The Wall tool is intended for drawing walls with specified thickness and height. In these walls you can make [apertures](#)^[187] of any shape, for example for doors and windows.

When this button is pressed, the first clicking on the [graphics area](#)^[159] specifies the start point of a **Wall**. Second clicking specifies the end point of the **Wall**.

The **length** and the **width** of the wall appear in the [status bar](#)^[243].

In [line type panel](#)^[245] that appeared below **graphics area** there is a box in which it is possible to choose from the list or enter from keyboard the thickness of the wall.

Two buttons allow switching the **orientation** of the second wall side relatively to the first one



You can also switch the orientation quickly by pressing the **Space bar**.

In the [3D Video](#)^[284] a parallelepiped will be displayed at the wall place.

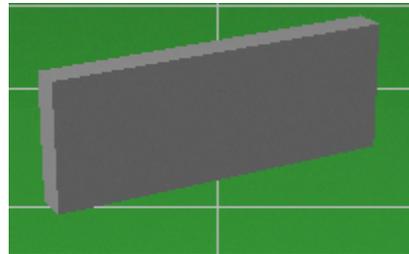
Default minimal and maximal heights of the wall are determined by the [line type](#)^[320], which constructs the wall. The heights can be set separately for each wall by means of the [current construction parameters panel](#)^[247], on which it is also possible to set coordinates of the wall in numeric values.

Color of the parallelepiped is determined only by [line type](#)^[320], which is used at constructing.

On the **current construction parameters panel** it is possible to set and fix **parameters of the wall**: coordinates of the first, second points, length, angle.

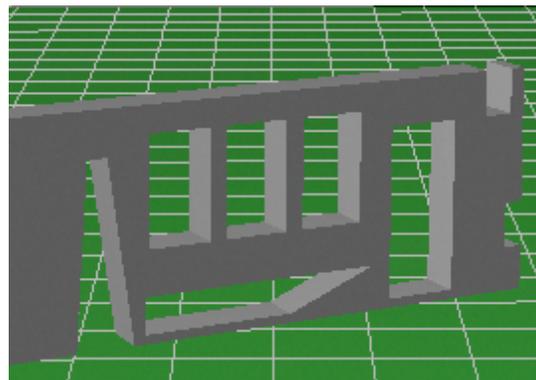
In walls it is possible to make apertures for doors and windows using the [Aperture in Wall](#)^[187] tool.

See also: ["Constructions" button group](#)^[187]

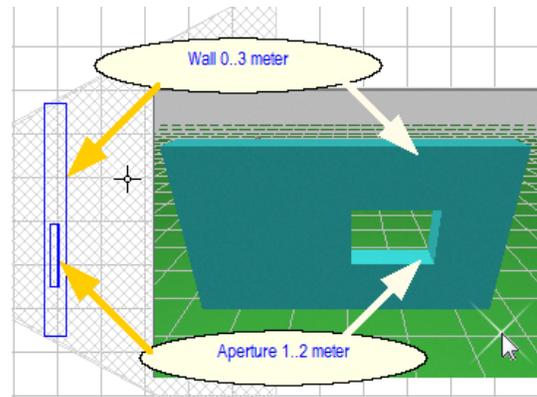


Constructions > Aperture in Wall

The Aperture in Wall tool designed to easily create apertures (openings) of various shapes in the walls, built by the [Wall](#)^[186] tool.



In order to an aperture will appear in the 3D space, it must intersect the horizontal projection of the wall.



The Aperture in Wall tool is similar to the [Inclined rectangle](#)^[184] tool. But the **Inclined rectangle** creates a **flat rectangle** in 3D space, but the **Aperture in Wall** placed inside the **Wall**, cuts an aperture in the wall. This aperture equals to the projection of the same **flat rectangle** on the plane of the wall.

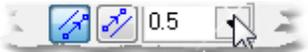
The **minimal height of aperture** corresponds to the **lower side** of this rectangle, and the **maximal height** - to the **upper one**.

In the **Graphics window** the upper side of aperture is displayed by **thick line**.

In [line type panel](#)^[245] that appeared below **graphics area** there is a box in which it is possible to choose from the list or enter from keyboard the thickness of the aperture.

The Thickness of the wall affects only the shape of aperture projection in the Graphics window. In the 3D Video the apertures always cut through a wall at its full thickness.

Two buttons allow switching the **orientation** of the second aperture side relatively to the first one



You can also switch the orientation quickly by pressing the **Space bar**.

For modeling complex apertures it is possible to [edit](#)^[177] the Apertures by points, moving its vertexes.

*When moving separate vertexes press **Ctrl**.*

You can create complex apertures using several intersecting apertures.

See also: [Wall](#)^[186], ["Constructions" button group](#)^[187]

Constructions > Circle

When this button is pressed, the first clicking on the [graphics area](#)^[159] specifies the **center of a circle**. Second clicking completes the **circle** construction.

The [status bar](#)^[243] displays the information on the sizes and location of the circle.

To switch the **circle** into the **editing state** you need to double-click on **its center** or on the **point on its radius** that appears during the process of construction.

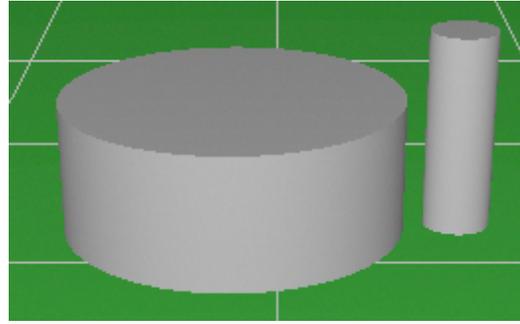
In the [3D Video](#)^[284] a cylinder will be displayed in the circle place.

Default minimal and maximal heights of the cylinder are determined by the [line type](#)^[320], which constructs the circle. The heights can be set separately for each circle by means of [current construction parameters panel](#)^[247], on which it is also possible to set coordinates of the circle in numeric values.

Color of the cylinder is determined only by [line type](#)^[320], which is used at constructing.

On the **current construction parameters panel** it is possible to set and fix **parameters of the circle**: coordinates of the center and second point, radius, angle.

See also: ["Constructions" button group](#)^[181]



Constructions > Arc

When this button is pressed, the first clicking on the [graphics area](#)^[159] specifies the **center** of an **arc**. Second and third clicking specify its **ends**.

To switch the arc into the **editing state** you need to double-click on **its center** or on either of its two ends.

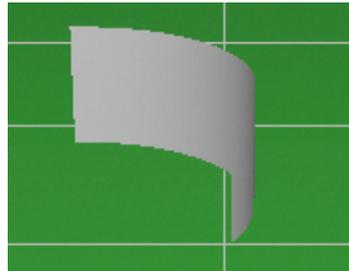
In the [3D Video](#)^[284] the arc stretches, creating a cylindrical surface.

Default minimal and maximal heights of the cylindrical surface are determined by the [line type](#)^[320], which constructs the arc. The heights can be set separately for each arc by means of [current construction parameters panel](#)^[247], on which it is also possible to set coordinates of the arc in numeric values.

Color of the arc is determined only by [line type](#)^[320], which is used at constructing.

On the **current construction parameters panel** it is possible to set and fix **parameters of the arc**: coordinates of the center, first and second points, radius, angle.

See also: ["Constructions" button group](#)^[181]

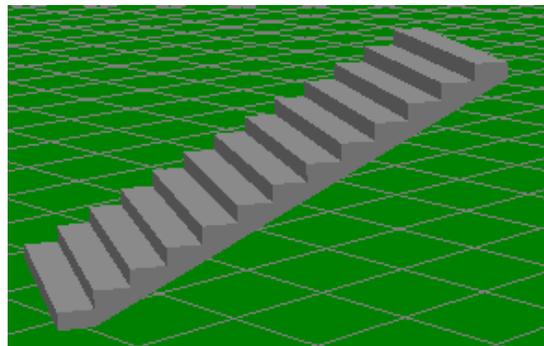


Constructions > Stairs

Stairs is similar to the [Inclined rectangle](#)^[184] and differs from it that in the [3D Video and](#)^[284] 3D World windows it is shown in the form of stairs

On the **current construction parameters panel** the minimum height corresponds to the pedestal of the stairs, maximum height corresponds to the top of the stairs.

In the **Graphics window** the upper side of stairs is displayed by **thick line**.



The number of steps is calculated automatically from the height of one step equals to 15 cm.

See also: ["Constructions" button group](#)^[187]

Constructions > Text

When this button is pressed, clicking on the [graphics area](#)^[159] specifies the place for a text string. At this point a **pop-up frame** with cursor will appear.

The necessary text is to be entered within a frame. To separate the lines use **Enter**.

The [font type panel](#)^[246] appears below in the graphics area allowing to change the [font type](#)^[322]. A **pop-up menu** is available within a frame, appearing at clicking the right mouse button.

The entered text is a text marker and can be quickly found using the [Find text](#)^[219] tool. This is a very convenient and quick means for navigation on big layouts.

In the [3D Video](#)^[284] Texts are not displayed.

See also: ["Constructions" button group](#)^[187], [Find text](#)^[219]

Constructions > Mask

When this button is pressed, the first clicking on the [graphics area](#)^[159] specifies the first vertex of **rectangular mask**. Second clicking completes the mask construction.

The [status bar](#)^[243] displays the information on the mask sizes and location.

Using **masks** allows to cover any image parts. [Constructions](#)^[187] and [texts](#)^[189] can be drawn over masks.

To cover **separate construction fragments** you can also use **line of white color**.

In the **3D Video** masks are not shown.

In the [3D Video](#)^[284] the Mask is not displayed.

See also: ["Constructions" button group](#)^[187]

Constructions > Filling

Filling is similar to a [mask](#)^[189], but can be of any color, and also in the form of **different hatch type**. Color of filling is defined by the **color of line type**, by which the filling is made, and **type of hatching** or its absence - by **style of this line type**.

Fillings, as well as other objects, could be [edited](#)^[177] by moving separate vertexes, and thus could be stretched on various objects.

In the [3D Video](#)^[284] fillings are not shown.

See also: ["Constructions" button group](#)^[187]

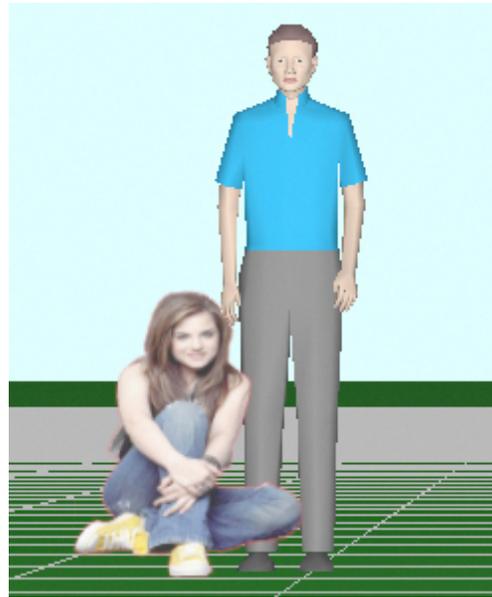
Constructions > 3D image

This tool is similar to [Inclined rectangle](#)^[184]. As well as the **inclined rectangle** it allows to place a rectangle in three-dimensional space at any angle.

But this rectangle can be "covered" by any raster image in *.bmp , *.jpg, *.gif, *.tiff, *.png formats. The image can be a photo or a figure. In *.bmp and *.jpg files, pixels of the image can be transparent if they have a color **coincided** with the **color of the left bottom pixel**. Thus the image border can take any form.

In *.png files transparent pixels will be displayed transparent.

In many cases raster images can replace [3D models](#)^[190] which are difficult to make. They can be used for modeling many objects from banknotes and plates up to a complex background.



After choosing this button the **Loading 3D image** dialog box appears. After choosing a file in *.bmp, *.jpg, *.jpeg, *.png, *.gif, *.tif or *.tiff format place **3D image** in the same way as Inclined rectangle.

On the [Current construction parameter panel](#)^[247] the minimal height corresponds to the bottom bound of this rectangle and the maximal height - to the top bound.

In the **Graphics window** the top of 3D images is displayed by **thick line**.

Later **3D image** can be [edited](#)^[177] by moving its grips. It is possible to change **3D image** sizes on the Current construction parameter panel, delete and change the image file using buttons  and  on the **Current construction parameter panel**.

To make transparent pixels with color **coincided** with **color of left bottom pixel** (or transparent pixels of *.png file), check **Transparence checkbox** on the **Current construction parameter panel**.

*To get the transparence of *.bmp or *.jpg file, the image file has to be specially prepared by means of any graphic editor, for example **Paint**. **Pixels that should become transparent have to be filled by color that coincides with the color of left bottom pixel.***

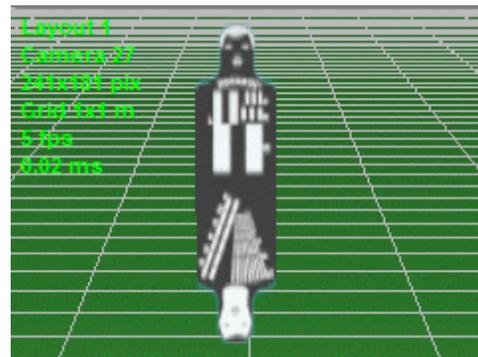
See also: ["Constructions" button group](#)^[181]

Constructions > Rotakin

Rotakin - an animated rotating test target for visual estimation of spatial resolution and motion distortions on the 3D images.

In the **horizontal plane** the Rotakin automatically turns towards the active camera.

In the **vertical plane** the Rotakin rotates with a specified speed about an axis passing through its center (in **Professional** version only).



To place the Rotakin specify a place for the Rotakin by clicking. On the **current construction parameters panel** it is possible to set minimal and maximal heights of the Rotakin.

*Rotating test target named **Rotakin** is used in field testing of video surveillance systems by the techniques developed by the **Home Office Scientific Development Branch 'Performance Testing of CCTV Perimeter Surveillance Systems (Using the Rotakin Standard Test Target)'**. The Rotakin model meets the requirements of the document.*

See also: ["Constructions" button group](#)^[187]

Constructions > Global snaps

Choosing this item opens a submenu enabling to switch global snaps on/off and display the snap panel, with the help of which it is convenient switch the snaps fast when drawing.

Snaps enhance the convenience in drawing. As a result of the snaps' functioning the cursor "sticks" to the certain **points**, **lines** or **directions**.

- **Points** - the cursor sticks to base object points.
- **Lines** - the cursor sticks to objects lines.
- **Angular** snap functions at construction of line segments, angles, cables, and at moving and rotating as well. After that the subsequent construction points are leveled from the previous points horizontally and vertically.
- **Extension** - the cursor sticks to the virtual horizontal and vertical lines passing through base objects points.

The snap Extension is disabled for [hidden](#)^[236] objects and in the [Select/Edit](#)^[177] mode.

- **At grid** - the cursor sticks to grid nodes.

*In the [Options box](#)^[333] you can change **snap sensitivity**.*

- **Show panel** - display the **snap panel**, with the help of which it is convenient switch the snaps fast while drawing.

The **pop-up menu** appearing when clicking the [graphics area](#)^[159] with the right button of the mouse contains an item **Local snap**. The **local snaps** have the same function as the global ones though working **during one operation**.

Constructions > Lock constructions

After modeling the environment the cameras' placement stage begins. At this stage displacement of constructions is not required any more, and their casual selection can cause inconveniences. If this item is marked, the selection of constructions is locked. To release the locking, click this item once again.

3D models > 3D Model

The item opens submenu, in which there are **3D models** which are present in the program library.

When any item in the submenu is chosen, clicking in the [graphics area](#)^[159] specifies the place for a **3D model**.

3D models placement is possible in the horizontal and vertical projections, however only 3D models placed in **the horizontal projection** will be visible in the [3D Video](#)^[284].



In the horizontal projection the **3D models** are displayed in the **top view**, in the vertical projection - in the **side view**, and in the [3D Video](#)^[284] models are as **3D objects**.

Horizontal and vertical [projections](#)^[292] for displaying in the **Graphics window** can be created in the [3D Models](#)^[297] window.

3D models can be **moved, rotated, copied**, changed [draw order](#)^[236] as other VideoCAD objects.

The default **height of the 3D models** above the ground is determined by the **maximal height of the line type**^[320] which was chosen when the **3D model** was being placed. The height can be set separately for each **3D model** using the [current construction parameters panel](#)^[247].

To **change 3D model height** above the ground, [select](#)^[232] the 3D model, then [change line type](#)^[237] or switch the 3D model to editing state by double clicking on it and change value in the **3D H** box on the **Current construction parameters panel**.

By default the **3D models** are on the ground and constructed by the **line type** with the number, specified on the [Lines](#)^[320] tab of the [Options box](#)^[319]. This line type has the **maximum height equal to 0**.

*Heights can also take on **negative values**, in this case 3D model plunges under ground.*

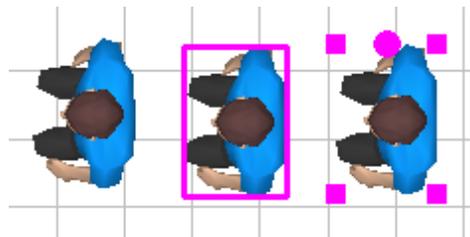
*For example, **to place a 3D model on a surface**: construct the surface by the [rectangle](#)^[184] tool using **line type** with the required maximum height, place the 3D model on it, and then change 3D model **line type** to the line type of the surface.*

[In the Editing state](#)^[167] using the **Current construction parameters panel** you can resize 3D models separately on axes.

To do this, enter new values into X, Y, Z boxes during 3D model editing. If the  box is marked, change of any size leads to proportional change of other sizes, thus model proportions are not broken. 3D model **height above the ground** is displayed and can be changed in **3D H** box.

In the [editing state](#)^[167], 3D models are displayed with square grips and pink circle.

You can rotate the 3D model by the mouse using the circle, scale 3D model on X and Y axis using the square grips. You can move the 3D model by pressing the left mouse button on the 3D model, as well as in the selected state.



License plate of cars

Let's consider 3D models - cars with license plates. License plate type, the same for all car

models, is determined by the file **number.bmp** file in the directory **\Models**, and the **plate size** - by the corresponding settings in the **Options box** on the [3D modeling](#)^[325] tab. This opportunity allows using the same models in different countries with different license plates.

To make cars appear in the 3D Video with the license plate of your country:

- create a ***.bmp** file with the image of you license plate;
- !! *The size of file sides, in pixels, must be equal to powers of two:*
16,32,64,128,256,512,1024,2048
- replace the file **number.bmp** by your file;
- specify the sizes of your license plate in the **Options box**.

Adding new 3D models, manage 3D models

You can add new 3D models to the library using [Add 3D Model](#)^[231] menu item.

You can add, delete, duplicate 3D models, distribute 3D models by directories in menu, get projections of 3D models for the Graphics window using the [3D Models](#)^[291] window.

Files of 3D models in ***.vcm** format can be exported from **SketchUP** and **3ds max** using plugins. Custom 3D models for VideoCAD can be created in **SketchUP** and **3ds max**.

See more: [Importing 3D models from SketchUp and Autodesk 3ds Max](#)^[397]

See also: [3D Video](#)^[284], [3D Models](#)^[291], [Options box>Lines](#)^[320], [Options box>3D modeling](#)^[325].

3D models > 3D Models window

Open the **3D Models** window. This window is intended for working with [3D models](#)^[190], add, delete, duplicate, make projections etc.

See more: [3D Models window](#)^[291]

3D models > Add 3D model

Add a 3D model to the program library. In the dialog box, select a file of 3D model ***.vcm** format and click **Open**.

Files in ***.vcm** format can be obtained by exporting from SketchUP and 3ds max using plugins. For details, see [Import of 3D models from SketchUp and Autodesk 3dsMax](#)^[397]

If VideoCAD library already has a 3D model with the same name or ID, you will be prompted to add the model under a different name or ID.

Then you will see the [3D Models window](#)^[291], in which you can create the [projection](#)^[292] of the 3D model to display it in the [Graphics window](#)^[158] and [menus](#)^[190]. To do this click the **Save projection button** and close the **3D Models** window. After this, icons of the 3D model will appear in menus and the 3D model can be placed in the graphics area.

For other features of the 3D Models window, see [3D Models window](#)^[291]

If your 3D model has **textures**, in the same directory where the ***.vcm** file is opened from, a folder with textures must be. The folder should be named **<model name> _textures**. VideoCAD plugin for SketchUP automatically creates the folder with the textures in the directory of saving exported

model.

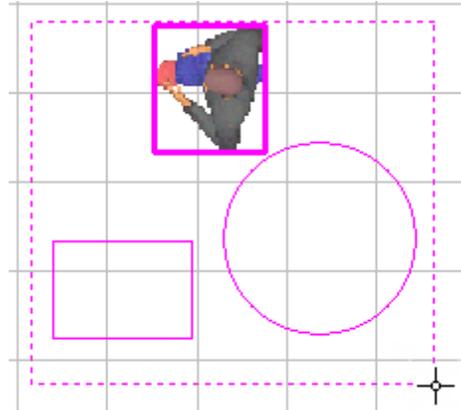
Edit > Select All

Select all constructions, models, cameras, cables and illuminators on the current layout.

Edit > Select/Edit

With this button chosen the first corner of **selection window** appears when clicking any empty place of **graphics area**^[159] once. Clicking it again completes the designation of **selection window**.

All the **objects**, which hit in the **selection window** and reside on the **projection** coinciding with one being clicked for the first time, will be **selected**^[161]. However, the earlier **selected objects** not hitting in the **selection window** will revert to **normal state**^[160].



*If **Ctrl** is pressed at clicking, the **objects** within the **selection window** are inverted, on the contrary, state of those not hitting in the **selection window** remains the same.*

It is possible **to select objects by one** by clicking their image once, thus enabling the earlier selected **objects** to revert to normal state.

*If **Ctrl** is pressed at clicking, the **objects** are inverted, and the state of the rest remains the same.*

During construction **3D scenes**^[284] it is often necessary to place some constructions one over another at a different height, made by means of different **line types**^[320].

To select one or more construction, located one over another, made by means of different line types:

- make the **line type panel**^[245] visible, for example by double clicking any construction;
 - choose on the panel the line type of construction you want to select;
- select the construction by clicking.

Just repeat clicking at the same place without moving the cursor. Thus objects under the cursor will be selected sequentially.

To move objects on the foreground or background use menu items: **Bring to front**^[236], **Send to back**^[236].

Selected objects can be moved. To move the selected objects, bring the cursor to the selected one, press the left mouse button and move the selected objects. After finishing the moving, release left mouse button.

To cancel selection click this button again.

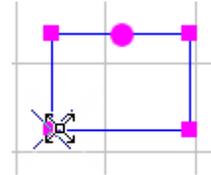
*To **select all objects** on the current layout use **Ctrl+A** shortcut.*

*For switching to Select / Edit mode from any mode use also **Esc** button.*

*See also: **Selected state**^[161]*

Editing state of objects

To translate an object into [editing state](#)^[167] double-click its image. After that **pink grips** appear on the object base points. When moving the cursor over this point its image changes.



To edit an object click beside a base point with a grip and move the cursor. After clicking for the second time, the changed object is set up.

If on one side of a construction a **circle** is displayed, the construction can be rotated around its axis by catching the circle by mouse.

To switch the [circle](#)^[225] into the editing state you need to double-click on its center or on the point on its radius that appears during the process of construction.

To switch the [arc](#)^[226] into the editing state you need to double-click on its center or on either of its two ends.

When editing a [rectangle](#)^[184] or a [mask](#)^[189], then several points will move at a time, the rectangle or the mask remaining square.

If **Ctrl** is pressed when editing a rectangle or a mask, then one point will move only.

When editing a [Double line](#)^[185] or [Wall](#)^[186], the whole Double line or Wall will be moved.

If **Ctrl** is pressed when editing the double line or wall, only one line will be moved.

When clicking the [text](#)^[189] twice the pop-up frame appears allowing to edit text in it. When clicking the right mouse button the pop-up menu of text editing appears in the frame.

In the editing state, [3D models](#)^[190] are displayed with square grips and pink circle.

You can rotate the 3D model by the mouse using the circle, scale 3D model on X and Y axis using the square grips. You can move the 3D model by pressing the left mouse button on the 3D model, as well as in the selected state.



It is possible to change object's parameters in editing state on the [current construction parameters panel](#)^[247] which automatically appears in the bottom of graphics window.

See also: [Editing state](#)^[167]

☐ **Activate cameras**

When double-clicking the camera lens the following actions are performed:

- the [Active camera](#)^[162] is saved.
- the camera being double-clicked will become active.

It is convenient to pan and tilt the active camera by moving the grip in the middle of the view area upper bound.

In a similar way by moving grips on the ends of the view area upper bound it is possible to change [lens focal length](#)^[256] of the camera.

If a [model](#)^[304] is assigned to the camera, the focal length changing is possible only in the limits specified in [model parameters](#)^[317].

See also: [Active camera](#)^[162]

See also: ["Edit" button group](#)^[177]

Edit > Cut

Cut the [selected objects](#)^[161] into the VideoCAD internal clipboard.

It is possible to cut **objects** of different projections at a time, and to cut any quantity of [constructions](#)^[181], [3D objects](#)^[229], **cameras**

Edit > Copy

Copy the [selected objects](#)^[161] into the VideoCAD internal clipboard.

It is possible to copy **objects** of different projections at a time, and to copy any quantity of [constructions](#)^[181], [3D objects](#)^[229], [texts](#)^[189] and **cables**.

See also: [Copy with base point](#)^[234]

Edit > Cut with base point

Cut the [selected objects](#)^[161] into the VideoCAD internal clipboard relative to a base point. After clicking this button specify the **base point** of cutting.

It is possible to cut **objects** of different projections at a time, and to cut any quantity of [constructions](#)^[181], [3D objects](#)^[229], [texts](#)^[189], **cameras** and **cables** as well.

When cutting the active camera it is copied.

See also: [Cut](#)^[234]

Edit > Copy with base point

Copy the [selected objects](#)^[161] into the VideoCAD internal clipboard relative to a base point. After clicking this button specify the **base point** of copying.

It is possible to copy **objects** of different projections at a time, and to copy any quantity of [constructions](#)^[181], [3D objects](#)^[229], [texts](#)^[189], **cameras** and **cables** as well.

See also: [Copy](#)^[234]

Edit > Paste

Paste the **objects** from the VideoCAD internal clipboard.

After clicking this button specify the **base point** of paste in the projection being clicked when **cutting** or **copying**.

It is possible to paste into different [layouts](#)^[340], paste **cables** of one camera while another camera is active (in this case the pasted cables belong to a camera which is active during paste), and to paste any quantity of [constructions](#)^[181], [3D objects](#)^[229], **cameras**, [texts](#)^[189] and **cables** at a time.

It is available to **copy** and **paste constructions, cables** and **texts between the projects**. To this effect make a copy in one project, then open another project or create a new one and paste what you have copied.

Be careful when copying and pasting **cables**. You can copy only **cables of Active camera**^[162], and when pasting, these cables will belong to the **camera which is active during pasting**.

*If a camera is being pasted a **new camera** with parameters of the pasted camera is created automatically. **This is an alternative way to create new cameras.***

[Shadows](#)^[172] in the [Graphics window](#)^[158] are calculated for the [active camera](#)^[162], but pasted camera doesn't become active. Therefore the view area of the pasted camera is displayed without shadows. To calculate shadows - [activate](#)^[162] the camera after pasting.

Edit > Move

Move the [selected objects](#)^[161].

After clicking this button the first click in a [graphics area](#)^[159] designates the starting moving point, the second click - the final one.

*When moving take into account the **projection** to which the objects are attached. A simultaneous moving objects in different projections vertically is locked as being incorrect.*

[Selected](#)^[161] objects or cameras can be moved in [Select / edit](#)^[177] mode. In order to move place the cursor above the selected object, press left mouse button, move, after moving is finished release the left mouse button.

[Shadows](#)^[172] in the [Graphics window](#)^[158] are calculated for the [active camera](#)^[162], but moved camera can be not active. If the camera is not active, the view area of the moved camera is displayed with old shadows. To recalculate shadows - [activate](#)^[162] the camera after moving.

Edit > Rotate

Rotate the [selected objects](#)^[161].

After clicking this button the first click in a [graphics area](#)^[159] designates the rotation **center**, the second click specifies the initial rotating point, and the third click specifies the final rotating point.

*When rotating take into account the **projection** to which the objects are attached. The selected objects, attached to the projection with a rotation center designated, can rotate only.*

*The [scalable](#)^[322] fonts can rotate only. If a font is not scalable then its **initial point** rotates only, **the text remaining horizontal**.*

The active camera can be rotated in [Select / edit](#)^[177] mode by moving the grip in the middle of the view area upper bound.

[Shadows](#)^[172] in the [Graphics window](#)^[158] are calculated for the [active camera](#)^[162], but rotated camera can be not active. If the camera is not active, the view area of the rotated camera is displayed with old shadows. To recalculate shadows - [activate](#)^[162] the camera after rotating.

Edit > Scale

Change scale of [selected](#)^[161] constructions relative to the center of scaling.

After clicking on this button, the first click on the [graphics area](#)^[159] specifies the **center of scaling**.

Then moving the cursor up increases sizes of selected constructions, moving the cursor down decreases sizes of selected constructions.

In the [Status bar](#)^[243] the current scale factor is displayed.

When required sizes will be achieved, click for the second time to complete scaling operation. To cancel the scaling press **ESC**.

This tool does not scale [3D models](#)^[190]. 3D models can be scaled in [editing state](#)^[161] with the help of the [Current construction parameter panel](#)^[248].

Edit > Mirror

Mirror the [selected](#)^[167] constructions relative to the horizontal or vertical line passing through the specified point.

After clicking on this button, the first click on the [graphics area](#)^[159] specifies the point through which a mirror line must be passed.

Then moving the cursor changes position of the mirror line.

When required position of the mirroring objects will be achieved, click for the second time to complete mirroring operation. To cancel mirroring press **ESC**.

Edit > Bring to Front

Move [selected objects](#)^[167] on the foreground, then other objects will not shadow them. To move cameras over constructions use the [Cameras over constructions](#)^[216] item.

Changing the objects' draw order can be required at operation with large [3D models](#)^[229] of rooms, and also at operation with constructions placed one over another.

Edit > Send to Back

Move selected objects on the background, then selected objects will be covered by other objects. To move cameras over constructions use the [Cameras over constructions](#)^[216] item.

Changing the objects' draw order can be required at operation with large [3D models](#)^[229] of rooms, and also at operation with constructions placed one over another.

Edit > Hide

Hide the [selected objects](#)^[167].

With this item chosen the **selected objects** proceed into [hidden state](#)^[163]. In the **hidden state** the objects in the **Graphics window** are displayed on the background in **light grey** color. The rest characteristics are similar to those of [normal state](#)^[160].

In the [3D Video](#)^[284] window the hidden objects are not displayed. Hidden objects are not exported to [AutoCAD formats](#)^[202], *therefore to exclude some objects from export - hide them.*

The **hidden state** is used to conceal the temporarily interfering objects.

To return to **normal state** [select](#)^[232] the **hidden objects**.

The snap [Extension](#)^[229] is disabled for **hidden objects**.

When working with a separate **object** it is convenient to **select all** the objects in [layout](#)^[207] using the shortcut **Ctrl+A** and **hide** them. After that **select** the objects needed.

Edit > Align

Align the [selected objects](#)^[167].

Because limited accuracy of computer calculations, sometimes after a rotation objects' form is being distorted a little.

The effect of choosing this item is alignment of the form of selected objects.

Efficiency of alignment depends on a scale. Vast scale provides the minimum of efficiency, small scale - the maximum. At high degree of efficiency small objects can be distorted.

Edit > Change Line type

After choosing this item at the bottom of the [graphics area](#)^[159] appears the [line type panel](#)^[245]. In the **line type panel** you can choose [line type](#)^[320] for the [selected](#)^[161] [constructions](#)^[181] **and cameras**.

If during changing the line type of selected objects by the **Change line type** tool, to press and hold **Ctrl**, then the selected objects will also change their minimum and maximum height according to the chosen line type . If **Ctrl** is not pressed, the heights remains unchanged.

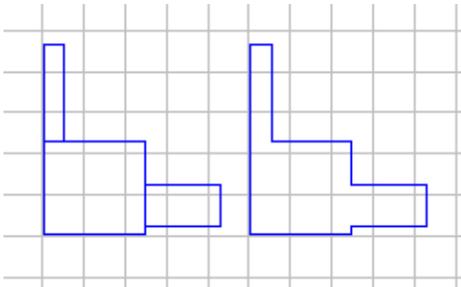
For changing line type with returning heights to values set in the new line type [parameters](#)^[321], use the [Line type panel](#)^[245] in [editing state](#)^[161] of one construction.

Edit > Combine to block

Combine to a block all [selected](#)^[161] constructions. The block will behave as one object. Combining is convenient at modeling complex objects and their subsequent moving, rotating and copying. To destroy the block use the [Destroy](#)^[237] tool.

Edit > Merge contour

Merge contours of [selected](#)^[161] constructions. This tool works with [walls](#)^[224] and [rectangles](#)^[222]. Merging improves appearance of drawing of buildings. To destroy merged contours use the [Destroy](#)^[237] tool.



[Line type](#)^[320] of the contour is determined by line type of the first construction of the contour. You can create multiple contours of different constructions with different line types.

Edit > Destroy

Divide selected [blocks](#)^[237] or [contours](#)^[237] to separate objects.

Edit > Undo

Undo the last operation.

VideoCAD stores several **last operations including Undo operation**. When clicking this button successively VideoCAD retraces to the last states and a state before the button **Undo** was clicked for the first time.

The quantity of the stored operations can be adjusted in the Options box>Miscellaneous>[UNDO depth](#)^[334].

Edit > Redo

Redo the last operation undone by the [UNDO](#)^[196] tool.

Edit > Erase

Erase the [selected objects](#)^[161].

If there are no **selected objects** this item is disabled.

Use also **Del**.

You can not erase the active camera.

Edit > Erase all

Erase all [constructions](#)^[181].

If there are no **constructions** this item is disabled.

Cables > Signal cable

When this button pressed, you can draw the **signal cable** of the **active camera** by successive clicks in the **graphics area**. The end of each segment is the start of the next one. To stop drawing cable, press **ESC**.

The [status bar](#)^[243] displays the segment length and its projection to distance and height.

Both clicks are to be made in the **same projection**. If the projections are different the measured values are incorrect, therefore when constructing a segment with its ends in different projections the values are not displayed in the **status bar**. In this case when changing the drawing the segment is attached to the projection with its **initial point**.

A cable consists of **segments**, allowing to draw it in different projections and layouts, representing an actual scheme of laying accurately.

When [copying](#)^[180] the **cable segments** between **cameras** and [layouts](#)^[340] a process of cable drawing is accelerated considerably even in complex CCTV systems.

When drawing a cable the menu item [Cable laying](#)^[239] might be used. When choosing it a float panel of the same name appears enabling to choose a shift of segment ends for a level parallel cable drawing along the walls, columns etc.

The type and parameters of **line designating the Signal cable** can be changed in the [options box](#)^[320].

VideoCAD summarizes the lengths of all the segments, considers the **reserves** and calculates the **total length of cable**. To change the default parameters and obtain the calculation results double-click the image of any cable segment or click **Signal cable** again.

A dialog box of the same name appears after that.

*You can open this box by choosing **Calculate** item near **Signal cable** item.*

The results of the cables' calculation on each individual camera and on the project as a whole are included into the text file obtained by [Text report](#)^[200] and [Cable report](#)^[240].

In multi-layer drawings, cables belong to the same layer as a camera to which the cables belong.

It is possible to use [Line segments](#)^[183] for cable modeling with subsequent cable length calculation. Use separate [line types](#)^[320] for drawing a cable of each type. For length calculation use the [Length calculation of line segments](#)^[343] tool and the [Cable report](#)^[240].

See also: "[Constructions](#)" button group^[181], [View>Active camera cables](#)^[216], [View>All camera](#)

[cables](#)^[216], [Cable laying](#)^[239], [Length calculation of line segments](#)^[343], [Cable report](#)^[240].

Cables > Power cable

When this button pressed, you can draw the **power cable** of the **active camera** by successive clicks in the **graphics area**. The end of each segment is the start of the next one. To stop drawing cable, press **ESC**.

The [status bar](#)^[243] displays the segment length and its projection to distance and height.

Both clicks are to be made in the **same projection**. If the projections are different the measured values are incorrect, therefore when constructing a segment with its ends in different projections the values are not displayed in the **status bar**. In this case when changing a drawing the segment is attached to the projection with its **initial point**.

A cable consists of **segments**, allowing to draw it in different projections and layouts, representing an actual scheme of laying accurately.

When [copying](#)^[180] the **cable segments** between **cameras** and [layouts](#)^[340] a process of cable drawing is accelerated considerably even in complex CCTV systems.

When drawing a cable the menu item [Cable laying](#)^[239] might be used. When choosing it a float panel of the same name appears enabling to choose a shift of segment ends for a level parallel cable drawing along the walls, columns etc.

The type and parameters of **line designating the power cable** can be changed in the [options box](#)^[320].

VideoCAD summarizes the lengths of all the segments, considers the **reserves** and calculates the **total length of cable**. To change the default parameters and obtain the calculation results double-click the image of any cable segment or click **Power cable** again.

A dialog box of the same name appears after that enabling to choose a **cross-section area of power cable** to fit the requirements of **camera voltage supply**. It is assumed that the conductor material is **copper** and the conductor temperature is **+ 50° C**

*You can open this box by choosing **Calculate** item near **Power cable** item.*

The results of the cables' calculation on each individual camera, each individual section area and on the project as a whole are included into the text file obtained by [Text report](#)^[200] and [Cable report](#)^[240].

In multi-layer drawings, cables belong to the same layer as a camera to which the cables belong.

It is possible to use [Line segments](#)^[183] for cable modeling with subsequent cable length calculation. Use separate [line types](#)^[320] for drawing a cable of each type. For length calculation use the [Length calculation of line segments](#)^[343] tool, [Cable report](#)^[240].

See also: "[Constructions](#)" button group^[181], [View>Active camera cables](#)^[216], [View>All camera cables](#)^[216], [Cable laying](#)^[239], [Length calculation of line segments](#)^[343], [Cable report](#)^[240].

Cables > Cable laying

With this item chosen a **float panel** of the same name appears enabling to choose a shift of segment ends for a level parallel cable drawing along the walls, columns etc.

See also: [View>Active camera cables](#)^[216], [View>All camera cables](#)^[216]

Cables > Length calculation of line segments

Clicking this item will open a box allowing calculate total length of any [line segments](#)^[220]. This

tool allows using line segments for modeling cables.

See more: [Length calculation of line segments](#)^[343], *See also:* [Cables](#)^[238]

Cables > Cable report

Choosing this item opens a box with a text report of all [line segments](#)^[183] and [cables](#)^[193] made by **line types** with marked [Cable](#)^[320] box in the parameters of the line type.

These **line types** are considered as **cable brands**. These line types can be assigned to the [Signal cable](#)^[341] and the [Power cable](#)^[342] of any camera.

You can simply draw cables as **line segments** on layouts using these line types. In this case, the cables are considered as **main cables** which are not attached to any camera.

The Cable report includes the cables attached to cameras and the **main cables** as well. Cable lengths is calculated for each brand (line type) separately.

See also: [Length calculation of line segments](#)^[343], [Calculation length of cables and getting the Cable report](#)^[388], [Signal cable length calculation box](#)^[341], [Power cable electrical parameters and length calculation box](#)^[342], [Cables summary](#)^[347]

Help > About VideoCAD

Open the About box with the general information of VideoCAD version and the Authors.

Help > Help contents

Open the contents of this Help file.

Help > Language

Choose the language.

All the text resources of the program are stored in *.Ing files in the VideoCAD installation directory. We are interested in translating the program to other languages.

If you can do it, could you please contact us: support@cctvcad.com

We offer big discounts for the translations.

How to add a new interface language

There is English.Ing file in a directory of VideoCAD (or VideoCADdemo) installation. All text elements of the interface are loaded from this file.

For creation of new interface language it is necessary:

1. Copy English.Ing (Russian.Ing) file under a new name <YourLanguage>.Ing
2. Accurately translate each line in the file. Don't change positions of the lines, don't delete or create new lines! Each position corresponds to some interface element. Don't translate lines which begin from '///' - they are labels. It is necessary to keep all blanks between lines.
3. Copy the obtained new file to the directory of VideoCAD(VideoCADdemo) installation and start VideoCAD (or VideoCADdemo).
4. Choose Main menu> Help> Language><YourLanguage>
5. Check up new interface. Correct the <YourLanguage>.Ing file if necessary.

Don't hesitate to contact us in case of any troubles.

Help > Home page

Visit CCTVCAD Software home page in the Internet.

Help > Order

Visit CCTVCAD Software Order page in the Internet.

Help > User forum

Visit CCTVCAD Software User forum in the Internet.

Help > Contact us

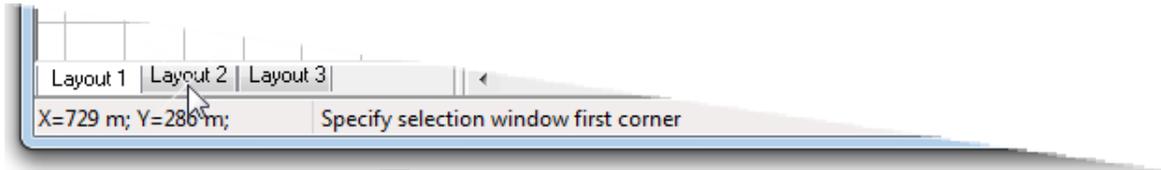
Send us an email message.

Help > Change registration code

Open the Enter key box to change the registration code.

Ability to change the registration code might be usefull for users with multiple licenses with USB dongles. Each USB dongle corresponds its own registration code. Message "The Dongle does not fit the License." means that the USB dongle does not match registration code, which registered the program. You need to change or a USB dongle, or enter the code corresponding to the dongle connected.

9.1.4 Layout tabs



See [location of the Layouts tabs](#)^[158]

There are **Layouts tabs** in the bottom-left corner of the [Graphics area](#)^[159]. Each tab corresponds to the separate layout created in the project.

The layouts are separate sections of monitored object (building, room, territory and storey). A layout contains the horizontal and vertical projections locating backgrounds, **cameras**, [cables](#)^[238] and [constructions](#)^[181]. Each camera can be displayed in one **layout** only, but camera **cables** may pass through several layouts.

The project may contain up to **10** layouts. Originally one layout is created into project.

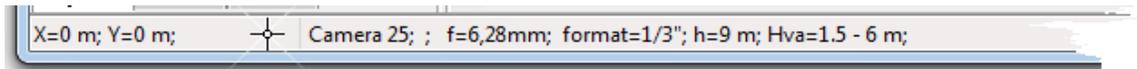
To show any layout, click the tab with its name.

Using the pop-up menu, which appears by right clicking on the tab, you can create, delete, and rename layouts or show the current layout completely.

The **original layout** and any layout with the cameras present in it can not be deleted.

See also: [Layouts box](#)^[340]

9.1.5 Status bar



See: [location of the Status bar](#)^[158]

[Graphics window](#)^[158] **status bar** is situated in the bottom of the **graphics window** and consists of two parts.

The left part is constantly displaying the **current coordinate of the cursor** relatively to the [origin of coordinates](#)^[218].

If the **origin** coinciding with the active camera is set up, then the coordinates have the following values:

- .If the cursor is in the **vertical projection**, then it is the **distance to the camera location** and its **height above the ground**. If the cursor is in the **horizontal projection**, then it is the **distance to the active camera location** in horizontal and vertical.

If there is no **active camera** in the layout displayed, then the values of coordinates have no sense.

- The right part is displaying the **measurement results** and the **hints**.

*The **construction coordinates** are displayed relatively to the chosen [origin of coordinates](#)^[218]. The coordinates of constructions **belonging to one camera only** ([change view area upper bound](#)^[195]) are always displayed **relatively to the active camera**.*

At moving the cursor nearer to the camera icon the name, model name and basic camera parameters are displayed.

During [scaling](#)^[181], in the right part of the Status bar the **current scale factor** is displayed.

9.1.6 Pop-up panels

See [location of the Pop-up panels](#)^[158]

Pop-up panels appear automatically in the bottom of the Graphics window during creating or editing constructions and texts.

[Line type panel](#)^[245]

[Font type panel](#)^[246]

[Current construction parameter panel](#)^[247]

9.1.6.1 Line type panel



The panel is designed for choosing [line types](#)^[320] and displaying parameters of the **current line type**.

The panel appears automatically in the bottom of the [graphics area](#)^[159] when clicking the [construction buttons](#)^[181], when choosing the correspondent **menu items** or when [editing](#)^[177] **constructions**.

The panel hides automatically in other modes. You can hide the panel by choosing the **Hide panel** item in the **pop-up menu** appearing when right clicking the panel.

The panel contains the following items:

- Line type number box
- Line type name box

Choosing values in these boxes changes the **current line type**.

*As a result of changing **line type** of a construction using this tool, the minimum and maximum [heights](#)^[247] will be returned to values set in [parameters](#)^[321] of the new line type.*

For changing a line type without changing heights, use [Change line type](#)^[237] tool.

When drawing a [Double line](#)^[223] [Wall](#)^[186] or [Aperture in Wall](#)^[187], in the right part of **line type panel** appear additional elements:



- Box in which it is possible to choose or enter from the keyboard the **width of the double line (wall or aperture)**.
- Two buttons  allow switching the **orientation of the second line** relatively to the first one. *You can also switch the orientation quickly with the help of the **Space bar**.*

Other items display parameters of the **chosen line type**. The parameters can be changed in the [options box](#)^[320] launched by double-clicking the **line type panel** or by choosing the item **Edit line type** in the **pop-up menu** which appears when right clicking the panel.

9.1.6.2 Font type panel



The panel is designed for choosing **font types** and displaying parameters of the **current font type**. The panel appears automatically in the bottom of the [graphics area](#)^[159] when clicking the button [Text](#)^[189], when choosing the correspondent **menu items** or when [editing](#)^[177] **text**.

The panel hides automatically in other modes. You can hide the panel by choosing the item **Hide panel** in the **pop-up menu** appearing when right clicking the panel.

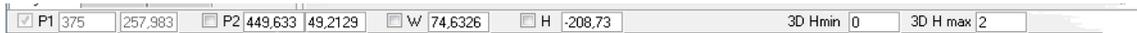
The panel contains the following items:

- Font type number box
- Font type name box

Choosing values in these boxes changes the **current font type**.

Other items display parameters of the **chosen font type**. The parameters can be changed in the [options box](#)^[322] launched by double-clicking the **font type panel** or by choosing the **Edit font type** item in the **pop-up menu** which appears when right clicking the panel.

9.1.6.3 Current construction parameter panel



The Panel is intended to set and edit **parameters of constructions, 3D models**. The Panel appears automatically at the bottom of the [Graphics area](#)^[158] when drawing or editing constructions. The set of the parameters for each kind of construction (point, line, rectangle, etc.) differs.

For example:

- for a point it is coordinates of the point, and its heights in the 3D Video;
- for a line segment it is coordinates of the segment's ends, length, angle and its heights in the 3D Video;
- for a rectangle it is coordinates of corners, height, width and its heights in the 3D Video, etc.

Options of the panel in **Construction** and **Editing**^[161] modes differ.

In the Construction mode:

It is possible to draw constructions, having set the parameters sufficient for complete definition of this construction.

For example, for a line segment it is enough to set coordinates of the first and second point, or coordinates of the first point, an angle and length.

It is possible to fix some parameters of construction, having marked check boxes nearby these parameters L 3,70935. At moving the cursor, the construction will be drawn in such a manner that the fixed parameter will remain constant.

For example, for a line segment it is possible to fix length or angle, for a rectangle - width or height, etc.

After a construction has been drawn, in the right end of the panel Edit  button appears. Clicking this button allows editing just created construction.

In the Editing mode:

It is possible to edit any parameters of construction from keyboard, thus the result of changing will be visible at once.

In both modes it is possible to change the **minimal and maximal heights** of the construction in the 3D Video irrespective of parameters of [line type](#)^[320], by which the construction is drawn.

3D model, 3D image, inclined rectangle, transparency

During placing or editing [3D models](#)^[190], special parameter set on the Current construction parameter panel is displayed.

See details: [3D models](#)^[248].

During drawing or editing [3D images](#)^[191] using the **Current construction parameter panel** it is possible:

- Load raster image by **Load image**  button;
- Delete image by **Delete image**  button;
- Mark **Transparence** box to make pixels transparent, which color coincides with the color of the left-bottom pixel.

During [Inclined rectangle](#)^[184] drawing or editing it is possible to make it transparent by 70 %. To do this mark **Transparence** box.

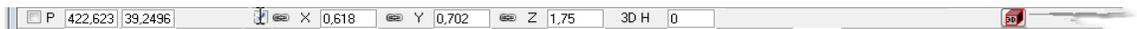
*Transparence of **3D images** and transparence of **Inclined rectangle** have different purport. Inclined rectangle becomes completely transparent by 70 %, what makes possible modeling glass.*

*On **3D image**, if its raster image is not ***.png**, pixels become completely transparent, which color coincides with color of the left- bottom pixel. Other pixels remain opaque.*

*If its raster image is ***.png**, then transparent pixels of png file will be transparent in VideoCAD (***.png** format supports transparency).*

*Thus, you can model objects of irregular shape using **3D images**.*

9.1.6.3.1 3D models



Current construction parameter panel 3D models

You can resize 3D models separately on axes.

To do this, enter new values into **X**, **Y**, **Z** boxes during 3D model editing. If the box is marked, change of any size leads to proportional change of other sizes, thus model proportions are not broken.

3D model **height above the ground** is displayed and can be changed in the **3D H** box.

The button  allows to open the [3D Models](#)^[291] window with edited 3D model loaded in it.

9.1.7 Keyboard shortcuts

Keyboard shortcuts allow fast activation of various commands, by pressing shortcuts on the keyboard.

VideoCAD has:

- [Predefined shortcuts](#)^[249] which cannot be changed;
- [Customizable shortcuts](#)^[250] which can be adjusted according to users' preferences.

Predefined shortcuts

F1 Call Help information of interface element, box or window, which has the input focus.

Ctrl+A Select all [objects](#)^[160] in the current [layout](#)^[340].

Ctrl+TAB Switch to the next **layout** in turn.

Ctrl+Space bar Save the *active camera* and activate the next camera in turn in the current *layout*. If there is no active camera in the current **layout**, then a camera with the minimal number will be activated.

ESC Stop the current operation, if an operation is executed. If no operation is executed, switching to the [Select/Edit](#)^[177] mode.

DEL Delete [selected](#)^[177] objects.

Spacebar Pressing **Spacebar** when constructing a [double line](#)^[185], [wall](#)^[186], [aperture in wall](#)^[187] enables to switch the **orientation of the second line (side)** relatively to the first one quickly.

+ (plus on the digital keypad) Zoom in, if the input focus is on the [Graphics area](#)^[159].

- (minus on the digital keypad) Zoom out if the input focus is on the **Graphics area**.

When **Alt** is pressed, it is possible to move drawing in the Graphics window using **arrow keys** and change scale using **+ plus and - minus** keys irrespective of the input focus.

Ctrl has several purposes:

- Changes the [selection logic](#)^[177]
- Allows moving the **horizontal projection** vertically apart from the vertical one using the **middle mouse button** or the button [Move drawing](#)^[195].
- If **Ctrl** is not pressed, then the **whole drawing moves**, if **Ctrl** is pressed, the **horizontal projection moves only**.
- If **Ctrl** is pressed and held down when editing [rectangle](#)^[184], [mask](#)^[189], [inclined rectangle](#)^[184], [filling](#)^[189] or [3D image](#)^[191] by moving pink grips, then one point move only. If **Ctrl** is not pressed when editing these objects, then several points will move at a time, the editing object remain square.
- If **Ctrl** is pressed when editing a [double line](#)^[185], [wall](#)^[186], [aperture in wall](#)^[187] then **only one line** will be moved. If **Ctrl** was not pressed when editing these objects, the **whole double line (wall, aperture)** will be moved.
- If **Ctrl is not pressed** at changing the common **scale**, then the scale changes roughly which is convenient at navigation. If **Ctrl is pressed**, the scale changes with the less step which is convenient for the precise drawing positioning before printing or saving. The effect of reducing zoom step presents in the [Graphics window](#)^[158].
- If during changing the line type of selected objects by the [Change line type](#)^[237] tool, to press and hold **Ctrl**, then the selected objects will also change their minimum and maximum height

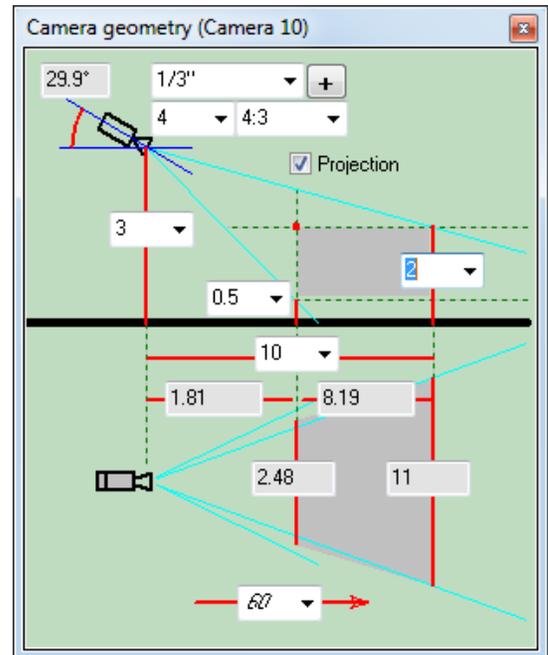
according to the chosen line type . If **Ctrl** is not pressed, the heights remain unchanged.

Customizable shortcuts

Customizable shortcuts are seen in the [Main menu](#)^[197] of the **Graphics window** during the program operation. These shortcuts can be changed on the [Keyboard](#)^[324] tab in the **Options box**. Shortcuts can be assigned to any item of the **Main menu** of the **Graphics window**.

9.2 Camera Geometry

Camera Geometry box includes geometric parameters of [active camera](#)^[162], lens and installation parameters of the camera.



In the **Camera Geometry box**, geometric parameters of the active camera view area in the horizontal and vertical planes are displayed.

The image in the **Camera Geometry box** represents two projections of view area, parted by the horizontal black line corresponds to the ground in the vertical (upper) projection.

The red lines mark the **sizes**, the green dash lines specify **auxiliary constructions**, the dark blue lines designate the camera tilt angle, and the turquoise ones mark the space bounds of camera view area.

The **actual projection** of view area as a result of calculations is filled by grey color.

The camera location and **calculated** parameters are displayed in the **text boxes** next to the camera icon and the red dimension lines. The parameters in the white boxes can be changed, by choosing them from list or by typing. When any of the parameter is changed, the values of the rest parameters are recalculated.

You can change any parameters **of all selected cameras simultaneously**. For this purpose:

- [Select](#)^[177] necessary cameras on the layout
- Right click on the combo box, then click on the **Assign to selected cameras** pop up item.

The parameters in the **grey** text boxes are results of calculation and can be changed only through changing the parameters in the white boxes.

The linear parameters are entered and outputted in **meters** or **feet** according to the [measurement system](#)^[199] set in the project, if not specified otherwise on the image. The angular parameters are inputted and outputted in **degrees**.

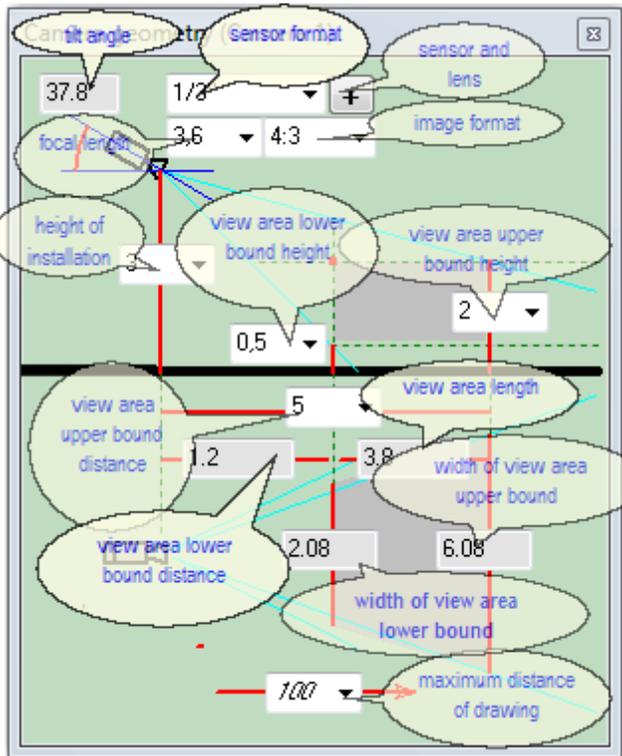
When an **incorrect value** is entered the box turns **red**. When an incorrect value ratio is ensued from the input, all boxes with the values of mutually incorrect ratio turn red. If calculation with incorrect values is still possible and has sense, the program nevertheless performs it. In this case check the results carefully. You can see the source of mistake in the [graphics window](#)^[158].

If the image of view area **changes radically** with new values, the image in the **Camera Geometry box** changes correspondingly, thus the arrangement of parameter boxes are changed too. Watch carefully the image changed, since with the image alteration the parameter boxes might interchange their positions.

See also: [Parameters in the Camera Geometry box²⁵⁵](#)

External link: ["The principles of CCTV design in VideoCAD. Part I. Camera view area"\(*.pdf\)](#).

9.2.1 Parameter list



Camera parameters

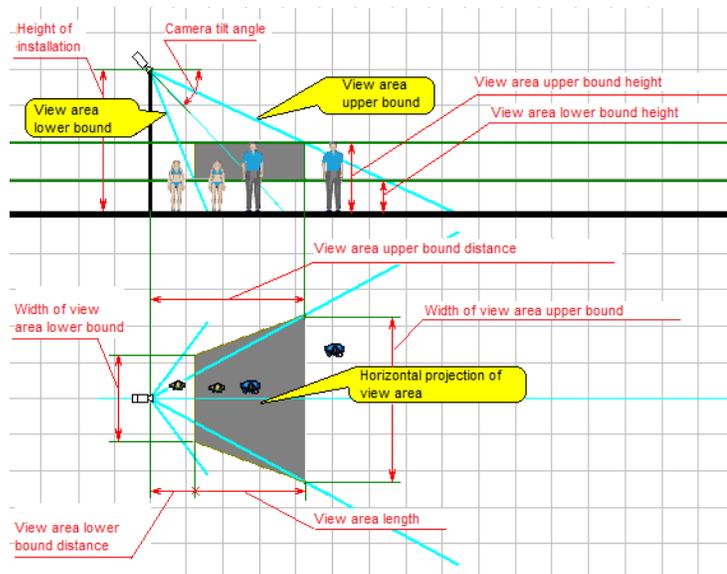
- [Image sensor size](#) ^[255]
- [Lens focal length](#) ^[256]
- [Aspect Ratio \(of output image\)](#) ^[257]
- [Sensor and Lens](#) ^[257]

Camera installation parameters

- [Height of installation](#) ^[257]
- [Camera tilt angle](#) ^[258]

View area limitations

- [View area upper bound height](#) ^[258]
- [View area lower bound height](#) ^[259]
- [View area upper bound distance](#) ^[259]
- [View area lower bound distance](#) ^[261]
- [View area length](#) ^[263]
- [Width of view area upper bound](#) ^[264]
- [Width of view area lower](#)



[bound](#)^[265]
[Maximum distance of
drawing view area](#)^[265]
[Projection](#)^[265]

9.2.2 Parameters

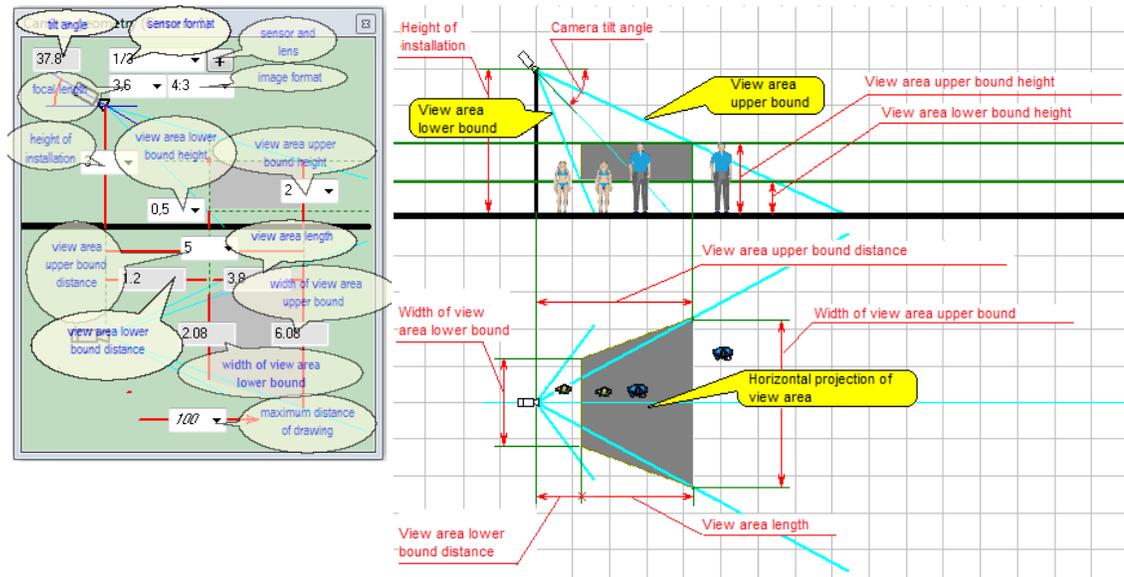


Image sensor size

In the box, you can specify the **size of the Image sensor** or the [size of Active area of the Image sensor](#)^[255].

See more: [Image sensor and Active area of image sensor](#)

The **Image sensor size** can be specified by any of the following ways:

- Choosing a standard format (type) from the list
1/10", 1/8", 1/6", 1/5", 1/4.5", 1/4", 1/3.6", 1/3.2", 1/3", 1/2.7", 1/2.5", 1/2.3", 1/2", 1/1.8", 1/1.7", 1/1.6", 2/3", 1/1.2", 1", 4/3", 1.5";

This traditional way of setting Image sensor size can be [unaccurate for modern cameras](#)^[415].

- Entering a custom format in inches, in the form of **X/Y"**. For example: **1/7.31"**;

If you enter a format which does not exist in the list, the box turns yellow, and the Image sensor size will be calculated by VideoCAD.

- Entering diagonal size of the image sensor in millimeters, in the form of **dX.Y**. For example: **d6.0**.

See more: [Specifying image sensor size through its diagonal and aspect ratio](#)^[418]

- Entering **sensor side sizes** in millimeters horizontally and vertically separated by hash, in the form of **W#H**. For example: **4.8#3.6**;

See more: [Direct specifying image sensor side sizes](#)^[418]

After **format** or **length of diagonal**, separated by space character, you can specify the **aspect ratio of the image sensor** in the form of **W:H**. For example: **1/3" 16:9** or **d6 16:9**. If the aspect ratio of the image sensor is not specified, it is assumed equal to **4:3**.

See more: [Direct specifying active area size of the image sensor](#)^[417]

Active area side sizes of the image sensor can be specified in millimeters horizontally and

vertically separated by asterisk, in the form of **W*H**. For example: **4.8*3.6**;

See more: [Direct specifying active area side sizes of the image sensor](#)^[417]

See also: [Sensor and Lens>Image sensor](#)^[267], [Specifying active area size of the image sensor](#)^[415]

When moving the cursor to the image sensor box the information on horizontal and vertical view angles of lens appears.

Lens focal length

The values can be chosen from the list or typed by keyboard, e.g. when using the **varifocal lenses**.

Choose a value given in the lens **specification** in this box.

It is assumed that the **lens format** equal to or larger than the camera **Image sensor format** is used.

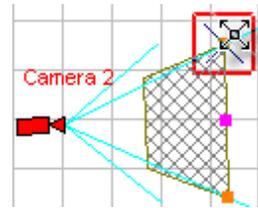
The **lens focal length** influences all the **calculated** parameters.

When moving the cursor to the lens focal length box the information on **calculated** view angles appears.

If in lens' specification there are view angles which are different from the calculated ones, then probably the lens has **distortion**. For precise modeling such lens you should enable and adjust [simulating distortion](#)^[267]. Distortion simulation is possible in VideoCAD Professional

Focal length can be chosen from the list or typed into this box or duplicate boxes on the [Tool bar](#)^[175] of the Graphics window and on the [3D Video](#)^[287].

It is convenient to change lens focal length of active camera on layout in the [Select/Edit](#)^[177] mode, by moving grips at the corners of view area projection.

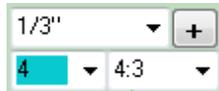


If a [model](#)^[304] is assigned to the camera, and the model has [fixed](#)^[316] focal length lens, then you can not change the focal length.

If a model is assigned to the camera, and the model has a lens with [limited](#)^[317] variable focal length, then you can change focal length within the limits only. When approach to the limit values, the box will become crimson.

You can change focal length in wide range of 0.5-1000mm of cameras, which have not assigned model or the assigned model have not specified limits of the lens focal length.

If the active camera is [panoramic](#)^[269] then the lens focal length box is colored by aqua-green.



You can change lens focal length **of all selected cameras simultaneously**. For this purpose:

- [Select](#)^[177] necessary cameras on the layout
- Right click on this combo box, then click on the **Assign to selected cameras** pop up item.

See also: [Sensor and Lens>Lens](#)^[269]

Aspect ratio (of output image)

Aspect ratio of the **output image** of the camera: 4:3,16:9, 16:10 etc.

The **Aspect ratio** of the **output image** equals to the **Aspect ratio of the active area of the image sensor** and may be different from the **Aspect ratio of the image sensor**.

The **Aspect ratio of the image sensor** can be specified in the [Image sensor size](#)^[255] box.

See more: [Specifying the Aspect ratio of output image](#)^[420]

You can enter custom values from keyboard in the form of <width> :<height>, for example **11:4**.

By specifying formats **3:4** or **9:16**, you can specify the so-called **corridor format** in which the height of the frame is larger than its width.

For correct simulation resolution in the corridor format you must also swap the number of pixels horizontally and vertically in the [camera parameters](#)^[277].

Separated by space character after the **Aspect ratio** you can set the **crop factor** - the ratio of cropping active area size of the image sensor when the active area does not touch the edges of the image sensor. The Crop factor can be set as a vulgar fraction (separated by slash) or a real number. For example **4:3 0.67** or **16:9 720/1080**. If the Crop factor is not specified, it is taken to be unity.



See more: [Specifying the crop factor](#)^[420]

If the camera has directly assigned active area sizes, then this box shows 'custom' and it becomes unavailable. To make it available, set the size of image sensor by any way except of direct specifying its active area size.

See also: [Sensor and Lens>Image sensor's active area](#)^[268], [Specifying active area size of the image sensor](#)^[415]

Sensor and Lens

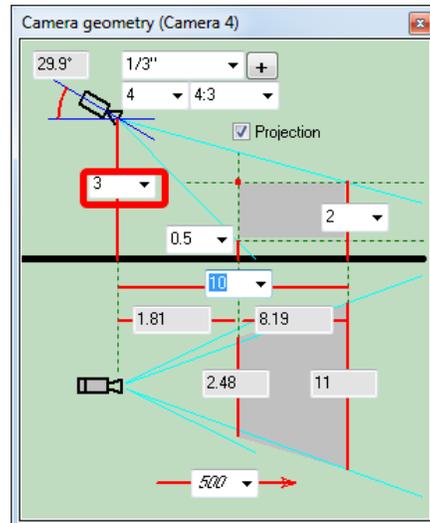
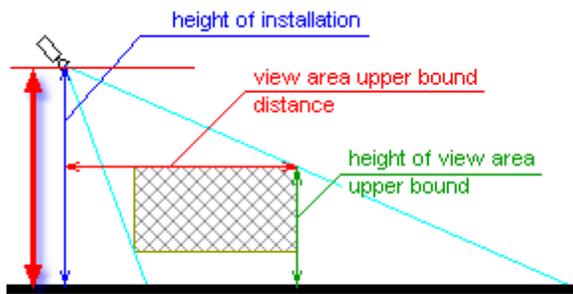
Clicking this button will open **Sensor and Lens** box. In the box it is possible to specify any [image sensor size](#)^[267], [active area size](#)^[268] and adjust modeling active camera as a [panoramic camera](#)^[269]

See more: [Sensor and Lens](#)^[267], [Specifying active area size of the image sensor](#)^[415]

Height of installation

Height of installation can be chosen from the list or typed. The height of installation influences all calculated parameters.

Height of installation can be negative.

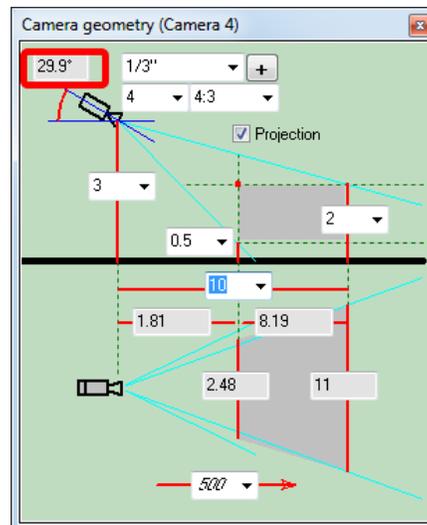
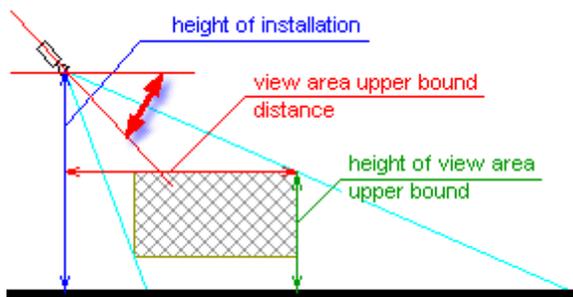


Camera tilt angle

Camera tilt angle is a calculated parameter and can not be edited directly. The camera tilt angle is an angle between the **main optical axis** of camera lens and a horizontal.

Camera inclination is defined not by the tilt angle but by the three parameters:

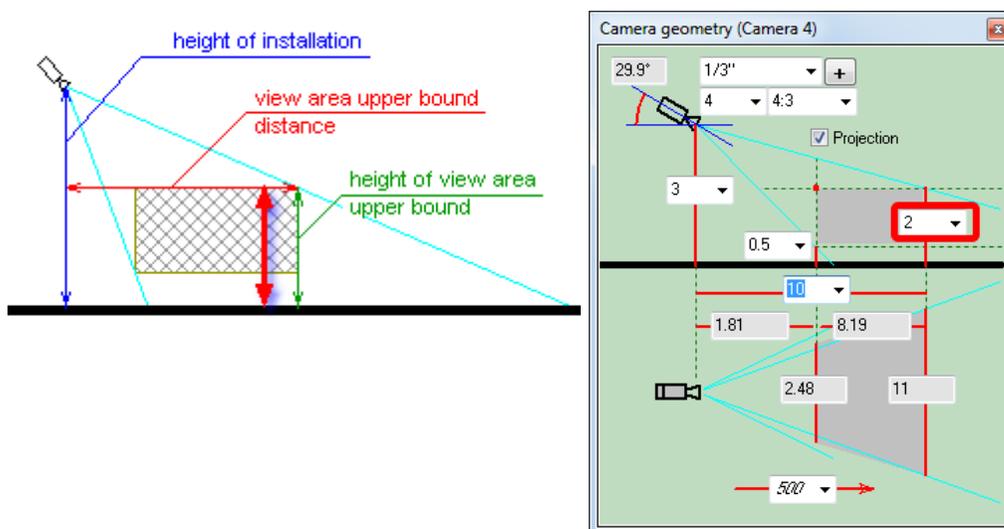
- [Height of installation](#)^[257];
- [View area upper bound distance](#)^[260]
- [View area upper bound height](#)^[258]



View area upper bound height

The **height of view area upper bound** can be chosen from the list or typed. In the horizontal projection of the calculated view area the space above the upper bound height is not taken into consideration.

Together with [view area upper bound distance](#)^[260] it completely determines a camera tilt angle and all **calculated** parameters through it.



Height of view area upper bound can be negative.

Height of calculating Spatial resolution and Shadows

Heights of the upper and lower bounds of view area are taken into account when calculating [shadows](#)^[172]. If in the menu of the [Shadow](#)^[172] tool **Within projection** is chosen, then a point in the horizontal projection is considered as shaded if at least partially shaded the vertical segment, formed by this point in the altitude range from the **view area lower bound height to the view area upper bound height**.

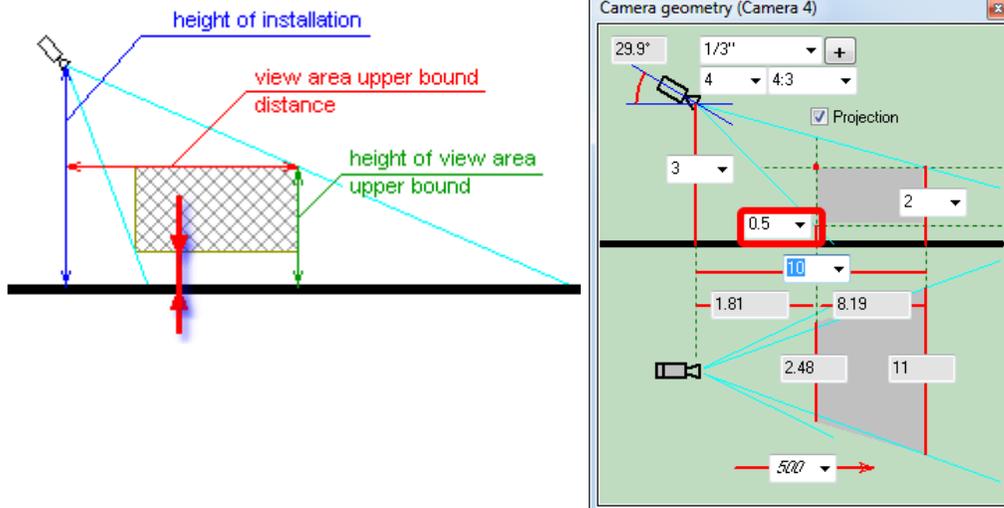
If in the [Height](#)^[275] box of the **Spatial resolution box**, **AUTO** is chosen and in the [View area projection bounds](#)^[168] and [Shadow](#)^[172] buttons the **Within projection** is chosen, then calculation of spatial resolution in the horizontal projection is carried out at the middle height between the **heights of the view area lower bound and the view area upper bound**.

View area lower bound height

The **height of view area lower bound** can be chosen from the list or typed. In the horizontal projection of the calculated view area the space below the lower bound height is not taken into consideration.

The height of view area lower bound influences the following **calculated** parameters:

- [View area lower bound distance](#)^[261]
- [View area lower bound width](#)^[265]



Height of view area lower bound can be negative.

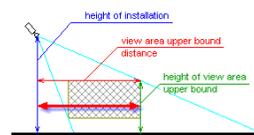
Height of calculating Spatial resolution and Shadows

Heights of the upper and lower bounds of view area are taken into account when calculating shadows^[172]. If in the menu of the Shadow^[172] tool **Within projection** is chosen, then a point in the horizontal projection is considered as shaded if at least partially shaded the vertical segment, formed by this point in the altitude range from the **view area lower bound height to the view area upper bound height**.

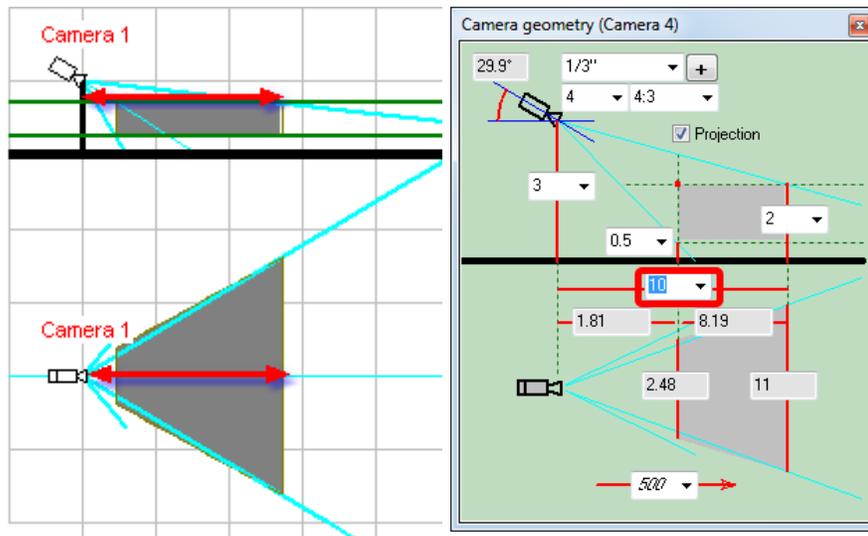
If in the Height^[275] box of the **Spatial resolution box**, **AUTO** is chosen and in the **View area projection bounds**^[168] and **Shadow**^[172] buttons the **Within projection** is chosen, then calculation of spatial resolution in the horizontal projection is carried out at the middle height between the **heights of the view area lower bound and the view area upper bound**.

View area upper bound distance

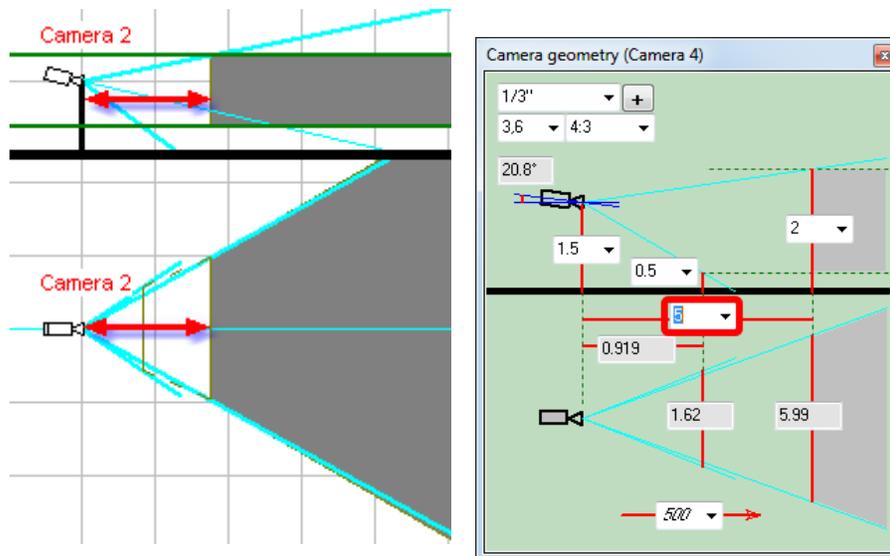
Together with the **height of view area upper bound**^[253], the **view area upper bound distance** completely determines the camera tilt angle and all the calculated parameters via it.



When the camera is located above the **view area upper bound**^[253], a **view area upper bound distance** is the **maximal distance of surveillance**. The view area upper bound distance is chosen from the list or typed. The **view area** is calculated up to this distance.



When the camera is located below the [view area upper bound](#)^[253], the **view area upper bound distance** can become the **minimal distance of surveillance**.

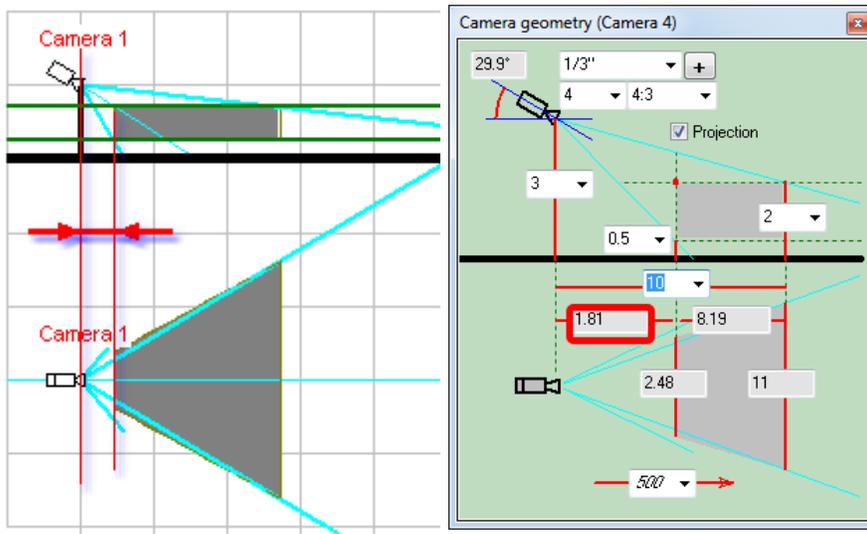


When a camera is located above the **view area upper bound**, a **view area upper bound distance** is the **maximal distance of surveillance**. The view area upper bound distance is chosen from the list or typed. The view areas are calculated up to this distance. Together with the [height of view area upper bound](#)^[258], the **view area upper bound distance** completely determines the camera tilt angle and all the calculated parameters through it.

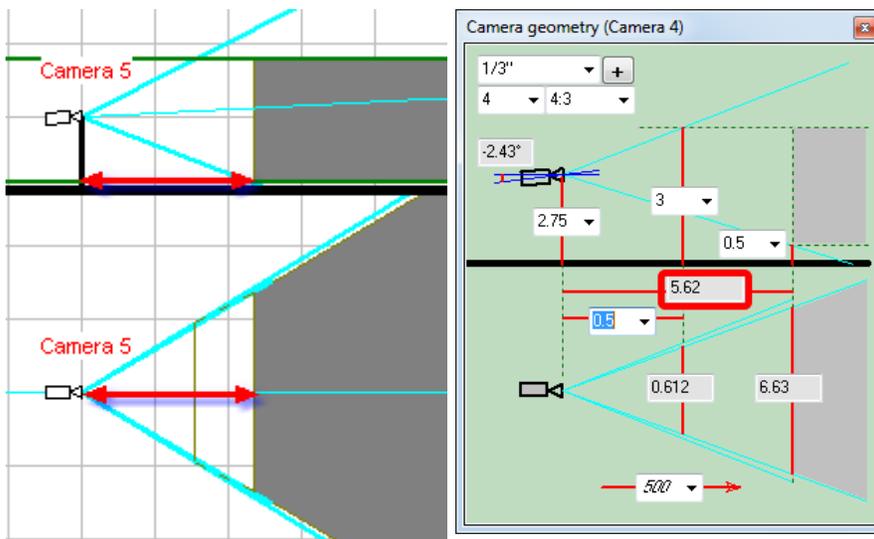
View area lower bound distance

The **view area lower bound distance** is a **calculated parameter** and can not be edited.

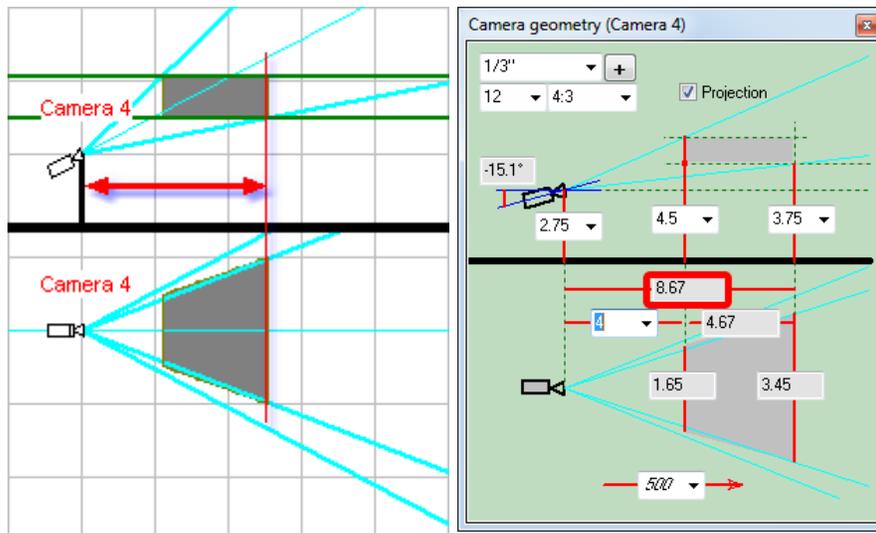
When the camera is located above the [view area upper bound](#)^[253], the **view area lower bound distance** is the **minimal distance of surveillance (dead zone of surveillance)**.



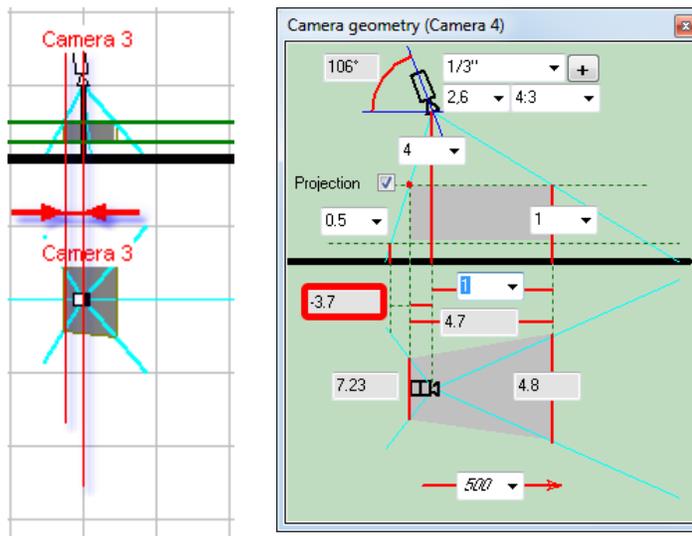
When the camera is located below the [view area upper bound](#)^[253], in some positions the **view area lower bound distance** is the **minimal distance of surveillance** too.



In some positions the **view area lower bound distance** can be the **maximal distance of surveillance**.



The view area lower bound distance can be negative.



This parameter reflects the correct value only if:

- Camera is not rotated around its axis or the [rotation angle](#)^[255] is multiple of 90 degrees;
- [Lens distortion](#)^[267] is not considered.

In other cases, the projection of view area has a more complicated form.

View area projection length

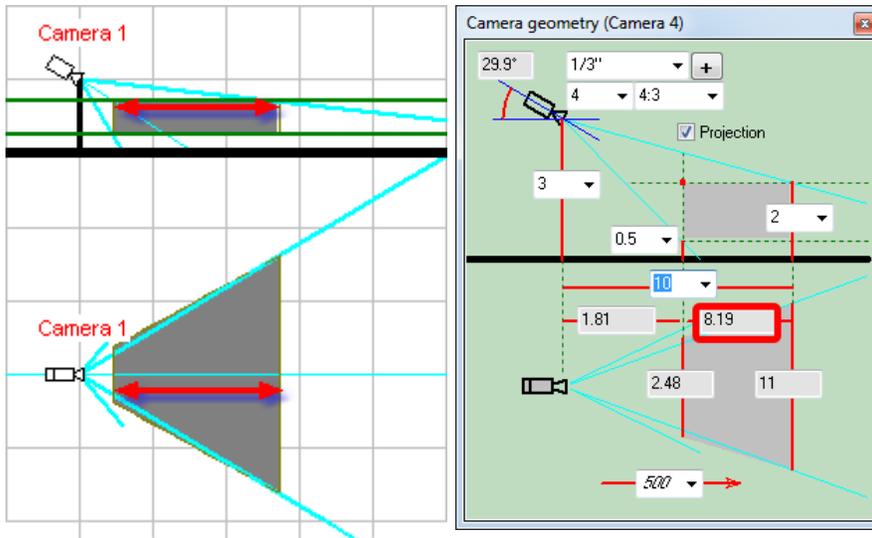
The **view area projection length** is a **calculated** parameter and can not be edited.

When there is an **actual view area projection**, the view area projection length displays the absolute value of difference between the upper and the lower bound distances of view area projection.

When there is no **actual view area projection**, the parameter doesn't have any sense and is not displayed. The parameter displaying enhances the convenience in use when it is required to obtain the length of view area projection.

This parameter reflects the correct value only if:

- Camera is not rotated around its axis or the [rotation angle](#)^[265] is multiple of 90 degrees;
 - [Lens distortion](#)^[267] is not considered.
- In other cases, the projection of view area has a more complicated form.



Width of view area projection upper bound

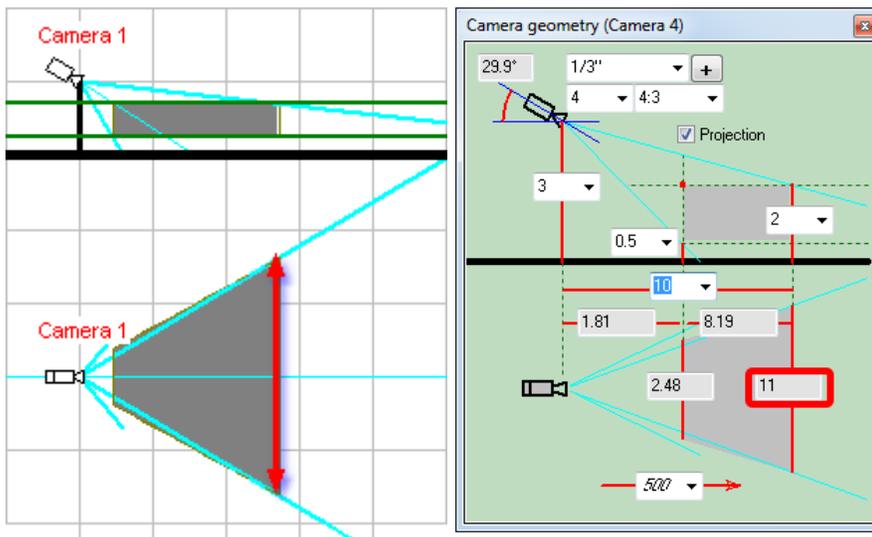
The **width of view area projection upper bound** is a **calculated** parameter and can not be edited.

According to the "[Projection](#)^[265]" switcher state the **width of view area projection upper bound** displays the camera view area width at the point of intersection between the camera view area bound and the view area projection upper bound, or the view area projection edge width between the lower bound and the upper one.

This parameter reflects the correct value only if:

- Camera is not rotated around its axis or the [rotation angle](#)^[265] is multiple of 90 degrees;
- [Lens distortion](#)^[267] is not considered.

In other cases, the projection of view area has a more complicated form.



Width of view area projection lower bound

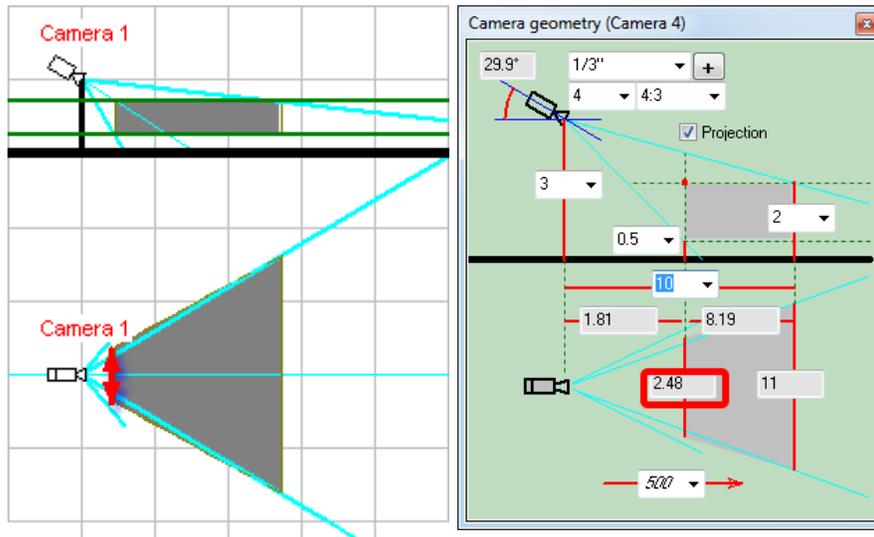
The **width of view area projection lower bound** is a **calculated** parameter and can not be edited.

According to the "[Projection](#)^[265]" switcher state the **width of view area projection lower bound** displays the camera view area width at the intersection point between the camera view area bound and the view area projection lower bound, or the view area projection edge width between the lower bound and the upper one.

This parameter reflects the correct value only if:

- Camera is not rotated around its axis or the [rotation angle](#)^[255] is multiple of 90 degrees;
- [Lens distortion](#)^[267] is not considered.

In other cases, the projection of view area has a more complicated form.



Projection

A "**Projection**" is a switcher determining a way of calculation:

- The [view area lower bound distance](#)^[261] and the [view area lower bound width](#)^[265] when the view area is narrowing upwards on the **view area lower bound distance**;
- The [view area upper bound distance](#)^[260] and the [view area upper bound width](#)^[264] when the view area is narrowing downwards on the view area **upper bound distance**;

When the switcher is checked, the view area bound distance and width are calculated according to narrower level of the view area opposite bound. In this case all the points of the calculated view area horizontal projection from the lower bound up to the upper one hit in the camera view area.

When the switcher is not checked, the distance up to the camera view area bound intersection with the upper or lower bounds and the width of this bound are calculated.

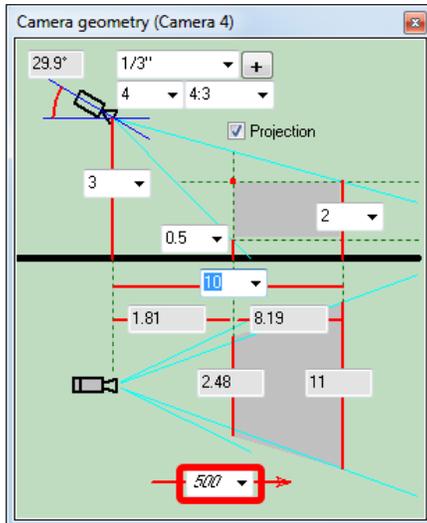
When the view area is not narrowing towards the opposite bound, the switcher doesn't have any sense and is not displayed.

Maximum distance of drawing view area

Value in this combo box limits the distance from the camera beyond which the view area is not

drawn in the [Graphics window](#)^[158] and in the [3D Video](#)^[284].

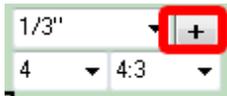
If the value in this box is less than the maximum of the [view area upper bound distance](#)^[255] and the [view area lower bound distance](#)^[255], the box is colored in pink color.



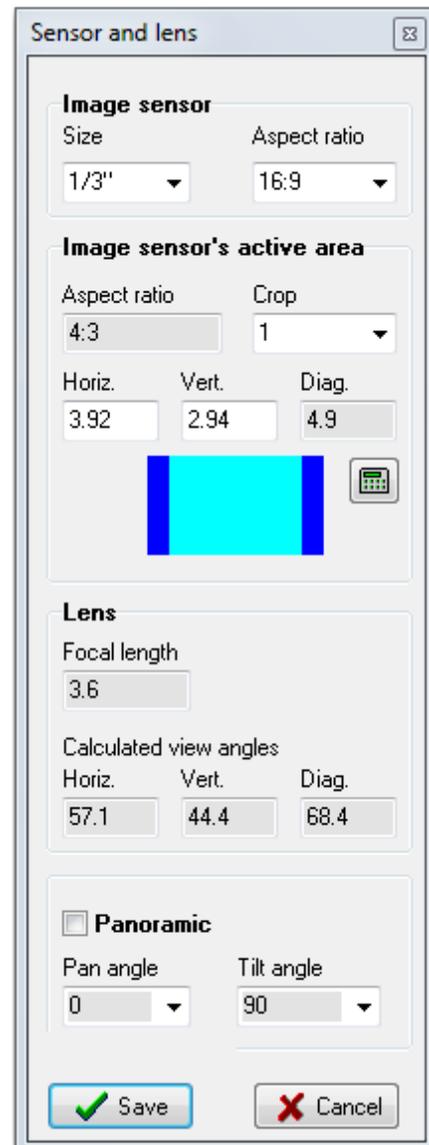
External link: ["The principles of CCTV design in VideoCAD. Part I. Camera view area" \(*.pdf\)](#).

9.3 Sensor and Lens

The **Sensor and Lens** box can be invoked by clicking the Plus button in the [Camera Geometry](#) ^[251] box.



In the box it is possible to specify any [image sensor size](#) ^[267], [active area size](#) ^[268] and adjust modeling active camera as a [panoramic camera](#) ^[269].



▣ Image sensor

See before: *Image Sensor and Active area of image sensor*

On the **Image sensor** panel you can set the size and aspect ratio of the image sensor or size of active area of the image sensor.

Size and **Aspect ratio** boxes duplicate the [Image sensor size](#) ^[255] box on the **Camera geometry** window, but allow you to enter the size and aspect ratio in different boxes.

In the **Size** box you can specify the **image sensor size** by any of the following ways:

- Choosing a standard **format (type)** from the list
1/10", 1/8", 1/6", 1/5", 1/4.5", 1/4", 1/3.6", 1/3.2", 1/3", 1/2.7", 1/2.5", 1/2.3", 1/2", 1/1.8", 1/1.7", 1/1.6", 2/3", 1/1.2", 1", 4/3", 1.5";

This traditional way of setting the image sensor size can be [unaccurate for modern cameras](#)^[415].

- Entering a custom format in inches, in the form of **X/Y"**. For example: **1/7.31"**;

If you enter a format which does not exist in the list, the box **turns yellow**, and the Image sensor size will be calculated by VideoCAD.

- Entering diagonal size of the image sensor in millimeters, in the form of **dX.Y**. For example: **d6.0**.

See more: [Specifying image sensor size through its diagonal and aspect ratio](#)^[418]

- Entering **sensor side sizes** in millimeters horizontally and vertically separated by hash, in the form of **W#H**. For example: **4.8#3.6**;

See more: [Direct specifying image sensor side sizes](#)^[418]

In the **Format** box you can specify the **active area side sizes** of the image sensor in millimeters horizontally and vertically separated by asterisk, in the form of **W*H**. For example: **4.8*3.6**;

See more: [Direct specifying active area side sizes of the image sensor](#)^[417]

In the **Aspect ratio** box you can specify the **aspect ratio of the image sensor** in the form of **W:H**. For example: **16:9** or **4:3**.

To save changes click **Save**.

To cancel changes click **Cancel**.

See also: [Specifying active area size of the image sensor](#)^[415]

Image sensor's active area

See before: [Image Sensor and Active area of image sensor](#)

On the **Image sensor's active area** panel you can specify parameters of active area of the image sensor.

In the **Aspect ratio** box displays the **aspect ratio of the active area of the image sensor**. It is identical with the [Aspect ratio of the output image](#)^[257] of the camera.

See more: [Specifying the Aspect ratio of output image](#)^[420]

In the **Crop** box you can set the **crop factor** - the ratio of cropping active area size of the image sensor when the active area does not touch the edges of the image sensor. In other cases Crop=1. The Crop factor can be set as a vulgar fraction (separated by slash) or a real number. For example **4:3 0.67** or **16:9 720/1080**. If the crop factor is not specified, it is taken to be unity.



See more: [Specifying the crop factor](#)^[420]

The **Calculator** icon  invokes the [Image sensor calculator](#)^[349] box for convenient calculation of image sensor's aspect ratio, active area aspect ratio and the crop factor.

The **Horiz.**, **Vert.** and **Diag.** boxes display sizes of the *active area* of the Image sensor, which are used in modeling the camera.

These sizes are calculated based on the **size** and **aspect ratio** of the image sensor, as well as the

aspect ratio of the output image.

In the boxes, you can directly type any sizes of the active area of the image sensor in millimeters. In this case, the aspect ratio of the active area will be defined by the ratio of its sizes. The [Aspect ratio](#)^[257] box will show **Custom**.

By this method, you can specify an arbitrary aspect ratio of the image and camera angles. To set arbitrary camera angles choose the sizes of the active area of the image sensor.

Below you can see the dynamic image showing the position and relative sizes of the active area on the image sensor (**aqua color**) subject to the selected aspect ratios and crop factor.

Examples of images of image sensor of real cameras:

Aspect ratio of Image sensor	4:3	16:9	4:3	16:9	16:10	16:10	16:9 (1920*1080)
Aspect ratio of Active area of Image sensor	4:3	16:9	16:9	4:3	16:9	4:3	16:9 (1280*720)
Crop	1	1	1	1	1	1	720/1080=0.67
Image							

To save changes click **Save**.

To cancel changes click **Cancel**.

See also: [Specifying active area size of the image sensor](#)^[415]

☐ Lens

On the **Lens** panel you can see:

Lens focal length - the box duplicates the [similar box](#)^[256] in the Camera geometry.

Calculated view angles are calculated from the **sizes of active area of image sensor** and the **lens focal length**.

Via changing sensor sizes when the [lens focal length](#)^[256] is fixed, you can set separately arbitrary horizontal and vertical **view angles**.

To save changes click **Save**.

To cancel changes click **Cancel**.

☐ Panoramic

The panel is designed to control simulation of cameras with a view area in the form of a hemisphere (fisheye, panoramic, 360°/180° cameras).

To enable the simulation of the active camera as a panoramic camera, check the **Panoramic** box.

In the **Pan angle** and **Tilt angle** combo boxes the angles of rotation of camera main optical axis in horizontal and vertical planes are specified.



Thus, if the camera is mounted on a vertical wall, the Tilt angle should be zero, and Pan angle determines angle of the wall. If the camera is mounted on a ceiling, the Tilt angle must be set to 90 degrees, and the Pan angle does not matter. If the camera is mounted on the floor, the Tilt angle should be 90 degrees.

Pan, tilt and rotation of the camera around its own axis, made in the usual way does not affect the position of the panoramic camera. By rotation the camera in the usual way, you can view images from the panoramic camera in different directions in the [3D Video](#)^[284]. In this case, the view area will be limited at 180 degrees from the main optical axis of the lens. Beyond this limit the image is cut

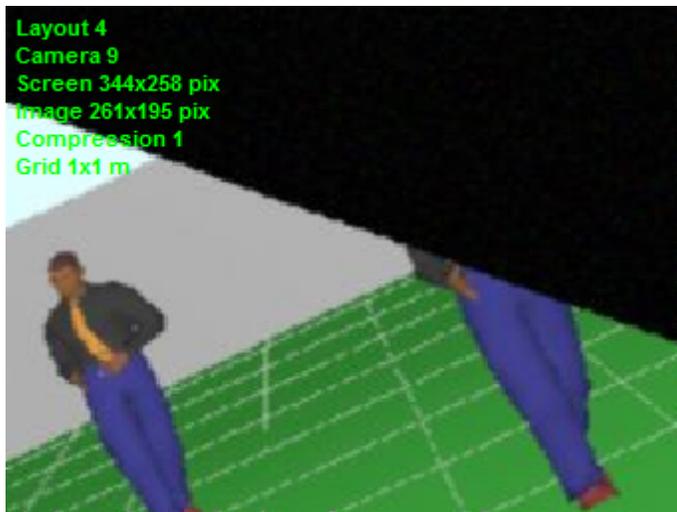


Image resolution of a *panoramic* camera is determined by the [Number of pixels of sensor](#)^[277] [Lens focal length](#)^[256] has no affect on the image resolution of a *panoramic* camera.

You can change the **Lens focal length**, thereby changing the field of view size, but the image resolution in the 3D Video will be always limited by the calculated resolution of the panoramic camera.

If the calculated resolution is worse, the resolution of the **3D Video** will be artificially reduced. The **Image** line in the [Titles](#)^[287] displays a virtual number of pixels for correct simulation of the resolution.

To enable modeling resolution in the 3D Video mark the item 3D Video>Main menu> [Processing>Resolution](#)^[287].

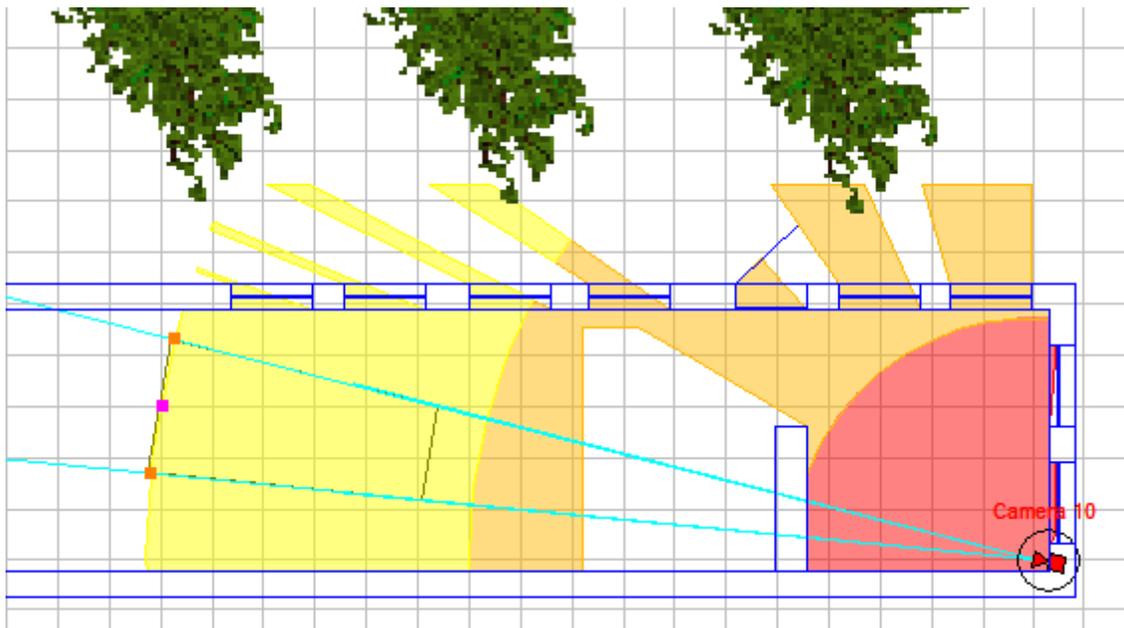
Distortion of a panoramic camera images in the **3D Video** is not modeled.

The simulated resolution is exact **only at the center of the frame**. Towards the edges of the frame the actual resolution is worse than simulated. The smaller the view angle, the more accuracy of simulating resolution on the edges of the frame.

For a more realistic model of the image, turn on modeling [compression](#)^[286].

In the [Graphics window](#)^[158] the horizontal projection of the view area and the distribution of [spatial resolution](#)^[272] are visualized. The projection is constructed in accordance with the [Within projection](#)

[173](#) rule.



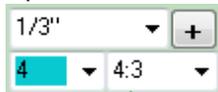
[Pattern criterion](#) [275](#) of spatial resolution for *panoramic* cameras must be based on spatial resolution (**Pixel per meter (Pixel per foot), Pixel for object**), but not on field of view size. Criterion **Field-of-view height, % of Field-of-view for object** are not suitable to *panoramic* cameras, because of *panoramic* cameras don't have a stable field of view.

To draw a camera using the special icons  or  in the Graphics window, you need to choose thus icon during [new camera creation](#) [200](#) or later on the [Camera list](#) [336](#) panel. Selecting the icon works regardless of the state of the **Panoramic** checkbox .

To make a [camera model](#) [304](#) a *panoramic* camera it is necessary:

- Assign *fisheye* to the parameter [Lens>Type](#) [317](#) to model the camera as *panoramic*.
- Assign *panoramic* to the parameter [Type>Fixed, PTZ,Dome, Mini](#) [316](#) to draw the camera using the special icons  or  in the Graphics window.

The lens focal length boxes in the Graphics window and the Camera Geometry box for panoramic



cameras are colored by aqua-green.

In reports for panoramic cameras instead of the lens focal length value the 'fisheye' word is displayed. .

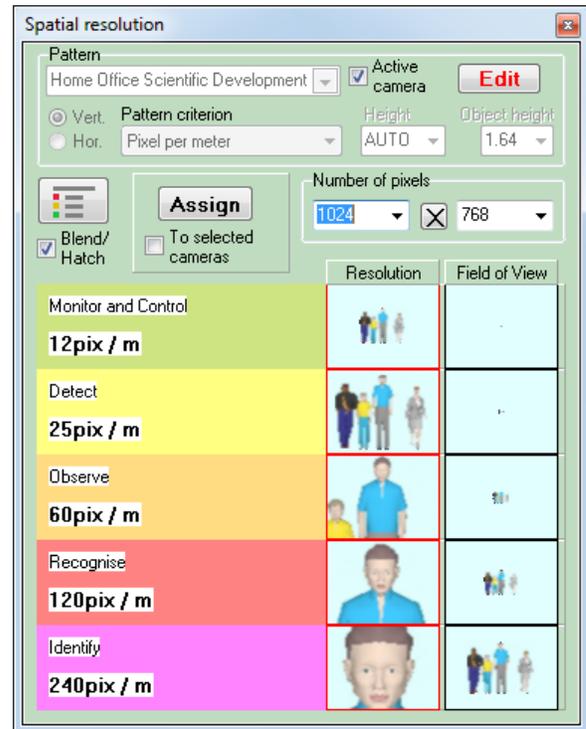
See also: [Modeling panoramic cameras \(Fisheye, 360°/180°\)](#) [409](#)

9.4 Spatial resolution

Graphics window

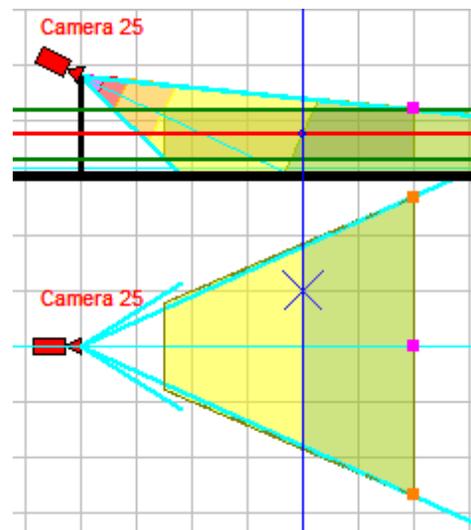
Tool bar

 Spatial resolution



View area of cameras can be divided into **regions** based on the following **criteria**:

- vertical or horizontal spatial resolution (pixels/meters, pixels/foot);
- vertical or horizontal field of view size (meter, foot);
- vertical or horizontal number of pixels covered by an object of the specified height(width) (meter, foot);
- the part of the frame height(width) covered by an object of the specified height(width) (meter, foot).



*These Criteria relates to the **spatial resolution** or the **field of view size**. For short, in the definitions, it is mentioned the **spatial resolution only** (the Spatial resolution box, the Spatial resolution pattern, the Spatial resolution criterion ...), except of special cases.*

In the **Graphics window**, projection of different **regions** of view area can be [filled](#)¹⁷⁰ by different color and (or) type of hatching.

Spatial resolution pattern

- contains information about the **regions** and how they are filled and (or) hatched.

VideoCAD project can contain up to **30** spatial resolution patterns. Each pattern can include up to **10** regions. You can assign different patterns to different cameras.

Spatial resolution box

- is designed for creating and editing the patterns of spatial resolution and field of view size visualization.

In the box there are prepared spatial resolution patterns according to the following criteria:

- Home Office Scientific Development Branch;
- Home Office Guidelines for identification;
- P 78.36.008-99;
- Australian Standard AS4806: Closed Circuit Television;
- European Standard EN 50132-7;
- ISO/IEC 19794 Biometric data interchange formats.

Individual patterns can be customized according to any other criteria related to the spatial resolution or the field of view size.

Also in the box there are examples of images of group of people are automatically displayed for each region of spatial resolution.

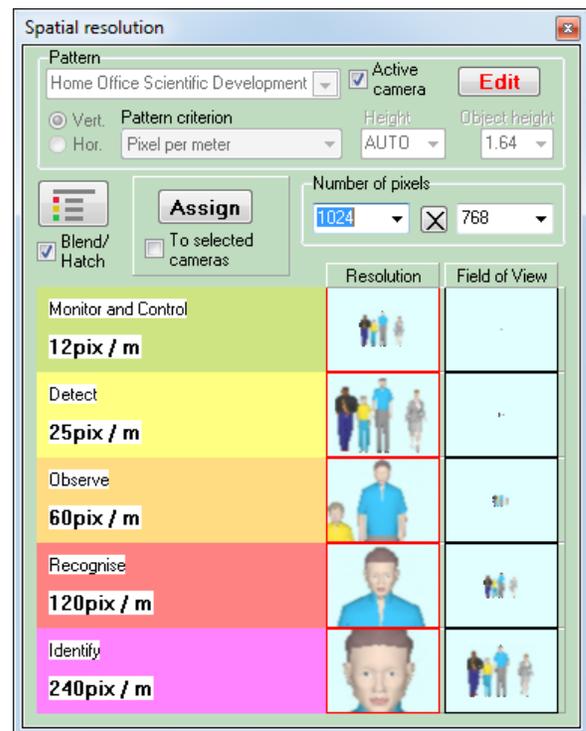
It is convenient to keep the Spatial resolution box opened during the analysis of spatial resolution in the Graphics window. Comparing color of regions on the layout with color in table in the spatial resolution box, on the images in the [Resolution](#)^[278] and [Field of view](#)^[278] columns you can immediately see the expected resolution and field of view size at every point of view area of each camera.

See further: [Tools in the Spatial resolution box](#)^[274], [Work with the Spatial resolution box](#)^[281].

See also: [Spatial resolution](#)^[170], [Fill projection](#)^[169], [Visualization of cameras' control area projections and spatial resolution inside them](#)^[381].

9.4.1 Tools

[Pattern](#)^[274]
[Active camera](#)^[274]
 [Edit/Save](#)^[274]
[Vert./Hor.](#)^[275]
[Pattern criterion](#)^[275]
[Height](#)^[275]
[Object height \(width\)](#)^[276]
[Draw Legend](#)^[276]
[Blend/Hatch](#)^[276]
[Assign](#)^[277]
[To selected cameras](#)^[277]
[Number of pixels](#)^[277]
[Table of regions](#)^[277]
[Resolution](#)^[278]
[Field of view](#)^[278]
[Type of hatching combo box](#)^[278]
[Colors of regions button](#)^[278]
[How to add your own images to the Table of regions](#)^[279]



Pattern



In this combo box the name of the chosen pattern of spatial resolution is shown. You can choose any pattern from 30 patterns of spatial resolution. Parameters of the chosen pattern are displayed and can be edited in the Spatial resolution box. The name of the pattern can be edited in this box, when the [Edit](#)^[274] button is pressed.

As a result of right-click on the combo box a pop up menu will appear. Selecting the **Default patterns** item, you can erase all changes in the patterns and return to the patterns set by default.

The box is inaccessible when the [Active camera](#)^[274] box is checked.

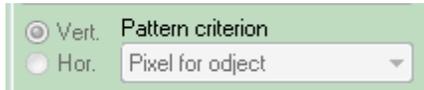
Active camera

If the checkbox is checked, a pattern assigned to the active camera is automatically displayed in the spatial resolution box. The [Pattern](#)^[274] combo box will become inaccessible for editing.



Edit the chosen pattern. Clicking on the **Edit** button makes parameters of the chosen pattern accessible for editing. The button caption is changed to **Save** - stop editing and save the modified pattern.

Vert./Hor. switch

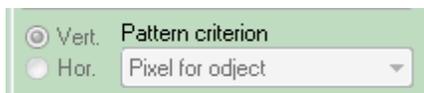


The switch allows to choose direction (horizontal or vertical) to which the [pattern criterion](#)^[275] must be applied.

- If **Vert.** is checked then the **Pixel per meter** is the number of pixel per meter along the vertical, the **Field-of-view height** is the height of the Field-of-View, the **Pixel for object** is the number of pixel covered by the object along the vertical, the **% of Field-of-view for object** is a part (%) of the Field-of-View covered by the object along the vertical;
- If **Hor.** is checked then the **Pixel per meter** is the number of pixel per meter along the horizontal, the **Field-of-view width** is the width of the Field-of-View, the **Pixel for object** is the number of pixel covered by the object along the horizontal, the **% of Field-of-view for object** is a part (%) of the Field-of-View covered by the object along the horizontal.

The switch is accessible for editing in the [Editing](#)^[274] mode.

Pattern criterion



In the box you can choose a **criterion** according to which regions in the pattern will differ.

You can choose one from 4 criteria:

- **Pixel per meter** (Pixel per foot) - vertical ([horizontal](#)^[275]) spatial resolution (pixels/meters, pixels/foot); .
- **Field-of-view height (width)** - vertical ([horizontal](#))^[275] field of view size (meter, foot);
- **Pixel for object** - vertical ([horizontal](#))^[275] number of pixels covered by an object of the height (width) specified in the [Object height\(width\)](#)^[276] box (meter, foot); .
- **% of Field-of-view for object** - the part of the frame height ([width](#)^[275]) covered by an object of the height (width) specified in the [Object height\(width\)](#)^[276] box (meter, foot).

Direction of the criterion (vertical/height or horizontal/width) can be specified by the [Vert./Hor](#)^[275] switch

Meters or feet as a unit of height are selected automatically depending on the [format of measurements](#)^[199] in the project.

For the criteria **Pixel per meter (Pixel per foot)**, **Pixel for object** the spatial resolution depends on the **number of pixels** specified in the [Number of pixels](#)^[277] boxes.

If number of pixels is not set (N/A), calculation is performed for vertical 576 pixels (or horizontal 768 pixels), what corresponds to analog camera.

Pattern criterion of spatial resolution for [panoramic](#)^[269] cameras must be based on the spatial resolution (**Pixel per meter (Pixel per foot)**, **Pixel for object**), but not on the field of view size. Criterion **Field-of-view height**, **% of Field-of-view for object** are not suitable to panoramic cameras, because of panoramic cameras have not a stable field of view.

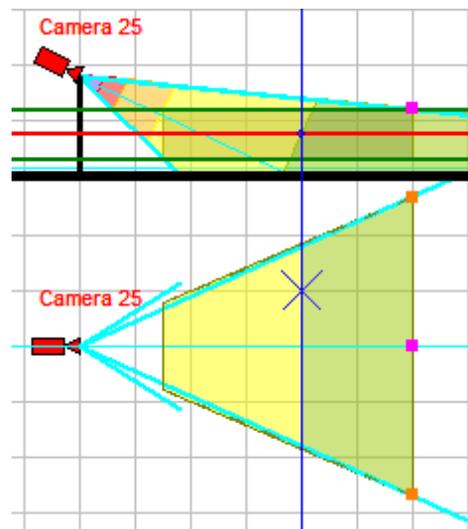
The box is accessible for editing in the [Editing](#)^[274] mode.

Height

Height of measuring the spatial resolution in the horizontal projection (height of the **horizontal red line** on the picture).

If the main optical axis of the camera is not parallel to the horizon, the spatial resolution in the horizontal projection depends on the height above the ground.

- If in the **Height** box **AUTO** is chosen and in the [View area projection bounds](#)^[168] and [Shadow](#)^[172] buttons the **Within projection** is chosen, then calculation of spatial resolution in the horizontal projection is carried out at the middle height between the [view area lower bound height](#)^[259] and the [view area upper bound height](#)^[258].



The box is accessible for editing in the [Editing](#)^[274] mode.

Object height (width)

Height ([width](#)^[275]) of the object for the criteria associated with an object: **Pixel for object** and **% of Field-of-view for object**.

The caption is changed according to the [Vert./Hor.](#)^[275] switch.

The box is accessible for editing in the [Editing](#)^[274] mode.



Draw Legend

Home Office Scientific Development Branch 2009

- Monitor and Control (20pix/obj)
- Detect (39pix/obj)
- Observe (100pix/obj)
- Recognise (200pix/obj)
- Identify (400pix/obj)

vertical; Hobj=1.64 m; Hmeas=AUTO

Draw legend of the current Spatial resolution pattern on the Graphics area. After choosing this button specify place of the legend on the Graphics area of the Graphics window.

You can select [font type](#)^[322] on the [font type panel](#)^[246] before placing or after double clicking near to the left top corner of the legend.

By means of font type you can change size and color of the legend. You can also make the legend [scalable](#)^[322] or nonscalable.

Legend is tied with his [Spatial resolution pattern](#)^[272]. If parameters of the pattern is changed then the legend will be changed too. You can place several legends of different patterns on the same layout.

Blend/Hatch

Show the regions in the Spatial resolution box hatched or filled by blend translucent colors.

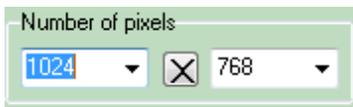
This box affects displaying regions in the Spatial resolution box only. Hatch or fill regions in the Graphics window can be determined separately for each camera using the [Fill projections](#)^[169] button.

Assign



Assign **chosen pattern** to the **Active camera**. If the **To selected cameras** box is checked, then the chosen pattern is assigned to **all selected cameras**.

Number of pixels



Attention! The purpose of these combo box differs in Starter, Lite and Professional versions!

In VideoCAD Lite these boxes represent number of pixels of the image of the [active camera](#)^[162].

The number of pixels affect visualization of the regions in the Graphics window. If the item [Processing>Resolutions](#)^[287] in the main menu of the 3D Video is checked, then the number of pixels of the image in the 3D Video will be limited by the value in these boxes.

If number of pixels is not set (N/A), calculation is performed for vertical 576 pixels and horizontal 768 pixels, that corresponds to analog camera.

These boxes affect numbers of pixels for modeling [images](#)^[278] on the far bounds of regions in the [Resolution](#)^[278] and the [Field of view](#)^[278] columns in the **Spatial resolution box**.

Images on the bounds of regions depend not only on the [criterion value](#)^[275], but also on the number of pixels.

Thus, for **criteria related to the number of pixels which covers a specified height (width) (Pixel per meter, Pixel for object)** value of the criterion determines the **spatial resolution**, ie how detailed the scene is photographed. In this case, the **Number of pixels** determines the size of the **field of view**.

Conversely, for **criteria related to the height (width) of the field of view (Field-of-view height (width), % of Field-of-view for object)** criterion value determines the size of the **field of view**. In this case, the **Number of pixels** determines the **spatial resolution**, ie how detailed the scene is photographed.

Table of regions

In rows of this table you can see and [edit](#)^[287] parameters of regions of the chosen spatial resolution pattern.

The bottom row of the table corresponds the nearest to the camera region.

On the first column of the table, on the background rectangles filled by a color assigned to the region, the Name of the region and the [Criterion value](#)^[275] at the far bound of region are

displayed.



Resolution column

The **Resolution** column contains fragments of images with people at the far bounds of each region. **These are fragments of images, not whole images.** **Field of view** of the fragments is less than the real **field of view**, but the **resolution** of people corresponds the real images exactly.

*On the images in the **Resolution** column, you can see with which resolution people at the far bound of each region will be visible.*

Field of view column

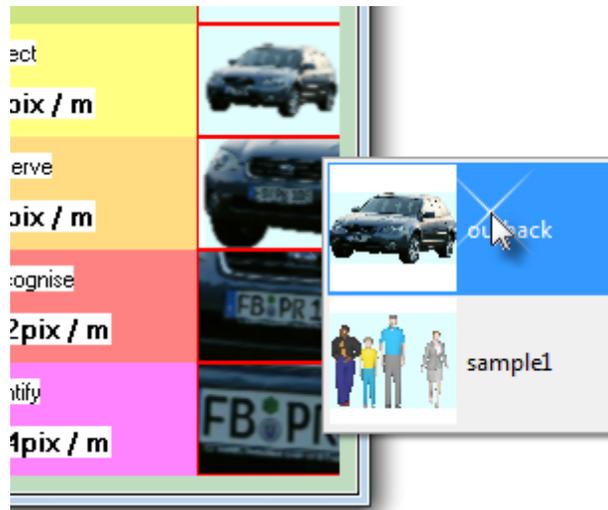
The **Field of view** column contains **whole reduced images** of people with the **field of view** at the far bounds of each region. **Resolution** of these images is less than resolution of the real image, but the **field of view** corresponds the real images exactly.

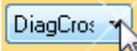
*On the images in the **Field of view** column, you can see which part of the field of view people at the far bound of each region will cover.*

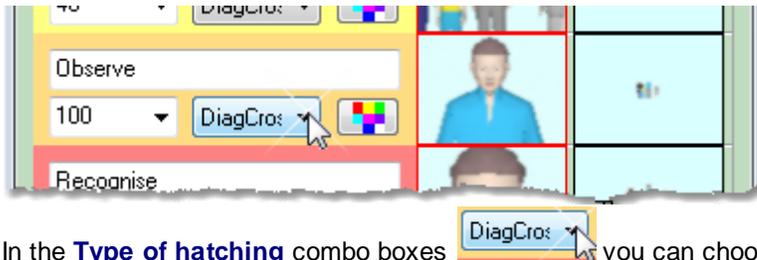
Images in **Resolution** and **Field of view** columns are automatically generated according to the **criterion value** of each region and the [Number of pixels](#)^[277] value. The images visualize the boundary values of the criterion.

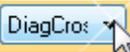
The height of "men in blue shirt" is 2 meters (about 6.5 feet).

Right click on any image in the **Table of regions**. Pop up menu will appear. With the help of this menu you can change image in the **Table of regions**.



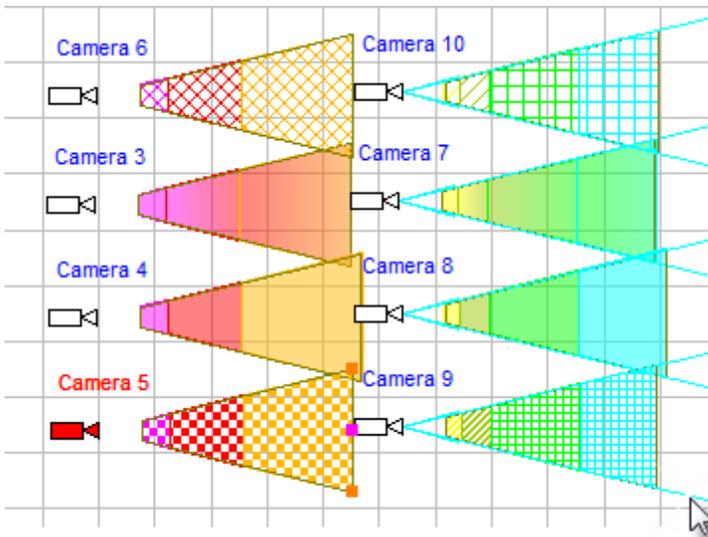
In the [Editing](#)^[274] mode the **Names of regions** and the **Criterion values** become accessible for editing. In addition the **Type of hatching** combo boxes  and **Colors of regions** buttons  appear.



In the **Type of hatching** combo boxes  you can choose type of hatching for each region.

Hatching will be visible in the **Spatial resolution box** when the **Blend/Hatch**^[276] box is not checked. In the **Graphics window**, hatching of the chosen type will be shown for cameras, which have chosen **Hatching** in the menu of the **Fill projections**^[169] button.

Color of region is the same for filling and for hatching.



How to add your own images to the Table of regions

Table of regions can display any images in *. **jpg** format, for example: photos of objects, etc. Adding your own images you can see how your objects will look at the far bounds of regions.

To add your own images to the Table of regions:

1. Take any *.**jpg** file, digital photo image etc.

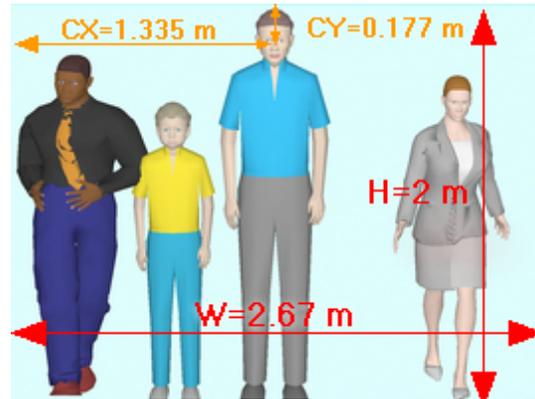
Simulated spatial resolution can not exceed the spatial resolution of the object on the used picture, so the spatial resolution of the object on the picture should be sufficient. The object should take the greatest possible part of the picture and the picture resolution should be sufficient.

2. Name your file by the following composite name: **<anyname>,<W>,<H>,<CX>,<CY>.jpg**

Thus the name is a string composed of the comma separated values:

<anyname> - any string without spaces and special characters;
<W> - image width, in meters;
<H> - image height, in meters;
<CX> - X coordinate of a spot on the image, at which the camera should be pointed (in meters);
<CY> - Y coordinate of a spot on the image, at which the camera should be pointed (in meters);

Origin of coordinates is on the top left corner of the image.



Example of file name:

sample1,2.67,2,1.335,0.177.jpg

3. Put your file in the VideoCAD installation directory, **/Resolution samples/** folder.
You can place several files to this folder.

4. Launch VideoCAD. Open the **Spatial resolution** box. Right click on any image in the **Table of regions**. Pop up menu will appear. With the help of this menu you can change image in the **Table of regions**.

If your file is missing in the menu, then you probably made a mistake in the filename. If the file is displayed not correctly, you probably typed wrong values of sizes in the filename.

See further: [Work with the Spatial resolution box](#)^[28]

9.4.2 Work with the Spatial resolution box

[Editing the Spatial resolution pattern](#)^[281]
[Assigning the pattern to cameras](#)^[282]

Editing the Spatial resolution pattern

1. Clear the [Active camera](#)^[274] box.
2. Choose a pattern for editing in the [Pattern](#)^[274] combo box.



3. Click the [Edit](#)^[274] button.  Caption on this button will be changed to **Save**. Parameters of the chosen pattern will become accessible for editing.

4. If necessary, edit the Name of the pattern in the [Pattern](#)^[274] box by the keyboard.
5. Choose [direction](#)^[275] (horizontal or vertical) and criterion in the [Pattern criterion](#)^[275] combo box.



6. Specify [Height](#)^[275] at which the criterion values should be calculated.
 - If in the [Height](#) box **AUTO** is chosen and in the [View area projection bounds](#)^[168] and [Shadow](#)^[172] buttons the **Within projection** is chosen, then calculation of spatial resolution in the horizontal projection is carried out at the middle height between the [view area lower bound height](#)^[259] and the [view area upper bound height](#)^[258].
 - If in the [Height](#)^[275] box of the **Spatial resolution box**, **AUTO** is chosen and in the [View area projection bounds](#)^[168] and [Shadow](#)^[172] buttons the **2 levels** is chosen, then calculation of spatial resolution in the horizontal projection is carried out at the [view area lower bound height](#)^[259]
7. In case of chosen criteria is related to an object (**Pixel for object**, **% of Field-of-view for object**), choose the object height(width) in the [Object height \(width\)](#)^[276] box.



8. If the **type of hatching** is needed to show, clear the [Blend/Hatch](#)^[276] box.
9. Specify values of the [criterion](#)^[275] at far bound of each region in the [Table of regions](#)^[277].

When editing the values of criteria, you must comply with the following rules:

9.1 The bottom row of the table should correspond to the closest to the camera region, and thus must have:

- maximum spatial resolution (the maximum value of the criterion **Pixel per meter**);
- any object must cover the maximum number of pixels (the maximum value of the criterion **Pixel for object**);
- minimum size of the field of view (the minimum criterion **Field-of-view height (width)**);

- any object must cover maximum part of the field of view (the maximum value of the criterion **% of Field-of-view for object**).

9.2 The values of the criteria should be edited consistently from region to region, starting from the closest to camera region (bottom row). For example, if the criterion is Pixel per meter, then in the bottom row should be the maximum spatial resolution, and in each subsequent row criterion value must be less than the row below.

If this rule is violated then the boxes with wrong values would be red highlighted.

9.3 In the [editing mode](#)^[274], the table unfolds and shows the **maximum number of region in the pattern (10)**. If you need a smaller number of regions, the "extra" regions must have equal values of the criterion. "Unnecessary" regions should be placed one after another at the top of the table.



10. You can edit the Name of each region in the **Name** box, choose a color that will be used for displaying the region in the Graphics window by clicking on the [Color button](#)^[278] , choose

hatch style in the [Hatch style](#)^[278]  [DiagCros](#)^[278] combo box.

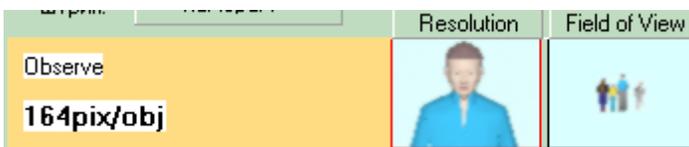
*Hatching will be visible in the **Spatial resolution** box when the [Blend/Hatch](#)^[276] box is not checked.*

*In the **Graphics window**, hatching of the chosen type will be shown for cameras, which have chosen **Hatching** in the menu of the [Fill projections](#)^[169] button.*

11. On the images in the [Resolution](#)^[278] column, you can see with which resolution people at the far bound of each region will be visible.

On the images in the [Field of view](#)^[278] column, you can see which part of the **field of view** people at the far bound of each region will cover.

Sample images are correct for the cameras with vertical number of pixels specified in the [Number of pixels](#)^[277] combo boxes .



12. When editing pattern will be finished, click the [Edit/Save](#)^[274] button once again.

▣ Assigning the pattern to cameras

To assign a pattern, displayed in the **Spatial resolution box** to a camera:

1. [Activate](#)^[162] the camera.
2. Click on the [Assign](#)^[277] button.

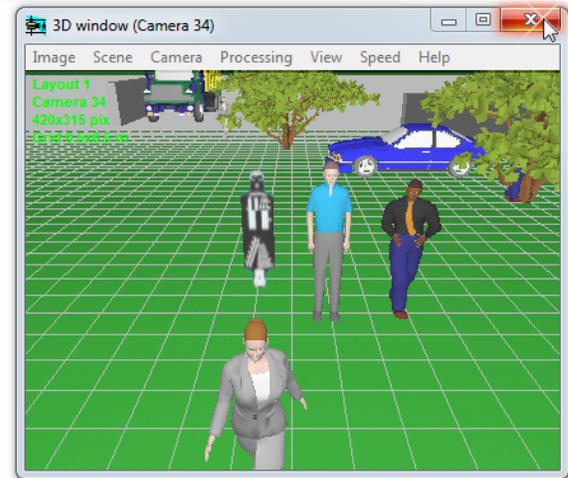
If the [To selected cameras](#)^[277] box is checked, then the chosen pattern is assigned to **all selected cameras**.



See also: [Spatial resolution](#)^[170], [Fill projection](#)^[169], [Visualization of cameras' control area projections and spatial resolution inside them](#)^[38]

9.5 3D Video

Graphics window
Main menu
View
3D Video



The 3D Video window is designed for 3D modeling images from the active camera.

▣ 3D Video can display:

- **Ground surface.** The ground color is set on the tab [3D modeling](#)^[325] in the Options Box.
- **Grid.** The presence, step and location of the grid are determined by the similar [grid parameters](#)^[176] in the graphics window.
- **Background**^[204]. The Background is not visible by default. You can make the background visible in the Main menu of 3D Video.
- **3D constructions;** represent stretched throughout the height [2D constructions](#)^[181] in the graphics window.
- **3D models.** These are prepared 3D models of people, cars and other objects. See more: [3D model](#)^[190]
- **3D images.** Usual raster images can be placed in the 3D space. See more: [3D image](#)^[191]
- **Cameras.** Cameras are represented as 3D models.
- **3D view areas.** View areas in VideoCAD Lite are shown in the 3D Video in the form of semi-transparent pyramids. See more: [3D view areas](#)^[288]
- **Titles**^[287]. At the left top corner the main image parameters are displayed.

Visibility of some objects can be switched in the [Main menu](#)^[286] of the 3D Video.

Location and editing these objects are carried out in the **horizontal projection** of the [graphics area](#)^[159]. In the **3D Video** the result of these actions can be observed.

▣ 3D Video allows to:

- disclose the view area distortions, arising from obstacles;
- [save](#)^[286] obtained images in the static files;
- see at the design stage that, for what the video surveillance system is made - **images from video cameras.**

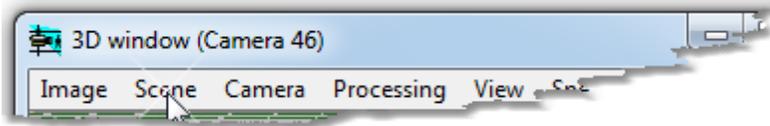
If image in the 3D Video is distorted, redrawing the image is too long or there are other artifacts, see [Errors in rendering 3D images](#)^[290].

See also: [3D Video main menu](#)^[286], [3D mode](#)^[190], [3D image](#)^[191], [Errors in rendering 3D images](#)^[290], [3D Models](#)^[291]

External link: "[The principles of CCTV design in VideoCAD. Part 3. 3D modeling in VideoCAD](#)"(*.pdf)

±

9.5.1 Main menu



Image

[Save as *.bmp \(*.jpg, *.gif, *.tif, *.png\)](#)^[286]

[Copy to clipboard](#)^[286]

[Printer setup](#)^[286]

[Print](#)^[286]

Processing

[Compression](#)^[286]

[Resolution](#)^[287]

View

[Title](#)^[287]

[PTZH frame](#)^[287]

[Background](#)^[288]

[Ground surface](#)^[288]

[3D view areas](#)^[288]

Help

Image > Save as *.bmp (*.jpg, *.gif, *.tif, *.png)

Save the static image in the 3D Video in any format from the following: *.bmp, *.jpg, *.gif, *.tif, *.png.

Image > Printer setup

Choosing this item opens a standard dialog box of current printer setup in Windows.

Image > Print

Print image in the 3D Video.

Processing > Compression

The item opens a submenu, in which the **image compression level** can be chosen.

Compression levels may differ from the compression levels in the settings of different DVR or IP cameras. To determine a correspondence use the visual image comparison.

Obtained image compress by the JPEG algorithm for approximating the image in the 3D Video to the real image from video cameras to exactly estimation the possibilities of detection, identification and reading

Using in your DVR algorithms different from JPEG is not generally an obstacle for compression modeling with the help of JPEG algorithm. Although other algorithm artifacts differ from JPEG artifacts, the general amount of information correspondence that can be determined by the careful visual image comparison is enough for modeling.

Processing > Resolution

If this item is checked, then the resolution in the 3D Video will be limited by value in the [Number of pixels](#)^[277] boxes, set for the active camera in the **Spatial resolution box**

The resolution will be limited in case of the size of the image in the 3D Video is more than value in the [Number of pixels](#)^[277] boxes.

This item must be checked for modeling resolution of [panoramic \(fish-eye\) cameras](#)^[269]. Distortion of a panoramic camera images in the **3D Video** is not modeled.

The simulated resolution is exact **only at the center of the frame**. Towards the edges of the frame the actual resolution is worse than simulated. The smaller the view angle, the more accuracy of simulating resolution on the edges of the frame.

View > Title

Place the following information in the left upper corner of the image:

- **Name** of the [layout](#)^[340] on which the active camera is placed.
- Active camera **name**.
- Current **image sizes** in pixels.
- Current image resolution in pixels (**Image**) and 3D Video size (**Screen**) separately, when the [image resolution](#)^[277] differs from the 3D Video size. The [Resolution](#)^[287] menu item must be checked;
- The [grid](#)^[176] **step**, if the grid is displayed.

View > PTZH frame

PTZH frame (Pan-Tilt-Zoom-Height) allows operating camera similarly to PTZ one and additionally change **camera's installation height**.

After clicking this item the camera's **field of view** extends, and the objects being off view area, for increasing the convenience of camera's adjustment, become visible. Real field of view is limited by **orange frame**.



Above the frame the buttons, which changes [view area upper bound distance](#)^[260]   and [view area upper bound height](#)^[258]  , are located. Current distance and height values are digitally shown under the buttons.

*It is recommended to set **view area upper bound height**, which is equal to maximal height of observed objects, and do not change it further. Further adjust camera's inclination by changing only the **view area upper bound distance**.*

On the right and to the left of the frame there are camera rotation buttons .

Under the frame there are buttons, which change the [height of camera installation](#)^[257] . Current value of **height** is digitally shown above the buttons. Near by them the [lens focal length](#)^[256]  **combo box** is located. Value in the box can be selected from the list or entered from the keyboard.

Using these tools it is possible to rotate the camera in both planes, change **lens focal length** and **height of installation**.

To change the position **on one step** click corresponding button. For **continuous moving** bring the cursor to the button, then press it and do not release the left mouse button. For precise position adjustment do the same, but with pressed **Ctrl**.

In the PTZH frame mode you can pan and tilt the camera by moving the image like moving drawing in the Graphics window. Press left mouse button, move cursor with the button pressed then release the mouse button. Camera tilt angle is changed through changing **view area upper bound distance**. But when **Ctrl** is pressed, the tilt angle is changed through changing **view area upper bound height**. You can pan camera using **arrow keys**.

Together with [Monitor window](#)^[294] this tool offers a [new method](#)^[363] of 3D CCTV design.

If a [mode](#)^[304] is assigned to the camera, and the model has [fixed](#)^[316] focal length lens, then you can not change the focal length.

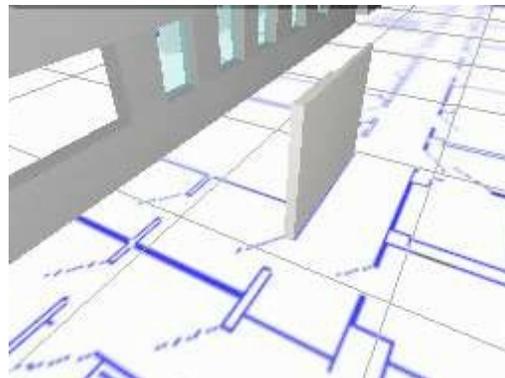
If a model is assigned to the camera, and the model has a lens with [limited](#)^[317] variable focal length, then you can change focal length within the limits only. When approach to the limit values, the box will become crimson.

You can change focal length in wide range of 0.5-1000mm of cameras, which have not assigned model or the assigned model have not specified limits of the lens focal length.

View > Background

Show or hide a background in the 3D image.

In case of vector background you can adjust [background resolution](#)^[326] in the 3D Video.



See more: [Background](#)^[204]

View > Ground surface

Show or hide ground surface. Ground color can be set on the [3D modeling](#)^[333] tab on the Options box.

View > 3D view areas

Enable in the 3D Video visualization of view areas of cameras with [3D view area](#)^[174]  enabled. View areas are shown in the form of pyramids.

If the [line type of camera](#)^[166] coincides with default line type for camera icons, specified in the [Options box>Camera icon>Camera icon>Line type](#)^[327], then sides of the view area are filled by different colors by default (Camera 7 on the figure).

If another line type was assigned to the camera, then filling view area of this camera is performed by a color (3D>Color) of this line type assigned to the camera. (Camera 5,9).

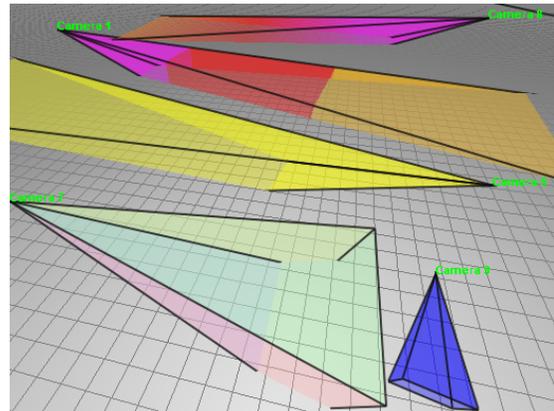
If the [Spatial resolution](#)^[170]  is enabled, then colors of filling projections is determined by Spatial resolution parameters (Camera 1,8).

View of 3D view area of the active camera can be adjusted by buttons on the Toolbar  [View area edges](#)^[167],  [Fill projections](#)^[169],  [Spatial resolution](#)^[170].

Transparency of the 3D view areas can be changed with transparency of view area projections in the Graphics window, in the [Transparency](#)^[327] box in the Camera icon tab in the Options box.

The 3D view areas can be limited by the maximum distance from the camera by using the Camera geometry> [Maximum distance of drawing view area](#)^[265].

To display the 3D view areas in VideoCAD Professional there is a special window - 3D World, it offers much more powerful tools for view area visualization.



Help

Open the Help system topic with the information about **3D Video**.

9.6 Errors in rendering 3D images

The quality of 3D images in the [3D Video](#)^[284] and [3D Models](#)^[291] windows and the speed of its refreshing depends much on your graphics card capabilities. To get maximum realism set the maximum quality of **Open GL** images.

On some outdated graphic cards visible pixelization, errors and the lack of image are possible. This is not a program fault. Some new graphic cards need an additional setting to get the maximum realistic quality.

The speed of image updating also depends on the quantity of the displayed 3D models.

If errors are visible on the image in the 3D Video or the computer buzzes at the 3D Video/3D World displaying, first of all **update the graphics card driver** to the latest version accessible on the manufacturer website. *The drivers which are used in Windows by default as a rule do not support hardware acceleration.*

Then try to change **Hardware acceleration** in the Display Properties box.

Then try to reduce **Model space** on the [3D modeling](#)^[325] tab in the **Options** box.

If failures or distortions remain, - a more high-end graphics card is necessary for 3D modeling. *For the best quality it is necessary to use a graphics card with **OpenGL** hardware support.*

Redraw speed of the image depends also on number and complexity of displayed 3D models and the size of opened 3D Video.

If the image is redrawn too slowly and that hinder operation in the Graphics window, try to adjust VideoCAD for the most comfortable working on your equipment and your projects:

Mark the [Redraw 3D image only by clicking](#)^[326] box on the [3D modeling](#)^[325] tab in the [Options box](#)^[319]. After that the image in 3D Video will be redrawn automatically only at activation of cameras. To force redrawing click on the image.

9.7 3D Models

Graphics window
Main menu
View
3D Models



The **3D Models** window is intended to manage [3D models](#)^[190] in the program library.

The **3D Models** window can be opened in several ways:

- Via the Main menu > [3D models](#)> [3D Models window](#)^[231];
- By clicking the button  on the [Current construction parameter panel](#)^[248] during placement or editing 3D models. In the 3D Models window the placed or edited 3D model will be loaded.
- Adding a new model via Main menu > [3D Models](#)> [Add 3D model](#)^[231]. The 3D Models window will appeared automatically after opening a 3D model file, the new 3D model will be loaded into the 3D Models window.

The **3D Models** window consists of display area and panels with tools.

On the top of panels there is a button of choosing 3D models. Clicking on the button opens a menu where you can select a 3D model from 3D model available in the library of 3D models.

In VideoCAD Lite there is only one tab - [Model](#)^[292]. In VideoCAD Professional there are more tabs **View** and **Navigation**.

Changes in the **3D Models** window will be applied to all instances of the 3D model already placed in the project. If you need several variants of the same 3D model with different properties, create a [copy](#)^[293] of the 3D model.

You can resize the **3D Models** window by dragging its borders by mouse. Via resizing the window, you can change **resolution of the 3D model's projection** for displaying in the [Graphics window](#)^[159].

The 3D model's projection is updated at the moment of clicking the [Save projection](#)^[292] button.

See further: [Model tab](#)^[292]

See also: [3D Video](#)^[284]

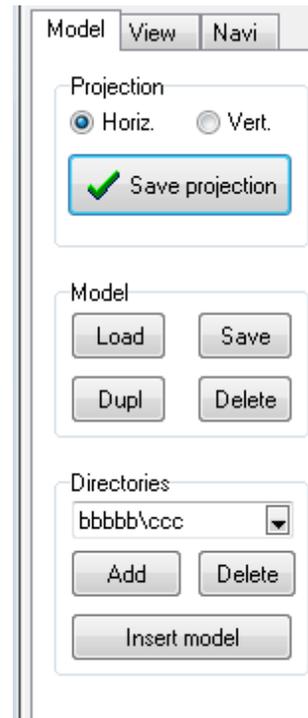
9.7.1 Model

On the Model tab you can:

- Load new 3D models from *.vcm files.

3D model files in *.vcm format can be obtained from **SketchUP** or **3ds max** with the help of special plugins. See more: [Import of 3D models from SketchUp and Autodesk 3dsMax](#)^[397].

- Delete 3D models from the library;
- Build **projections** of 3D models to display in the [Graphics window](#)^[159] and in [menus](#)^[190];
- Save 3D models to *.vcm files;
- Duplicate 3D models;
- Distribute 3D models by hierarchy directories for convenient access from menus.



Projection panel

The panel is intended to create **projections** of the 3D model to display in the [Graphics window](#)^[159] and the [menu](#)^[190]. Without the created projections, in the menus and Graphics window instead of the 3D models gray rectangles will be displayed.

These projections can be repeatedly re-created for new or already placed 3D models.

The order of creation projection:

1. By the **Horiz. <-> Vert.** switch, choose which projection should be created. Firstly you should create the **horizontal projection**. The **vertical projection** is used rarely only to display 3D model in Vertical projection of the [Graphics area](#)^[159].

2. Then adjust resolution of the projection visually, via changing window size by mouse.

For 3D-models of objects in order to improve performance you should chose minimally sufficient resolution.

3D-models-territories require high resolution, for its increase special tools on the View tab are offered.

3. After adjusting resolution, click the **Save projection** button. As a result in menus and in the [Graphics area](#)^[159] the 3D model will be displayed in the form of created projection.

Model panel

Load - Add new 3D model to the program library. In the appeared dialog choose a file in *.vcm format and click **Open**.

3D model files in *.vcm format can be obtained from **SketchUP** or **3ds max** with the help of special plugins. See more: [Import of 3D models from SketchUp and Autodesk 3dsMax](#)^[397].

If VideoCAD library already has a 3D model with the same name or ID, you will be prompted to add the model under a different name or ID.

Then you will see the [3D Models window](#)^[291], in which you can create the [projection](#)^[292] of the 3D model to display it in the [Graphics window](#)^[158] and [menus](#)^[190]. To do this click the **Save projection button** and close the **3D Models** window. After this, icons of the 3D model will appear in menus and the 3D model can be placed in the graphics area.

If your 3D model has **textures**, in the same directory where the *.vcm file is opened from, a folder with textures must be. The folder should be named **<model name> _textures**. VideoCAD plugin for SketchUP automatically creates the folder with the textures in the directory of saving exported model.

Save - save to *.vcm file the current 3D model. If your 3D model has **textures**, in the directory of saving *.vcm file, a folder with textures named **<model name> _textures** will be created.

Dupl - make a copy of the current 3D model. Copies can be useful, for example, while working with multi-storey buildings. You can create multiple copies of the 3D model of the building for each floor. For each copy make a [projection at different levels](#)^[292] and put them on different layers.

Delete - delete the current 3D model from the library. When you delete placed 3D model, all instances of this 3D model will be also deleted from the project.

Directories panel

The panel is intended for distribution 3D models by hierarchy directories for convenient access from menus.

List of directories - The list with full paths starting from the root directory. In the list you can choose a directory for deleting or to put in it the current 3D model.

Add - Add new directory. The name of the directory should be entered with all directories of higher levels. For example:

"cars" - new directory **cars** in the root directory of menus.

"cars\trucks" - new directory **trucks** in directory **cars**. If the **cars** directory does not exist, it will be created.

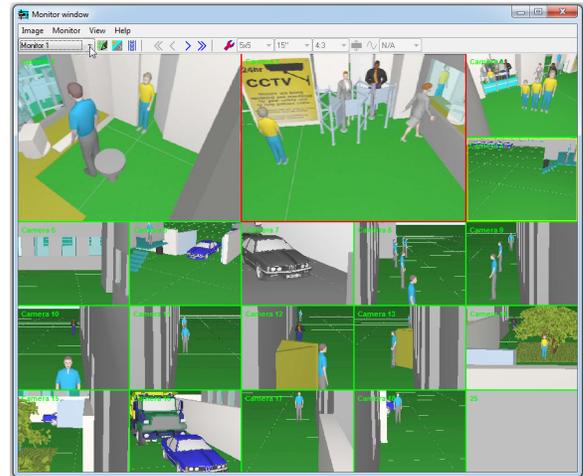
Empty directories are not visible in menus, only directories with 3D models are visible in menus.

Delete - Delete the directory, chosen in the List of directories. Only empty directory can be deleted.

Insert model - Put the current 3D model to the directory, displayed in the **List of directories**.

9.8 Monitor window

[Graphics window](#)
[Main menu](#)
[View](#)
[Monitor window](#)



Monitor window is intended to model monitors of video surveillance system. However the field of application of this tool is much wider.

Together with [3D Video](#)^[284] the Monitor window allows to project video surveillance system, working directly with images. Thus all necessary changes on the drawing are carried out automatically.

Monitor window logically finishes the information transfer process in video surveillance system "from a real object to an operator" and thus, allows to model the video surveillance system as a whole.

In Monitor window there can be up to 10 monitors. On each monitor up to 100 images from cameras could be displayed simultaneously or with the dividing into screens.

Using Monitor window in order to achieve the best result it is possible to compare various variants of cameras' placement.

Monitor window is useful at designing an operator's workplace. It is possible to estimate the detail of images from cameras in split screen, an option to display images from different cameras in various sizes, choose optimal quantity and sizes of monitors as well as optimal distance of watching these monitors, taking into account features of projected video surveillance system.

Together with [PTZH frame](#)^[287] this tool offers a [new method](#)^[363] of 3D CCTV design.

See also: [Work with Monitors](#)^[302], [Monitor window Tool bar](#)^[295], [Monitor window Main menu](#)^[298], [Monitor window Pop-up menu](#)^[300].

External link: ["The principles of CCTV design in VideoCAD. Part 3. 3D modeling in VideoCAD" \(*.pdf\)](#)

±

9.8.1 Tool bar



Monitor 1 **Monitor list**

In the combo box there is a name of displayed monitor. It is possible to choose other monitor. In VideoCAD there are 10 monitors, in which the set of cameras and the parameters are adjusted independently.

To rename the displayed monitor use item **Main menu** [Monitor>Rename \[299\]](#).

Update

Update all images on the displayed monitor.

Monitor window itself does not generate 3D images, but uses the ready images which are created in [3D Video \[284\]](#) and are stored in the memory that allows to work simultaneously with a big quantity of 3D images without decreasing program's speed.

As a result of clicking this button, for some time **3D Video** will appear, in which the images from all cameras will be modeled according to saved parameters of the cameras.

To update the image in one cell click it by the right mouse button and choose in the pop-up menu [Update \[300\]](#).

Previous screen, Next screen

Each monitor consists of 100 cells, but it is also possible to display a smaller quantity of cells simultaneously. The quantity of simultaneously displayed cells is chosen in the [Monitor dimension \[296\]](#) combo box.

Clicking the buttons **Previous screen** and **Next screen** shift the displayed cells on the **quantity of simultaneously displayed cells**.

*For example, if the monitor's dimension is 2x2, 4 cells are simultaneously displayed. If cells 5,6,7,8 are displayed, as a result of clicking the **Previous screen** button - cells 1,2,3,4 will be displayed, and by clicking the **Next screen** button - cells 9,10,11,12 will be displayed.*

Thus, each monitor can have several screens.

Previous cell, Next cell

Each monitor consists of 100 cells, but it is also possible to display a smaller quantity of cells simultaneously. The quantity of simultaneously displayed cells is chosen in the [Monitor dimension](#)^[296] combo box.

Clicking the buttons **Previous cell** and **Next cell** shift displayed cells on one cell.

*For example, if monitor's dimension is 2x2, 4 cells are simultaneously displayed. If cells 5,6,7,8 are displayed, as a result of clicking the **Previous cell** button - cells 4,5,6,7 will be displayed, and by clicking the **Next cell** button - cells 6,7,8,9 will be displayed.*

Edit

If this button is pressed, the **monitor editing tools** become available:

[Monitor dimension](#)^[296]

[Monitor diagonal](#)^[296]

[Screen Aspect Ratio](#)^[297]

[Stretch another aspect ratio images](#)^[297]

[Analog monitor](#)^[297]

[Monitor resolution](#)^[297]

[Monitor>Clear](#)^[299]

[Monitor>Rename](#)^[299]

[Clear cell](#)^[300]

[Opportunity of cameras connection to the monitor](#)^[302]

[Opportunity of moving and copying cells](#)^[303]

If this button is not pressed, monitor's editing is locked for protection against accidental change of the monitor.

Monitor dimension

In the combo box it is possible to choose quantity of simultaneously displayed cells on the current monitor.

2x2 corresponds to 4 cells, 3x3 - to 9 cells, etc.

One image can occupy 1, 4, 9 or 16 side-by-side located cells.

Changing value in the box is possible only in [Edit mode](#)^[296] of the monitor.

Monitor diagonal

In the combo box it is possible to choose **physical size of the screen** of the current monitor.

The size is set by diagonal, in inches. Value **NA** corresponds to the size which is not set. If the physical size is set, possibility to change the sizes of **Monitor window** by the mouse is locked.

To get precise sizes of the Monitor window you can adjust [Monitor size factor](#)^[334] in the **Options box**.

To change value in the box is possible only in [Edit mode](#)^[296] of the monitor.

4:3 ▾ **Screen aspect ratio**

You can choose in the combo box screen aspect ratio. 4/3 - standard monitor, 16/9 - wide-screen monitor.

 **Stretch another aspect ratio images**

If the button is pressed then images from cameras with differing aspect ratio will be stretched.

 **Analog monitor**

This tool allows to model analog monitors, the resolution of which is below the computers' one. If this button is pressed, the resolution of the monitor is limited to value **768x576** pixels.

To change button's state is possible only in [Edit mode](#)^[296] of the monitor.

1280*1024 ▾ **Monitor resolution**

In this box you can set resolution of the monitor. Resolution in the Monitor window will be limited by value in this box.

Changing value in the box is possible only in [Edit mode](#)^[296] of the monitor.

9.8.2 Main menu

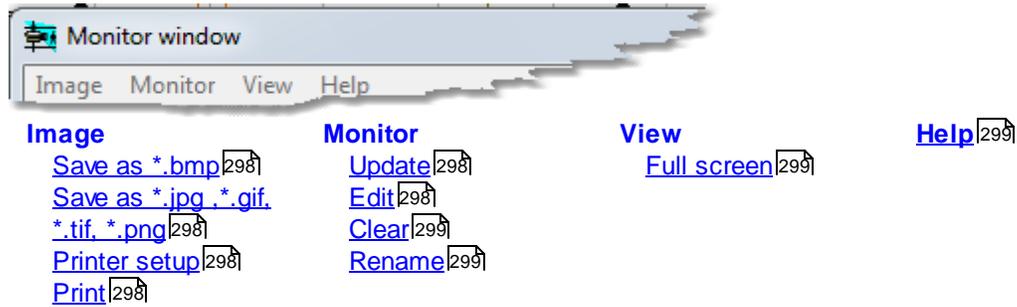


Image > Save as *.bmp

Save the image in the **Monitor window** in ***.bmp** format. The image is saved exactly as on the screen, but the obtained file will be big.

Image > Save as *.jpg, gif, *.tif, *.png

Save the image in the **Monitor window** in ***.jpg, *.gif, *.tif, *.png** formats. The image is saved compressed, at that a small loss of quality appears, but the file size turns to be small.

Image > Printer setup

Choosing this item opens a standard dialog box of current printer setup in Windows.

Image > Print

Print the image in the Monitor window.

Monitor > Update

Update all images on the displayed monitor.

Monitor window itself does not generate 3D images, but uses the ready images which are created in [3D Video](#) and are stored in the memory that allows to work simultaneously with a big quantity of 3D images without decreasing program's speed.

As a result of clicking this button, for some time **3D Video** will appear, in which the images from all cameras will be modeled according to saved parameters of the cameras.

To update the image in one cell click it by the right mouse button and choose in the pop-up menu [Update](#).

Monitor > Edit

If this item is checked, the **monitor editing tools** become available:

[Monitor dimension](#)
[Monitor diagonal](#)
[Screen Aspect Ratio](#)
[Stretch another aspect ratio images](#)
[Analog monitor](#)

[Monitor resolution](#)^[297]

[Monitor>Clear](#)^[299]

[Monitor>Rename](#)^[299]

[Clear cell](#)^[300]

[Opportunity of cameras connection to the monitor](#)^[302]

[Opportunity of moving and copying cells](#)^[303]

If this item is not checked, monitor's editing is locked for protection against accidental change of the monitor.

Monitor > Clear

Clear all cells of the displayed monitor, delete images and disconnect cameras.

Item is accessible only in [Edit mode](#)^[296] of the monitor

Monitor > Rename

Rename the displayed monitor. As a result of clicking this item a dialog box will appear, in which it is possible to enter the new name of the monitor.

Item is accessible only in [Edit mode](#)^[296] of the monitor

View > Full screen

Show the image from the displayed monitor **at full screen**.

In this mode it is possible to switch monitors sequentially using the keys **Page Up** and **Page Down**, to shift cells by cursor moving keys **Arrow left** and **Arrow right**, to change monitor's dimensions by cursor moving keys **Arrow up** and **Arrow down**.

To return to the monitor's showing in the window press any other key.

Help

Show Help section with description of **Monitor window**.

9.8.3 Pop-up menu

*The **Pop-up menu** appears as a result of clicking the right mouse button on any cell in **Monitor window**. Operations in the pop-up menu are carried out **above the camera, the image from which is present at the cell**. Therefore, in case of an empty cell items of the menu are inaccessible. Exception is the [Clear cell](#)^[300] item, which action concerns to the cell. Clicking this item deletes the image from the cell.*

[Show in 3D Video](#)^[300]
[Update](#)^[300]
[Activate](#)^[300]
[Find on layouts](#)^[300]
[Clear cell](#)^[300]

Show in 3D Video

Show the image in this cell in [3D Video](#)^[284]. The same result will be obtained, by double click the cell.

It is convenient in **3D Video** check the item of **Main menu>View> PTZH frame**^[287] and visually adjust cameras' positions. It is also possible to model parameters of the image and conditions of surveillance. Thus, it is possible to project video surveillance system, working only with images. All necessary changes on the layout will be automatically carried out. After changing the camera's parameters click the [Update](#)^[300] item.

Update

Update the image from the camera connected to this cell.

Monitor window does not generate 3D images itself, and uses ready images which are created in [3D Video](#)^[284] and are stored in the memory that allows to work simultaneously with a big quantity of 3D images without program's speed decreasing.

As a result of clicking this item, for some time **3D Video** will appear. In this window the image from the camera will be modeled. The image will be modeled according to saved parameters of the cameras.

*To update the images on the monitor use the [Update](#)^[295] button on the **Tool bar**.*

Activate

[Activate](#)^[167] the camera, connected to this cell.

Find on layouts

Find on layouts and select the camera, connected to this cell.

Clear cell

Delete the image from this cell and disconnect the camera from it.

Item is accessible only in [Edit mode](#)^[296] of the monitor

9.8.4 Work with Monitors

[Opening Monitor window](#) ^[302]
[Preliminary monitor's adjustment](#) ^[302]
[Connecting cameras](#) ^[302]
[Placement of images](#) ^[303]
[Updating images](#) ^[303]
[Work with monitor](#) ^[303]

Opening Monitor window

For opening the **Monitor window** click the [Monitor window](#) ^[176]  button on **Graphics window** tool bar. At first opening in Monitor window the first monitor with the name **Monitor 1** and parameters by default will be shown.

If the monitor is already adjusted and cameras are connected to it, at first opening **Monitor window** after starting the program for some time [3D Video](#) ^[284] will appear, in which images from these cameras will be modeled.

*Generation of 3D images can take a lot of time. To interrupt generation press **ESC**.*

Preliminary monitor's adjustment

For monitor's adjustment, first of all switch on **edit mode** by clicking the [Edit](#) ^[296]  button.

For renaming the monitor click the item in the **Main menu of Monitor window** [Monitor > Rename](#) ^[299].

Select **quantity of cameras, which will be displayed** the [Monitor dimension](#) ^[296] combo box.

If necessary, select **physical size** of monitor's screen in the [Monitor diagonal](#) ^[296] combo box.
Having set the size it will be impossible to change the size of Monitor Window by the mouse.

If it is an **analog monitor**, click the [Analog monitor](#) ^[297]  button. The button should look pressed.

In the [Monitor resolution](#) ^[297] box you can specify the resolution of monitor.

Connecting cameras

Connection of cameras is available only in **Edit mode** ([Edit](#) ^[296]  button is pressed).

[Select](#) ^[177] necessary cameras on the layout in **Graphics window**, and then click a cell on the monitor, beginning from which these cameras should be displayed on the monitor.

For some time [3D Video](#) ^[284] will appear, in which images from these cameras will be modeled. After that the images will appear in cells of the monitor, beginning from a cell selected by click.

Thus it is possible to connect any quantity of the selected cameras simultaneously.

*If at the moment of clicking on the monitor **Ctrl** is pressed, new cameras will fill only free cells on the monitor. Cells already filled will not change.*

The image from each camera is modeled according to saved parameters of the camera.

Placement of images

Images can be changed in positions, copied, deleted, merged in 4,9,16 side-by-side located cells to get big images from some cameras

For placement of images the [Edit](#)^[296] mode should be switched on.

To **interchange images' positions** in two cells, first click the first cell, then the second one.

For **copying the image** from one cell in another, first click the cell, from which it is necessary to copy the image, and then on the cell, where it is necessary to copy the image. At the same time **Ctrl** should be pressed.

To **delete the image** from the cell, click it by the right mouse button and choose in pop-up menu [Clear cell](#)^[300].

To **delete all images from the monitor** choose item in the **Main menu**>[Monitor](#)>[Clear](#)^[299].

To increase images' size by **merging the cells**, place the images from one camera in 4, 9 or 16 side-by-side located cells. These cells are merged automatically.

Updating images

Monitor window does not generate 3D images itself, and uses the ready images which are created in [3D Video](#)^[284] and which are stored in the memory. That allows to work simultaneously with a big quantity of 3D images without decreasing the program's speed.

That is why after changing the parameters of a camera it is necessary to **update** camera's image on the screen. To update the image in a cell click it by the right mouse button and choose in the pop-up menu [Update](#)^[300]. Then **3D Video** will appear, in which the image will be modeled according to saved parameters of the camera.

To update all images click the [Update](#)^[295]  button on the Tool bar.

Work with monitor

In order not to change monitor's adjustment by accident, switch off **Edit mode** by clicking the [Edit](#)^[296]  button. The button should look not pressed.

Application of monitors at designing can be various. For acquaintance with all options of the work with monitors, see: [Tool bar](#)^[295], [Menu bar](#)^[298] and [Pop-up menu](#)^[300].

9.9 Table of camera models

Graphics window
Tool bar
Table of camera models

Product	Model Name	Key Features	Type	Image sensor			Lens			Power supply							
				Size	Number of pixels	Aspect ratio	Type	Focal length	Angle of view (deg)	Voltage (V)	Consumption (W)	Provider	Cost				
J-2005	W1020V	yes	1/4"	800	800	4:3	standard	2.8	2.8	60°	60°	5	5	5	5	5	5
J-2005	W1020V	yes	1/4"	1280	800	16:9	standard	2.8	2.8	60°	60°	5	5	5	5	5	5
J-2005	W1020V	yes	1/4"	1280	800	16:9	standard	2.8	2.8	60°	60°	5	5	5	5	5	5
J-2005	W1020V	yes	1/4"	1280	800	16:9	standard	2.8	2.8	60°	60°	5	5	5	5	5	5
J-2005	W1020V	yes	1/4"	1280	800	16:9	standard	2.8	2.8	60°	60°	5	5	5	5	5	5
J-2005	W1020V	yes	1/4"	1280	800	16:9	standard	2.8	2.8	60°	60°	5	5	5	5	5	5
J-2005	W1020V	yes	1/4"	1280	800	16:9	standard	2.8	2.8	60°	60°	5	5	5	5	5	5
J-2005	W1020V	yes	1/4"	1280	800	16:9	standard	2.8	2.8	60°	60°	5	5	5	5	5	5

The table displays parameters of camera models. Rows in the table correspond to models and columns in the table correspond to model parameters.

To get help for any parameter, select a cell and press F1 or use the [Help of parameter \(F1\)](#) item in the pop-up menu.

Models can be assigned to cameras in the project. As a result of model assignment to a camera, model parameters would be assigned to the camera.

In VideoCAD Lite there are the most important parameters only, used in modeling. In VideoCAD Professional this table have much more parameters.

Parameters values can be taken from camera specifications.

Many cameras have different parameters in different modes, for example, at different resolutions, different combinations of settings. If you need to simulate different modes of these cameras, you should create several models for single camera.

At adding new model it is not necessary to specify all parameters, it is possible to set only important for a current task parameters. Unused columns in the table can be hidden. It is possible to create variety of table views with different sets of columns and switch between them.

Search, filtering, sorting of camera models by parameters are possible. These functions make the table suitable for optimal choice of camera models for specific tasks.

It is possible to print or export the table or its separate fragments into formats *.txt, *.csv, *.htm, *.rtf, *.xls.

It is possible to paste fragments from Excel and copy fragments to Excel using standard copying and pasting.

At that the copying cell number and types of data in the copying cells should coincide.

In the table the sums of some parameters are automatically calculated and displayed in the bottom row.

The table of camera models has 2 tabs:

All models

On the tab all camera models, which are available in the database of models, are presented. It is possible to add new models, edit and delete existing ones, as well as assign models to cameras in the project.

*The assigned model will be copied to the **Used models** tab automatically.*

The database file of models on this tab is located in the VideoCAD installation directory and is not included in the project. It is possible to [save](#)^[311] the database of models to file and [load](#)^[311] from file.

▣ Used models

On the tab there are camera models, which have been already assigned to cameras in the project.

It is possible to [edit](#)^[310] models and [assign](#)^[310] models to cameras in the project. Adding and deleting models from this tab is carried out automatically.

*The assigned model from the **All models** tab is automatically copied to the **Used models** tab. If the model is not used in the project any more, it is deleted from this tab.*

The database of models on the **Used models** tab is a part of the project. As a result of opening the project on other computer on the tab there will be the same models. You can [copy](#)^[311] model from this tab to the **All models** tab.

See more: [Table Interface](#)^[307], [Tool bar](#)^[310], [Pop-up menu](#)^[313], [Parameters of camera model](#)^[315].

9.9.1 Interface

Interface of the **Table of camera models** includes:

[Table Interface](#)^[307];

[Tool bar](#)^[310];

[Pop-up menu](#)^[313].

9.9.1.1 Table Interface

[Selecting model \(row\)](#)^[307]

[Selecting column](#)^[307]

[Selecting fragment](#)^[307]

[Selecting and editing cell](#)^[307]

[Changing column width](#)^[307]

[Changing row height](#)^[307]

[Moving columns](#)^[308]

[Visibility of columns](#)^[308]

[Table views](#)^[308]

[Sorting by column data](#)^[308]

[Filtering by parameter value](#)

^[308]

[Searching by parameter value](#)

^[309]

Selecting model (row)

To select **model (row)** bring the cursor to the left end of the row. The cursor should become a **right arrow** . Then click on this place. The selected row will be highlighted and marked by

the sign .

To select adjacent models use **up arrow** and **down arrow** keys.

By pressing the **down arrow** key on the bottom row, new model will be created.

Selecting column

To select a column bring the cursor to the border between header and data of the column. The cursor should become **down arrow** . Click on this border.

To select several columns hold **Ctrl**. To select range of columns hold **Shift** or move the cursor, holding the left mouse button.

Selecting fragment

Bring the cursor to a corner cell of a fragment, press the left mouse button and then move the cursor, holding the left mouse button pressed. After selecting the fragment release the left mouse button.

Selecting and editing cell

To select a cell, click on it. To edit, click on the selected cell once again. In most cells it is possible to choose parameter value from the list.

It is possible to move around the cells using keys with arrows. For editing press Enter.

Some cells admit choice from the list of values only.

Changing column width

Bring the cursor to border of a column on the header. The cursor will become a **double arrow**

. Press the left mouse button and move the cursor. After getting the necessary width release the mouse button.

Changing row height

Bring the cursor to border of a row on the left edge of the table. The cursor will become a **double**

arrow . Press the left mouse button and move the cursor. After getting the necessary height release the mouse button.

You can change height only for all rows simultaneously.

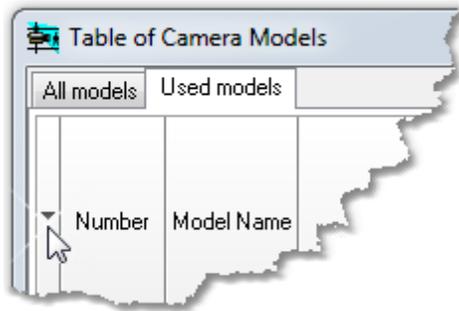
Moving columns

To move a column, place the cursor on the column header. Press the left mouse button and move the cursor. After moving column, release mouse button.

Visibility of columns

You can adjust visibility of columns, save and restore table structures as **Views**.

To show/hide any particular column:



- Click on the black triangle on the top-left corner of the table;
- In the appeared menu choose Visible columns;
- In the appeared list of all columns check or clear name of necessary columns.

See also: [Table tool bar>Views](#)^{B1↑}.

Table Views

You can adjust visibility of columns, save and restore table structures as **Views**.

See also: [Table tool bar>Views](#)^{B1↑}.

Sorting by column data

To sort by the parameter value in the column, just click on the column header. Reclick changes sort order to the reverse one.

To disable sorting, sort by the **Number** column.

Filtering by parameter value

Click on the arrow in the combo box at the column top (between parameters values and header)



and choose parameter value from the list.

In this combo box you can specify following filters:

- Order by descending;
- Order by ascending;
- Clear filter;

- **Custom**; - Combined custom filter with several conditions.
- **All** - all rows;
- **Not empty** - only not empty;
- **Empty** - only empty.
- **Boxes with possible field value**. Just select needed values.

Searching by parameter value

Select any cell in a column (just select by one click, the cell should not be in edit mode). Type fast a parameter value on the keyboard. During typing search of row (of model) will be carried out

with the typing parameter value in this column



See also: [Table of camera models](#)^[304], [Tool bar](#)^[310], [Pop-up menu](#)^[313], [Parameters of camera models](#)^[315]

9.9.1.2 Tool bar



Tool bars on [All models](#)^[304] tab and [Used models](#)^[305] tab differ a little. Differences are given below, in tool descriptions.

[Camera model](#)^[310]

[Assign](#)^[310]
[New](#)^[310]
[Edit](#)^[310]
[Delete](#)^[310]
[Copy to All models](#)^[310]

[Data](#)^[311]

[Save](#)^[311]
[Load](#)^[311]
[Export](#)^[311]
[Print](#)^[311]

[Views](#)^[311]

[Compress/Expand](#)^[311]
[Hide columns](#)^[312]
[Show all](#)^[312]
[Save view](#)^[312]
[Table view list](#)^[312]
[Delete view](#)^[312]

Camera model

Assign

Assign model selected in the table to the [active](#)^[161] camera.

As a result of assignment, model [parameters](#)^[315] will be assigned to parameters of the active camera. Changing of some parameters of the active camera will be disabled or restricted according to model limits.

If model from the [All models](#)^[304] tab is assigned it will be copied to the [Used models](#)^[305] tab.

To assign one model to **all selected cameras**, use pop up menu of the [Model of active camera](#)^[174] combo box on the [Tool bar](#)^[164] of the **Graphics window**.

New

The button is present on the [All models](#)^[304] tab only.

Create a new camera model. After clicking this button a new line will be added to the table. You can enter [parameters](#)^[315] of the new model to the line.

It is possible to specify parameters directly in the table of models. The majority of parameters can be chosen from lists. For specifying parameter, click the cell of table twice with an interval not less half of second. To turn the selected cell to edit state press Enter.

It is convenient to move the focus on the cells using the arrow keys. If you press the "down arrow" on the bottom line, a new line will be created.

It is possible to copy fragments into the table from **Excel** table. At that the number of cells and data types should coincide.

See also. [Parameters of camera model](#)^[315]

Edit

Edit parameters of camera model. After clicking this button, the current line will turn to editing mode. You can enter [parameters](#)^[315] of the new model to the line.

It is possible to specify parameters directly in the table of models. The majority of parameters can be chosen from lists. For specifying parameter, click the cell of table twice with an interval not less half of second. To turn the selected cell to edit state press Enter.

It is convenient to move the focus on the cells using the arrow keys. If you press the "down arrow" on the bottom line, a new line will be created.

*It is possible to copy fragments into the table from **Excel** table, it is possible to copy cells within the table of models. At that the number of cells and data types should coincide.*

See also. [Parameters of camera model](#)^[315]

Delete

Delete model selected in the table. As a result of deleting model from the [Used models](#)^[305] tab, model assignment will be removed from cameras, to which the deleted model had been assigned.

Copy to All models

The button is present on the [Used models](#)^[305] tab only.

Copy selected model from the [Used models](#)^[305] tab to the [All models](#)^[304] tab.

Data

Save

The button is present on the [All models](#)^[304] tab only.

Save model database to file.

Load

The button is present on the [All models](#)^[304] tab only.

Load model database from file.

Export

Export table of camera models to any of the following formats: *.txt, *.csv, *.htm, *.rtf, *.xls. File format can be chosen in **Save as** dialog box appeared.

You can export selected fragments using [pop-up menu](#)^[313].

Print

Print full table of camera models or a selected fragment of the table. Print dialog box will open in which it is possible to adjust printing options.

▣ Views

View - is a set, width and order of visible columns.

In real projects there is no necessity to use all parameters. At various times different parameters sets are necessary. You can [hide](#)^[312] unnecessary columns, [place](#)^[308] the rest columns in required order and [save](#)^[312] obtained view. After that at any moment you can [restore](#)^[312] the saved view (i.e. set and order of visible columns).

Compress/Expand

Compress columns so that the table is placed completely on the screen or restoring normal width of columns.

Hide columns

Hide [selected](#)^[307] columns.

Show all

Show all columns including [hidden](#)^[312] ones.

Save view

Save current table [view](#)^[311]. Dialog box will open, in which it is necessary to enter view name. The name will appear in the [Table view list](#)^[312].

Table view list

In the list there are all earlier saved [views](#)^[311] of the table. To load a view, just choose its name in the list.

Delete view

Delete the [view](#)^[311], the name of which is displayed in the [Table view list](#)^[312].

See also: [Table of camera models](#)^[304], [Table interface](#)^[307], [Pop-up menu](#)^[313], [Parameters of camera mode](#)^[315].

9.9.1.3 Pop-up menu

Pop-up menu appears at right-clicking on the **Table of camera models**.

[Hide selected columns](#)^[313]

[Freeze columns up to selected one](#)^[313]

[Show all columns](#)^[313]

[Cut selection](#)^[313]

[Copy selection](#)^[313]

[Paste](#)^[313]

[Delete selection](#)^[314]

[Print](#)^[314]

[Export selection](#)^[314]

[Select all](#)^[314]

[Open Internet link](#)^[314]

[Help of parameter \(F1\)](#)^[314]

[Update cameras of the selected model](#)^[314]

[Update cameras of all models](#)^[314]

Hide selected columns

Hide [selected](#)^[307] columns.

Freeze columns up to selected one

Freeze columns, beginning from the left column up to [selected](#)^[307] one. Frozen columns will not be moved at horizontal scrolling of the table.

Show all columns

Show all columns including [hidden](#)^[312] ones.

Cut selection

Cut contents of [selected](#)^[307] cells to the clipboard.
The cut contents can be [pasted](#)^[313] to other cells of the table or to **Excel** table.

Copy selection

Copy contents of [selected](#)^[307] cells to the clipboard.
The copied contents can be [pasted](#)^[313] to other cells of the table or to **Excel** table.

Paste

Paste clipboard contents to the [selected](#)^[307] cells.
*The content can be [copied](#)^[313] from other sells or from **Excel** table. The copying cell number and types of data in the copying cells should coincide.*

Delete selection

Clear [selected](#)^[307] cells.

Print

Print [selected](#)^[307] fragment of the table.

Print dialog box will open in which it is possible to adjust printing options.

Export selection

Export [selected](#)^[307] fragment to any of the following formats: *.txt, *.csv, *.htm, *.rtf, *.xls. File format can be chosen in **Save as** dialog box appeared.

Select all

Select all cells.

Open Internet link

Internet link is a camera model [parameter](#)^[315] too. To each model an Internet link to more detailed information can be assigned.

Help of parameter (F1)

Open help system topic with description of the parameter in the selected cell.

*Effect of the item is similar to **F1** pressing.*

Update cameras of the selected model

*At changing model parameters in the table, the parameters of cameras of this model, **do not change** automatically.*

Choose this item to bring parameters of all cameras **of the selected model** in correspondence with the parameters of this model.

The item is present only in the pop-up menu of [Used models](#)^[305] tab.

Update cameras of all models

*At changing model parameters in the table, the parameters of cameras of this model, **do not change** automatically.*

Choose this item to bring parameters of **all cameras** in correspondence with the parameters of **all models**.

The item is present only in the pop-up menu of [Used models](#)^[305] tab.

See also: [Table of camera models](#)^[304], [Table interface](#)^[307], [Tool bar](#)^[310], [Parameters of camera models](#)^[315].

9.9.2 Parameters of camera model

The **bold parameters** are used in camera modeling. The rest parameters exist only for information and comparison of different models.

In VideoCAD Lite there are only most important parameters, used for modeling. In VideoCAD Professional you can use more than 100 parameters.

Name ^[316]	Lens ^[317]	Power supply ^[318]
Producer ^[316]	Type ^[317]	Voltage ^[318]
Key feature ^[316]	Focal length ^[317]	Consumption ^[318]
Type ^[316]	Min. (mm), Max. (mm) ^[317]	Power (watt) ^[318]
Fixed, PTZ, Dome, Mini ^[316]	Angles of view (deg.) ^[317]	Current (A) ^[318]
Image sensor ^[316]		Provider ^[318]
Size ^[316]		Add. information ^[318]
Number of pixels ^[317]		Internet link ^[318]
Aspect ratio ^[317]		

See also: [Table of camera models](#)^[304].

9.9.2.1 Parameter description

The **red highlighted parameters** are used in camera modeling. The rest parameters exist only for information and comparison of different models. The majority of parameters can be chosen from lists. In VideoCAD Lite there are only most important parameters, used for modeling. In VideoCAD Professional you can use more than 100 parameters.

Name

Model name.

Producer

Producer of the model.

Key feature

Key feature of the model.

Type

Fixed, PTZ, Dome, Mini

Standard camera, PTZ camera, dome camera, mini-camera, auto-dome camera.

If the Display camera type box (on the tab in the [Options box](#)^[319]) is checked:

- If **PTZ** or **auto-dome** camera is chosen, icons of cameras of this model in the Graphics window will correspond to PTZ camera .
- If **mini-camera (mini or mini-dome)** is chosen, icons of cameras of this model in the Graphics window will correspond to mini-camera .
- If **panoramic** is chosen, icons of cameras of this model in the Graphics window will correspond to panoramic camera  or .

Image sensor

Size

The **Size** parameter determines **size of the image sensor** or **size of active area of the image sensor**.

See more: *Image Sensor and Active area of image sensor*

The **Image sensor size** can be specified by any of the following ways:

- By format (type) in inches. For example **1/3"**;
- By diagonal size of the image sensor in millimeters, in the form of **dX.Y**. For example: **d6.0**.
- By sensor sizes in millimeters horizontally and vertically via hash, in the form of **W#H**. For example: **4.8#3.6**;

After **format** or **length of diagonal**, separated by space, you can specify the **aspect ratio of the image sensor** in the form of **W:H**. For example: **1/3" 16:9** or **d6 16:9**. If the aspect ratio of

the image sensor is not specified, it is assumed equal to **4:3**.

Active area size of the image sensor can be specified in millimeters horizontally and vertically via asterisk, in the form of **W*H**. For example: **4.8*3.6**;

See also: [Image sensor size](#)^[255], [Specifying active area size of the image sensor](#)^[415]

Number of pixels

Horizontal and vertical numbers of effective pixels of the image sensor.

In VideoCAD Lite the Number of pixels is used for visualization of [spatial resolution](#)^[277] and to limit resolution in the [3D Video](#)^[287] window.

See more: [Number of pixels](#)^[277]

Aspect ratio

Aspect Ratio of the output image (horizontal side size of the **output image** to the vertical side size): 4:3, 16:9 etc.

The **Aspect ratio of the output image** may be different from the **Aspect ratio of the image sensor** (can be specified in the [Size](#)^[316] field).

See more: [Specifying the Aspect ratio on output image](#)^[420]

You can enter custom values from keyboard in the form of <width> :<height>, for example **11:4**.

By specifying formats **3:4** or **9:16**, you can set the so-called **corridor format** in which the height of the frame is larger than its width.

For correct simulation resolution in the corridor format you must also swap the number of pixels horizontally and vertically in the [camera parameters](#)^[317] and [image processing settings](#).

Via space character after the **Aspect ratio** you can set the **crop factor** - the ratio of cropping active area size of the image sensor when the active area does not touch the edges of the image sensor. Crop factor can be set as a vulgar fraction (separated by slash) or a real number. For example **4:3 0.67** or **16:9 720/1080**. If the crop factor is not specified, it is taken to be unity.



See also: [Specifying](#)^[420] [the crop factor](#)^[420], [Aspect ratio](#)^[257], [Specifying active area size of the image sensor](#)^[415]

Lens

Type

Lens type. If *fisheye* is chosen then the camera is a *panoramic* camera (180, 360 deg).

See more: [Panoramic](#)^[269]

Focal length

Min. (mm), Max. (mm)

Minimal focal length - camera view angles are maximal.

Maximal focal length - camera view angles are minimal.

For a camera of this model, [changing lens focal length](#)^[175] is possible only **within the limits from minimal to maximal**.

*For a lens with the **fixed focal length** minimal and maximal focal length are equal.*

See also: [Lens focal length](#)^[256]

Angles of view (deg.)

Calculated angles of view of the lens. Angles of view are determined by VideoCAD, from camera [sensor format](#)^[316] and lens [focal length](#)^[317].

Real angles of view can differ from the calculated ones because of [Lens distortion](#)^[316]

Power supply

Voltage

Supply voltage of camera.

Consumption

Power (watt)

Power consumption of camera.

Current (A)

The consumption current of the camera. The current is calculated by VideoCAD from **power consumption** and voltage.

On the [Used models](#)^[305] *tab the total current and power consumption of all cameras of this model is displayed additionally.*

Provider

Provider of the camera model.

Cost

Model cost.

Add. information

Any additional information about this camera model.

Internet link

Internet link to an information about this camera model.

9.10 Options

Graphics window

Main menu

View

Options

The box is intended for adjusting various parameters of the program.

The box can be opened by choosing the item **View > Options**^[218] in the Main menu of the [Graphics window](#)^[158] or by double-clicking on the [Line type panel](#)^[245] or the [Font type panel](#)^[246].

The box consists of the following tabs:

- [Lines](#)^[320]
- [Fonts](#)^[322]
- [Keyboard](#)^[324]
- [Camera icon](#)^[327]
- [3D modeling](#)^[325]
- [Export](#)^[329]
- [Miscellaneous](#)^[333]
- [Tool bar](#)^[332]

All the parameter changes in the tabs become valid immediately and you can see their result.

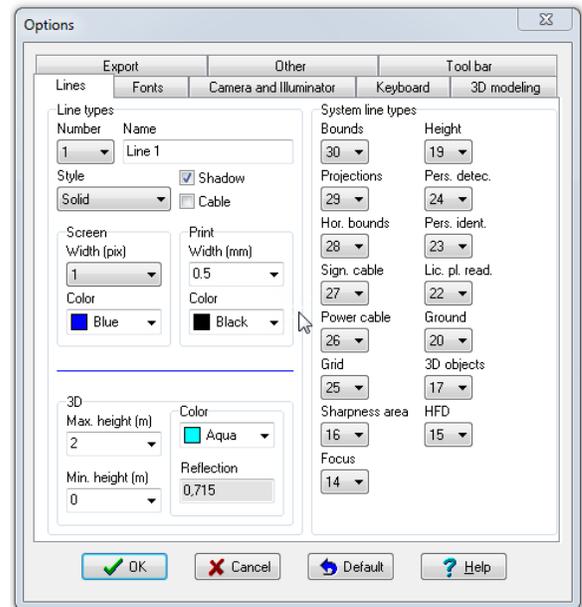
To **save** the introduced changes click **OK**.

To **cancel** the changes click **Cancel**.

To assign default values to all parameters on the opened tab click **Default**.

9.10.1 Lines

Graphics window
Main menu
View
Options
Lines



Left side of the tab

In the left side of the tab you can see and change parameters of any VideoCAD **line type**.

Up to **2000 types of lines** can be used in VideoCAD project.

Parameters in the left side of the tab :

- **Number** - the number of the displayed line type. Each line type has unique number from 1 to 2000.
- **Name** - the name of the line type. The name can be changed.
- **Style** - the name of line style. It can be chosen from the list (**Solid, Dash, Short Dash, DashDot, DashDotDot**, etc).
- **Shadow** - If the box is checked then all constructions made by this line type are considered as obstacles at calculating [shadows](#)^[172].

In addition, to make a construction be considered as obstacle in calculation of shadows, it must belong to a layer with the shadows option marked

See also: [Shadows](#)^[172], [Main menu>View>Calculate shadows for active camera](#)^[215], [Main Menu>View>Recalculate shadows](#)^[215], [Line type>Shadow](#)^[320], [Choosing the best place for PTZ \(dome\) camera](#)^[384], [Visualization of the camera control area projections and spatial resolution within them](#)^[381]

- **Cable** - If the box is checked then [line segments](#)^[183] made by this line type are considered as cables. Their lengths are included in the [cable report](#)^[240], their names present in the **Cable brand** lists in the [Signal cable](#)^[341] and [Power cable](#)^[342] length calculation boxes.
- **Screen width** - line width on the screen (pix).
- **Print width** - line width when printing (mm,inch).

- **Screen color** - line color on the screen.
- **Print color** - line color when printing.

Parameters, relating to the 3D tools:

- **Maximum height** - maximum height above the ground of **3D objects**^[187], made by the line of this type. Also the height above the ground of **3D models**^[229].
- **Minimum height** - minimum height above the ground of **3D objects**, made by the line of this type.

Heights can also take on negative values, and at that 3D model plunges under ground.

It is possible to change the heights on the [Current construction parameters panel](#)^[247] irrespective of line type.

- **Color** - the color of **3D objects**, made by the line of this type.

Right side of the tab

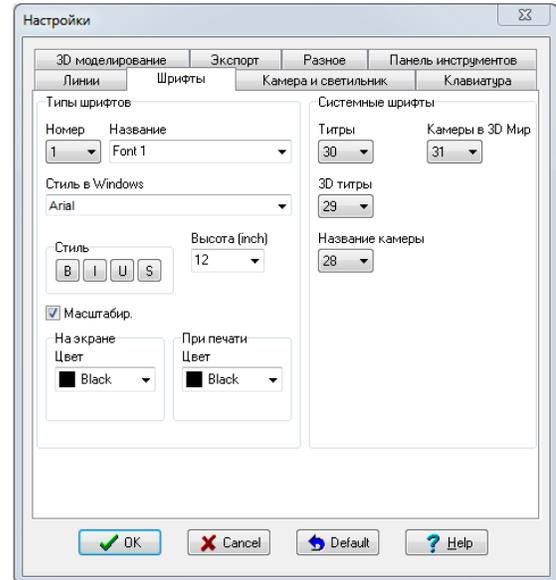
In the right side of the tab you can see and change the numbers of **line types for displaying the system objects**:

- View area edges.
- View area projection bounds.
- Horizontal bounds.
- Signal cable.
- Power cable.
- Grid.
- Ground indication.
- Height indication.
- Default line type for 3D models.

Don't use the system lines for constructions and change their parameters without necessary. Sometimes it leads to confusion.

9.10.2 Fonts

Graphics window
Main menu
View
Options
Fonts



Left side of the tab

In the tab left part you can see and change parameters of any VideoCAD **font type**.

Up to **100 types of fonts** can be used in VideoCAD project.

Parameters in the tab left part:

- **Number** - the number of the displayed font type. Each font type has unique number from 1 to 30.
- **Name** - the name of the font type. The name can be changed.
- **Style in Windows** - the name of **font typeface**. It can be chosen from the list.

*It is necessary to remember that not all the font typefaces are scaled correctly. To use VideoCAD it is recommended to use only scalable typefaces (**True Type** or **Open Type**). Using bit-mapped fonts (e.g., MS Sans Serif) is not recommended.*

- **Height** - The font height in inches (in the actual drawing sizes). **1 inch = 2.54cm**.
*If the **Scalable box** is not checked, then the height has only relative sense.*
- **Style** - Bold, Italic, Underline, Strike out
- **Screen color** - font color on the screen
- **Print Color** - font color at printing.
- **Scalable** -
 - If the **box is checked**, then the font size will change together with changing the drawing scale. The text typed in such font can be rotated to any angle. The box should be checked for the majority of fonts.
 - If the box **is not checked**, the font size will not change at changing the drawing scale, and at rotating text typed in such font it will be always horizontal. Such fonts are used for the **camera names** and **titles**. They prove to be convenient for creating labels to be read at any scale.

Right side of the tab

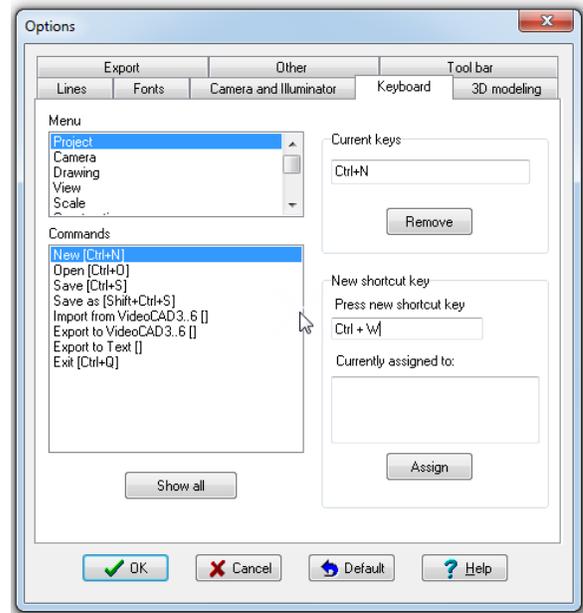
In the **tab right part** you can see and change numbers of **system fonts**:

- Font of the **titles** displaying;
- Font of the **titles** displaying in [3D Video](#)^[284];
- Font of the **camera name** displaying in the [Graphics window](#)^[158];
- Font of the **camera name** displaying in the [3D Video](#)^[284].

It is not recommended to use the system fonts and change their parameters without necessary. Sometimes it leads to confusion.

9.10.3 Keyboard

Graphics window
Main menu
View
Options
Keyboard



On the tab you can assign **Shortcuts keys (keyboard shortcuts)** for the items of the [Main menu](#)^[197] of the Graphics window.

Keyboard shortcuts allow fast activation of various commands from the Main menu, by pressing shortcuts on the keyboard.

The order of shortcuts assignment to item of the Main menu:

In the **Menu** box choose section of the [Main menu](#)^[197].

*In the **Commands** box the list of items of the chosen section will appear. Already assigned shortcuts are indicated in brackets after the names of menu item.*

*By the **Show all** button it is possible to call the full list of all menu items with assigned shortcuts. This list can be saved to text file.*

In the **Commands** box select the name of the menu item.

If the menu item has already assigned shortcut, the shortcuts will be displayed in the box on the **Current keys** panel.

*To remove assigned shortcuts click **Remove**.*

To assign new shortcuts:

- Set input focus on the **Press new shortcut key** box on the **New shortcut key** panel.
- Press shortcut key on the keyboard.

*The pressed shortcuts will appear in the **Press new shortcuts** box.*

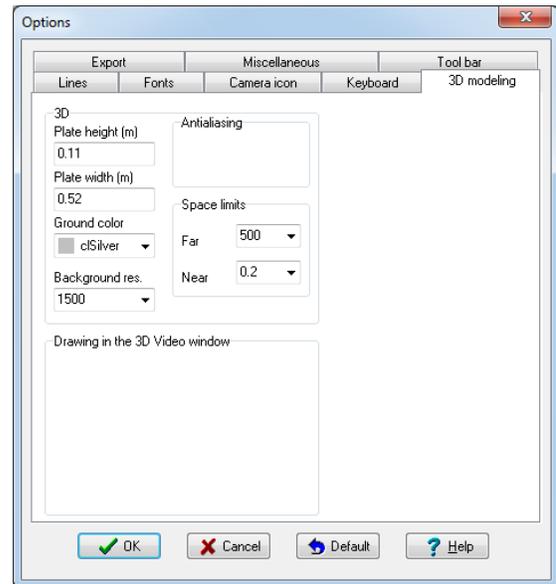
*If pressed shortcuts has been already assigned to other menu item, the name of this item will be displayed in the **Currently assigned to** box.*

- To assign typed shortcuts click **Assign**.

*Shortcut assignment will be removed from the item displayed in the **Currently assigned to** box*

9.10.4 3D modeling

Graphics window
Main menu
View
Options
3D modeling



3D panel

Plate height

- vertical size of the license plate in the [3D Video](#)^[284].

Plate width

- horizontal size of the license plate in the **3D Video**.

Specify in these boxes the sizes of license plate, accepted in you country.

*Also create *.bmp file with the image of you license plate, name it **Number.bmp** and replace with it the file of the same name in the folder **Models** in the VideoCAD installation directory.*

!! The size of file sides, in pixels, must be equal to powers of two:

16,32,64,128,256,512,1024,2048

After that [3D models](#)^[229] - cars will be displayed with your license plate.

Ground color

- ground color in the **3D Video**.

Licence plate antialiasing

If these boxes are checked- the license plates are displayed more realistic in the 3D Video, but at that it takes more time for repainting the 3D Video and there can be errors on some outdated graphic card.

Space limits

At the use of some **outdated graphic card** the occurrence of distortions on the image in the **3D Video** is possible. For reduction of the distortions it is recommended to reduce **Model space**.

*The increase of the **near space limit** has the much greater influence on distortions, than reduction of the **far space limit**.*

The objects which are closer to the camera, than **near space limit** or farther than **far space limit** will not be displayed, but the distortions of the objects which are **between space limits** will be reduced or removed completely.

Background res.

In this box you can set resolution of vector background in the [3D Video](#)^[288].

Redrawing 3D Video

On this panel you can optimize the speed of redrawing [3D Video](#)^[284] according to computer's performance, current design features and designer's habits.

Draw 3D Video in separate thread

Use separate program thread for redrawing image in the 3D Video. When the checkbox is checked, redrawing the 3D Video doesn't retard work of other windows but is carrying out with delay.

This checkbox is checked by default. If errors occur while redrawing the 3D Video, try to clear this checkbox.

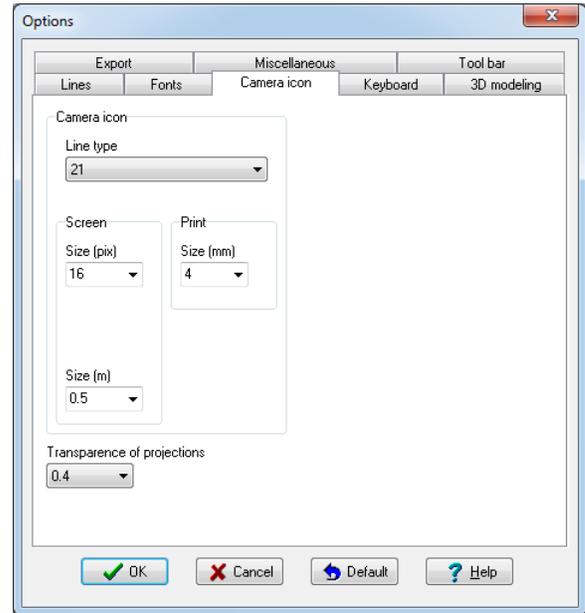
Redraw 3D image only by clicking

Modeling complex 3D scenes require high computer performance.

If the image in the 3D Video is redrawn too slowly and that hinder operation in the Graphics window, mark this box. After that the image in the [3D Video](#)^[284] will be redrawn automatically only at activation of cameras. To force redrawing click on the image.

9.10.5 Camera icon

[Graphics window](#)
[Main menu](#)
[View](#)
[Options](#)
[Camera icon](#)



On this tab can be changed:

Size and line type for icons of camera

The icon size is specified separately when displaying on the screen and when printing.

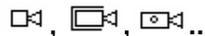
You can set any [line type](#)^[320] for a camera during [creating the camera](#)^[166].

The camera will be drawn by default line type, if another line type has not been specified during creation and placing.

Later on, you can change line type using [Change line type](#)^[237] tool.

Show camera type

If the box is marked, then cameras of different [types](#)^[166] will be represented by different icons:



In this case, camera tilt is not represented by the icons.

If the box is not marked, then all cameras will be represented by identical icons, which represent the camera tilt.

Scalable

If **Scalable** box is checked, then cameras' icons are scaled with the other constructions. Size of icons is specified in meters (feet) in the Size box below.

If **Scalable** box is not checked, then cameras' icons are not scaled. Size of icons is specified separately: on the screen in pixel - in the **Size (pix)** box, for printing in millimeters, - in the **Size (mm)** box.

Size

Size of scalable icons in meter (foot), when the **Scalable** box is checked.

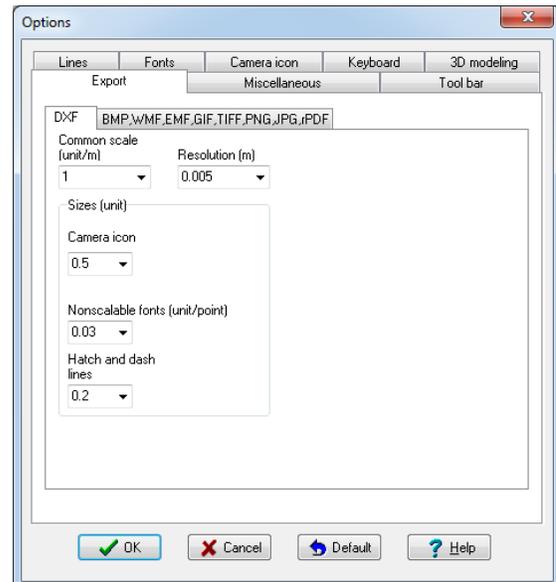
Transparence of projections

This combo box allows to adjust transparence of [filling view area projections](#)^[169] in the Graphics window. And transparency of [3D view areas](#)^[288] in the 3D Video.

See also: [Move active camera name](#)^[202]

9.10.6 Export

Graphics window
Main menu
View
Options
Export



On the tab you can adjust parameters of [drawing export](#)^[202].

The tab is divided to 2 sub-tabs:

- Parameters on the [DXF](#)^[329] sub-tab are related to the export to AutoCAD DXF format.
- Parameters on the [BMP, WMF, EMF, GIF, TIFF, PNG, JPG, PDF, PDF](#)^[330] sub-tab are related to the export to raster BMP, GIF, TIF, PNG, JPG, PDF formats and windows metafile vector formats (WMF, EMF). The tab includes the [Raster PDF](#)^[330] panel.

If the **Show this box before export** is marked, the Export tab will be shown before each export.

See also [Drawing>Save as](#)^[202]

DXF

In **VideoCAD 8 Lite** export to DXF format is performed in simplified way as well as in versions VideoCAD4-VideoCAD7. VideoCAD 8 Professional offers more powerful export tools.

All cameras and constructions splits into separate lines, parts of cameras are not combined into blocks, the structure of the background is broken. Filling of the view areas is not saved, it can be saved as hatching. When the [shadows](#)^[213] is enabled, view areas with shadows are not saved.

Simplified export is possible to DXF format only. Resolution is limited by the value in the [Resolution](#)^[330] combo box.

While simplified export, the export file will be multi-layers. In obtained *.dxf file there will be the following layers:

- Background;
- Constructions;
- Cameras;
- Additional (grid, titles, horizontal);
- Frame for printing (if it is enabled).

Raster objects (projections of [3D models](#)^[229]) are saved in the form of rectangles.

Common scale (unit/m, unit/ft.)

Common scale of exporting drawing. The scale can be set in **AutoCAD unit per meter (or foot)** on the VideoCAD layout.

Resolution (m. or ft.)

Resolution is the accuracy of export. Objects having sizes smaller than the set resolution could be exported with errors. In most cases the resolution of 0.005m (0.5 cm) is optimal. For big size drawings (kilometers) the export with such resolution can lead to errors. In this case, it is needed to increase resolution and repeat export.

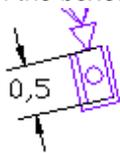
Sizes (unit)

As the export is usually executed with resolution, different from the screen resolution, it is necessary to adjust the size of nonscalable objects. In case of nonscalable objects become too small or too big in the exporting file.

Sizes (unit)

Camera icon (unit)

In the boxes you can specify sizes of camera **nonscalable** icons in AutoCAD units.



See also: [Scale^{\[327\]}](#).

Sizes (unit)

Nonscalable fonts, Hatch and dash lines

In the boxes you can specify scale factors for Nonscalable fonts (unit/point), Hatch and dash lines. The factor for Hatch and dash lines also applied for arrows.

☐ BMP,WMF,EMF,GIF,TIF,PNG,JPG,PDF

Scale factor

Unlike [DXF^{\[329\]}](#), the scale is not related to drawing size (in meter or foot), it is related to screen size only.

Common scale

Common scale of exporting drawing relatively layout size on the screen.

Camera icon, Nonscaleable fonts and hatches.

In the boxes you can specify scale factors of **nonscalable** Camera icon, Nonscaleable fonts.

See also: [Scale^{\[327\]}](#).

Raster PDF

On the panel there are tools for export to raster PDF.

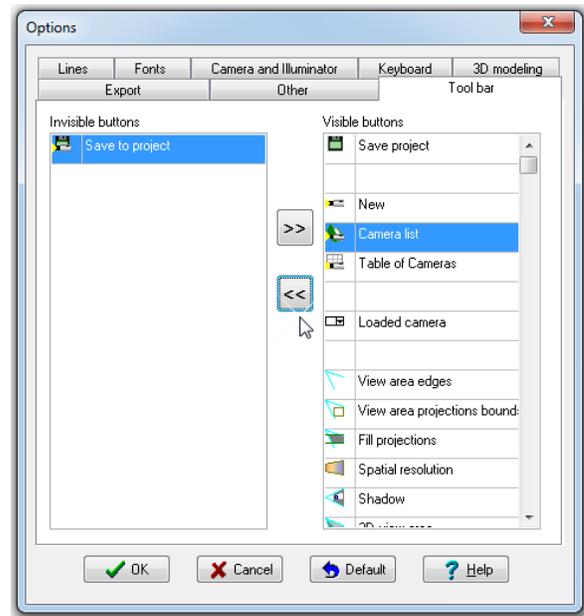
- Page Width and Height in centimeters or inches
To change page orientation, invert Width and Height.
- Page margins, in centimeters or inches;
- Title, Author, Subject, Keywords.

Parameters on the left side of the [BMP, WMF, EMF, GIF, TIF, PNG, JPG, PDF](#)^[330] sub-tab also have an influence on raster PDF.

An alternative way to export to *.pdf is to [print](#)^[199] to a virtual printer, which produces printing result as a PDF file. In this method, the weight and color of [lines](#)^[320], [fonts](#)^[322] will match the values specified for printing.

9.10.7 Tool bar

Graphics window
Main menu
View
Options
Tool bar



On this tab you can control visibility of buttons on the [Tool bar](#)^[164] of the Graphics window. In the left window there are **Invisible buttons**, in the right window there are **Visible buttons**.

With the help of buttons  and  you can move buttons between these two windows making them visible or invisible.

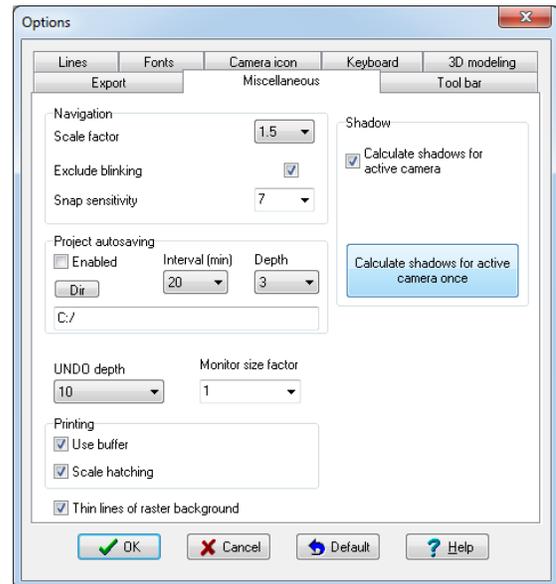
To move a button to other window:

- select it by clicking;
- click on the appropriate button  **Make the button visible** or  **Make the button invisible**.

If after changing buttons' visibility the Tool bar looks incorrectly, - restart VideoCAD.

9.10.8 Miscellaneous

Graphics window
Main menu
View
Options
Miscellaneous



Scaling factor when turning the mouse wheel

At a large factor the navigation becomes quicker, but less precise. Also use the key **Ctrl** [249]. Sign of this factor determines the reaction for direction of rotation the mouse wheel. The factor has an influence on scaling in the [Graphics window](#) [158].

Exclude blinking

If the box is checked, then the redrawing is carried out in the computer memory and displayed on the screen only at the end. At that there is no image blinking, but the redrawing speed lowers slightly. If the box is not checked, the redrawing is carried out directly on the screen.

Snap sensitivity

You can adjust a distance on which the cursor will be snapped to points, lines and grid as a result of [snap](#) [229] effect.

Lesser sensitivity allows to control mouse more precisely.

Higher sensitivity allows to use some imprecise pointer devices or work with high resolution monitors.

Calculate shadow for active camera

Enable/ disable calculating [shadows](#) [172].

Automatic calculating is performed for the [active camera](#) [161] only.

To disable automatic calculating shadows (with keeping already calculated shadows) clear this box.

This box is duplicated in the [Main menu](#) [215] of the Graphics window.

See also: [Shadows](#) [172], [Main menu>View>Calculate shadows for active camera](#) [215], [Main Menu>View>Recalculate shadows](#) [215], [Line type>Shadow](#) [320], [Choosing the best place for PTZ \(dome\) camera](#) [384], [Visualization of the camera control area projections and spatial resolution within them](#) [381]

Calculate shadow for active camera once

As a result of clicking this button, shadows for active camera will be calculated once, then the **Calculate shadow for active camera** box will be cleared and shadows will not be calculated anymore. Shadows have been calculated will be saved in project.

Project auto saving

With this panel, you can adjust auto saving VideoCAD's working projects to chain of files in intervals specified in the **Interval (min)**. The number of files is specified in the **Depth** box. The more files in the chain are and the larger the file size of the project, the more hard disk space will require. After full filling the chain, saving each new file will remove the oldest. You can specify autosave directory by clicking on the **Dir** button.

*Files in the chain are the usual project files of VideoCAD. The newest file called **vcadproject_1.vc7**, previous **vcadproject_2.vc7** etc.*

Auto saving works while working with the program. When no work, saving stops.

Printing

On the panel you can enable printing via buffer that allows to print without error on printers which do not support GDI+ drawing commands of transparent fills, gradient and transparent projection of 3D models. Via the buffer you can print without errors on most virtual printers, such as printing to PDF.

When using the buffer printing on the raster buffer is performed firstly, and then the raster buffer is passed to the printer.

Without the use of the buffer the image is passed to the printer in vector form, as printing commands. If the printer does not support all commands, the distortions of the printed image are possible.

However not all printers can work with the **Use buffer** mode in all cases. In case of issues clear the **Use buffer** checkbox. Try also to decrease printer DPI resolution, hide raster background.

When using the **print buffer** or if the printer does not scale hatching, to print hatching properly check the option **Scale hatching**. If the printer scales hatching on their own and the buffer is not used, clear the **Scale hatching**, otherwise the hatching will be printed too rare.

Thin lines of raster background

Mark of this checkbox increases the thickness of the thin dark lines on a light background to one pixel when displaying raster background in the Graphics window. In most cases it improves readability of the background when it is scaled.

This mode decreases speed of redrawing background.

UNDO depth

VideoCAD keeps several previous states for the possibility to undo operations using the [Undo](#)^[196] function.

The number of keeping states can be adjusted in this box. The more states are kept and the more the project size, the more RAM is needed.

Monitor size factor

Correction factor to bring the physical size of the [Monitor window](#)^[294] on the computer screen to the value specified in the [Monitor diagonal](#)^[296] box on the **Tool bar** of the **Monitor window**.

To set the factor:

- open the **Monitor window**;
- specify in the [Monitor diagonal](#)^[296] box on the **Tool bar** of the **Monitor window** approximately a

half of the physical diagonal of your computer screen. The **Monitor window** must be visible on the screen as a whole;

- measure by a ruler the physical diagonal of the **Monitor window** on the computer screen;
- calculate the needed **Monitor size factor = (value in the Monitor diagonal box) / (Physical diagonal of the Monitor window)**.

The Monitor diagonal is measured in inches. 1 inch = 25.4 mm.

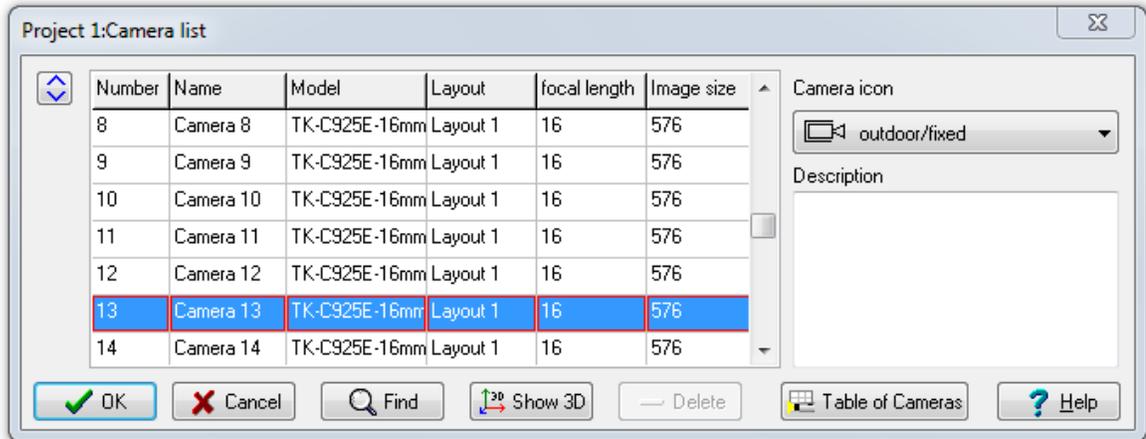
For various physical monitors and screen settings in Windows may require different Monitor size factors.

9.11 Camera list

Graphics window

Tool bar

 Camera list



In the **Camera list box** list of cameras in the project is displayed. **Active camera** is highlighted by **red frame**. Any camera can be activated, removed, renamed, found on layouts, it is possible to show 3D image from this camera. It is also possible to sort cameras in the list.

To perform any manipulations with the camera first select its name in the list by clicking.

For the chosen camera, it is possible to change **Additional information** and **Camera type**, which determines **camera icon type**.

Cameras are displayed by different icons, only if the [Display camera type](#)^[327] box in the [Options box](#)^[319] is marked.

To activate camera without closing the box, double click the row with camera name in the table.

It is convenient to activate any camera by double clicking on its lens on the layout or by camera's selection in the [Active camera](#)^[167] list on the **Tool bar** of the Graphics window. It is possible to activate cameras from the [Monitor window](#)^[300].

To find a camera on layouts select it in the table by clicking it once and then click **Find on layouts**. To show **3D image** from a camera select it in the table by clicking it once and then click **Show 3D**.

Choosing the items of **pop-up menu**, which appears when clicking the camera selected in the table with the right mouse button, can perform the same actions.

Using the pop-up menu it is also possible to **rename the camera** and select [camera model](#)^[304].

Choosing the item **Copy to clipboard** you can copy whole camera list to Windows' clipboard. After copying you can paste the camera list to **MS Word**, **MS Excel** or other software.

You can rename the camera and rename any number of cameras simultaneously using the [Numerate cameras](#)^[338] dialog box.

To sort the cameras in the list click the **Sort cameras**  buttons. Then will appear the buttons, by using which it is possible to move the cameras selected in the list upwards on one position, downwards, to the beginning or to the end of the list.

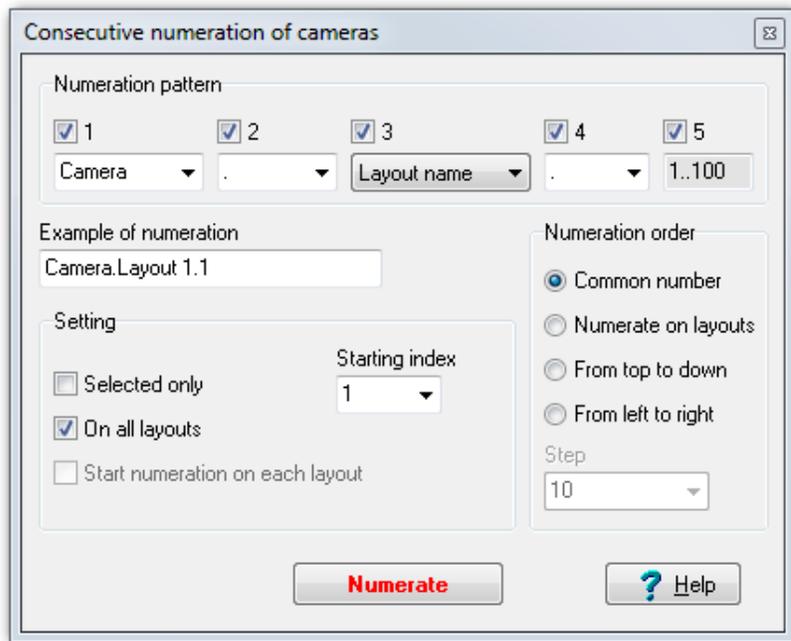
It is not recommended to change the order of cameras without necessity.

- To activate a camera and save the introduced changes click **OK**.
- To cancel the introduced changes and camera activation click **Cancel**.
- To switch promptly between cameras in the **graphics window** use the shortcut **Ctrl+Spacebar**.

See also: [Active camera combo box](#)^[167]

9.12 Numerate cameras

Graphics window
Main menu
Camera
Numerate
cameras



This tool allows renaming and serial numeration any quantity of cameras simultaneously.

Order of work:

1. Adjust [Numeration pattern](#)^[338].
2. Adjust [Numeration order](#)^[338].
3. Adjust additional [Setting](#)^[339].
4. Click [Numerate](#)^[339].

Numeration pattern

Numeration pattern can be adjusted by combo boxes and check boxes placed above the combo boxes.

In order that position of a combo box presents in the pattern, the box above this combo box should be marked.

It is possible to select variants of using the positions.

In the **Example of numeration** box the camera name example according to the specified pattern is displayed.

Numeration order

Camera numeration order on layouts is adjusted on the panel.

Common number - numerate in camera number increasing order all over the project. Camera numbers are displayed in the [Camera list](#)^[336] box in the **Number** column.

Numerate on layouts - numerate in camera number increasing order separately on each [layout](#)^[242].

From top to down - numerate cameras from top to down according to their position on layouts.

From left to right - numerate cameras from left to right according to their position on layouts.

Step - numeration step on layouts when numerating from top to down and from left to right (meters or foots).

☐ **Setting**

Selected only - if the box is marked, numerate only [selected](#) cameras, otherwise all cameras.

On all layouts - if the box is marked, numerate cameras on all layouts in the project, otherwise only on the current layout.

Start numeration on each layout - on each layout the numeration will be started over again. At that on different layouts in the project, cameras with identical names could be found.

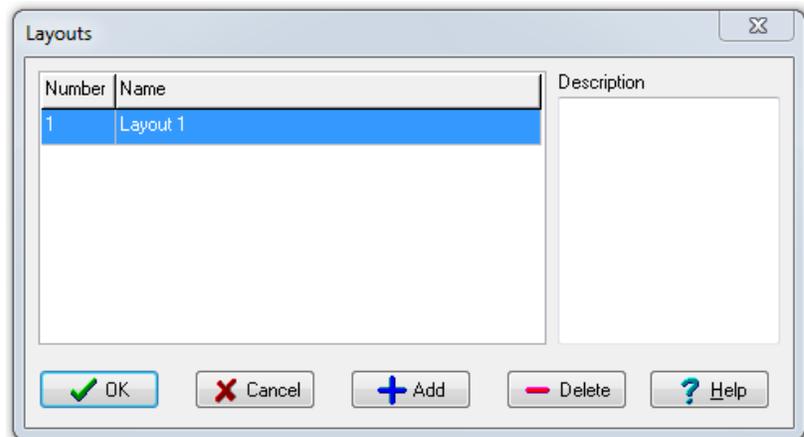
Starting index - index, from which to start numeration.

☐ **Numerate**

- start numeration.

9.13 Layouts

Graphics window
Main menu
Drawing
Layouts



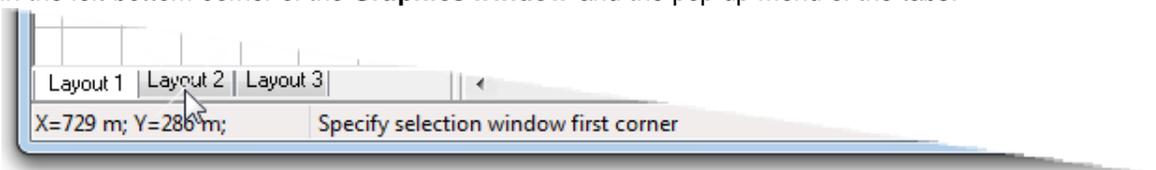
In this box a list of project **layouts** is displayed.

The project may contain up to **10** layouts. Originally one layout is created into project. You can create, delete or rename any project **layout**. To delete the **original layout** and any layout with the cameras present in it is not allowed.

The layouts are separate sections of monitored object (building, room, territory and storey). A layout contains the horizontal and vertical projections locating backgrounds, **cameras**, [cables](#)^[238] and [constructions](#)^[181]. Each camera can be displayed in one **layout** only, though the camera **cables** may pass through several layouts.

- To **choose** a **layout** for displaying it in the [graphics window](#)^[158] and saving the introduced changes select it in the table by clicking it once and then click **OK**.
- To **delete** a layout select it in the table by clicking it once and then click **Delete**.
- To **create** new layout click **Add**.
- To **rename** a layout double-click a line with its name in the table.
- To **cancel** the introduced changes and layout loading click **Cancel**.

It is convenience to switch the layouts, create, delete, rename the layouts using the [Layout](#)^[242] tabs in the left bottom corner of the **Graphics window** and the pop-up menu of the tabs.



To switch promptly between layouts in the **graphics window** use the shortcut **Ctrl+TAB**.

9.14 Signal cable length calculation box

Graphics window
Main menu
Cables
Signal cable

Parameter	Value
Cable brand	Twisted pair
Total length of all segments in layouts (m)	0
Reserve for cable laying (%)	10
Reserve for camera connection (m)	2
Reserve for receiver connection (m)	2
Cable length including reserves (m)	4
Cable coil size (m)	250
Cable coil number	1
Cable surplus (m)	246

VideoCAD summarises the lengths of all the **segments**, considers the **reserves** and calculates the **total length of cable**.

To change the default parameters and obtain the calculation results double-click on any **cable segment** or click [Signal cable](#)^[193] again.

A dialog box of the same name appears after that.

Cable brand

In this box you can assign a **brand** to the **signal cable of the active camera**. Cable brands are **Names** of [line types](#)^[320], which are considered as cables (the **Cable** box in the [line type parameters](#)^[320] is checked).. Thus we assign simultaneously cable brand and correspondent **line type** by which the cable will be drawn on layouts.

We can obtain [Cable report](#)^[240] which contains cable lengths of each brand separately.

The results of the cables' calculation on each individual camera and on the project as a whole are included into the text file obtained by [Text report](#)^[200]

See also: [Power cable electrical parameters and length calculation box](#)^[342], [View>Active camera cables](#)^[216], [View>All cameras' cables](#)^[216], [Length calculation of line segments](#)^[343], [Cable report](#)^[240].

9.15 Power cable electrical parameters and length calculation box

Graphics window
Main menu
Cables
Power cable

VideoCAD summarizes the lengths of all the **segments**, considers the **reserves** and calculates the **total length of cable**.

To change the default parameters and obtain the calculation results double-click on any **cable segment** or click [Power cable](#)^[193] again.

A dialog box of the same name appears after that enabling to choose a **section area of power cable** to fit the requirements of **camera voltage supply**.

It is assumed that the conductor material is copper and the conductor temperature is + 50° C

Cable brand

In this box you can assign a **brand** to the **power cable of the active camera**. Cable brands are **Names of line types**^[320], which are considered as cables (the **Cable** box in the [line type parameters](#)^[320] is checked).. Thus we assign simultaneously cable brand and correspondent **line type** by which the cable will be drawn on layouts.

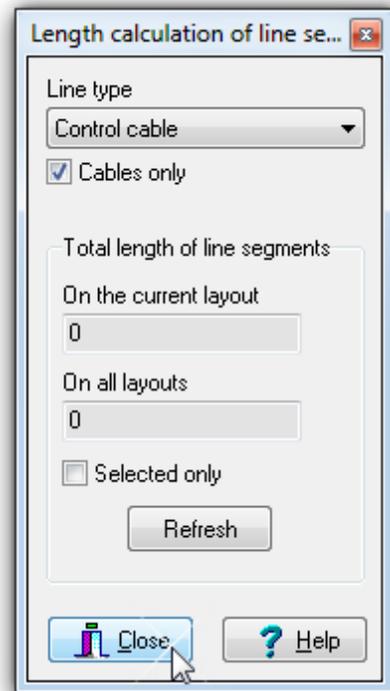
We can obtain [Cable report](#)^[240] which contains cable lengths of each brand separately.

The results of the cables' calculation on each individual camera, each individual section area and on the project as a whole are included into the text file obtained by [Text report](#)^[200].

See also: [Signal cable length calculation box](#)^[341], [View>Active camera cables](#)^[216], [View>All cameras' cables](#)^[216], [Length calculation of line segments](#)^[343], [Cable report](#)^[240].

9.16 Length calculation of line segments

Graphics window
Main menu
Cables
Length calculation of line segments



With this tool it is possible to calculate total length of [line segments](#)^[183] of the chosen [line type](#)^[320]. Thus, it is possible to use certain **line types** as **cables**.

Only [line segment](#)^[183] lengths are summarized. Lengths of other type [constructions](#)^[181] are not summarized.

Line type

In the combo box you can select [line type](#)^[320]. Line segments made by the line type will be summarized.

Cables only

When this box is checked, in the **Line type** combo box only line types which are considered as cables are shown (the **Cable** box in the [line type parameters](#)^[320] is checked).

Selected only

Summarize [selected](#)^[181] segments only.

After selecting **line type**, in the **On the current layout** and **On all layouts** boxes calculation results will appear.

Additional buttons:

Refresh - Recalculate.

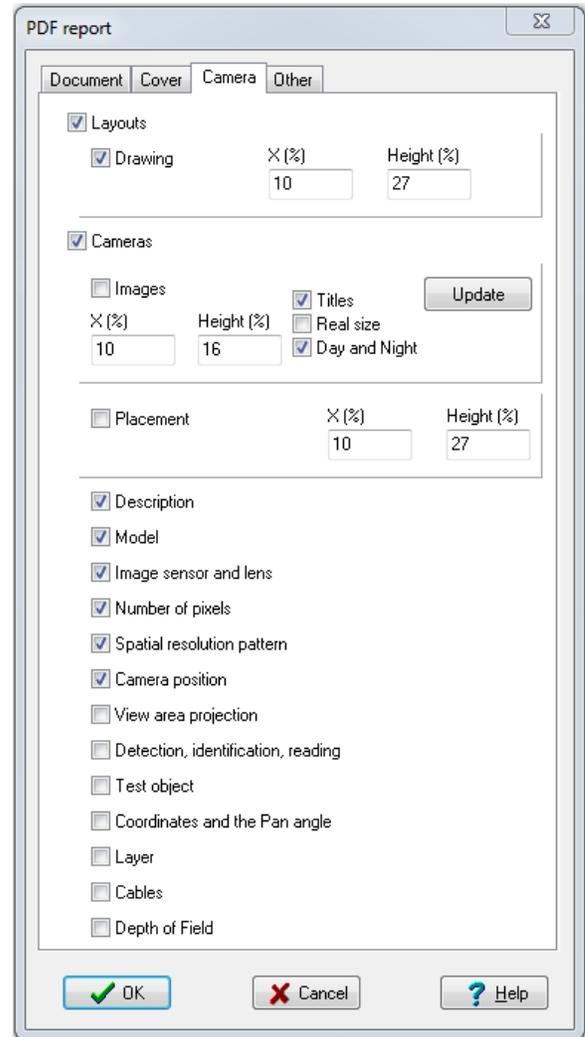
Close - Close the box.

Help - open this Help topic.

See also: [Cables^{\[238\]}](#), [Signal cable length calculation box^{\[341\]}](#), [Power cable electrical parameters and length calculation box^{\[342\]}](#), [Cable report^{\[240\]}](#)

9.17 PDF Report

Graphics window
Main menu
Project
PDF Report



The dialog box is used to configure the report in PDF format.

The box consists of the following tabs:

[Document](#)^[345]
[Cover](#)^[346]
[Cameras](#)^[347]
[Other](#)^[347]

To get a report you should adjust the settings on each tab, then click **OK**.

Document

On the tab the common parameters of a PDF document are specified.

Page **Width** and **Height** in centimeters or inches
To change page orientation, invert Width and Height.

Page **Margins**, in centimeters or inches;
Title, Author, Subject, Keywords.

In the **Font (codepage)** combobox a font for the document can be specified. The font must be TrueType. This can either be the name of the font as shown in the Windows\Fonts folder (for example "Times New Roman") or it can be the font family name with an optional style specifier in square brackets (for example "Times New Roman [BoldItalic]"). Possible optional specifiers are: [Bold], [Italic] or [BoldItalic]. A codepage can also be specified (for example "Arial [Bold] {1250}") which allows other encodings to be used.

If the report is in characters other than the Latin alphabet is not displayed correctly - select your codepage.

Possible code pages are:
 {0} Direct mapping
 {437} OEM_CHARSET
 {850} OEM_CHARSET
 {852} OEM_CHARSET
 {874} THAI_CHARSET
 {1250} EASTEUROPE_CHARSET
 {1251} RUSSIAN_CHARSET
 {1252} ANSI_CHARSET
 {1253} GREEK_CHARSET
 {1254} TURKISH_CHARSET
 {1255} HEBREW_CHARSET
 {1256} ARABIC_CHARSET
 {1257} BALTIC_CHARSET
 {1258} VIETNAMESE_CHARSET
 {1361} JOHAB_CHARSET

Below, you can set the **Font height** in % of the height of the sheet and **Line spacing**.

If the **Page Numbers** checkbox is checked, at the bottom of report pages the page numbers will be printed.

The **Headlines** checkbox enables drawing horizontal lines on top and on bottom of each page.

Below you can specify **Header** and **Footer**.

Cover

On the tab parameters of the cover sheet can be specified.

If the **Cover** checkbox is marked, the cover is included in the report.
 If the **Frame** checkbox is marked, the frame is drawn on the cover.

If the **Logo** checkbox is marked, then any image can be drawn on the cover.
X (%), Y (%) - the position of the image on the sheet in % of the sizes of the sheet.
W (%), H (%) - the size of the image on the sheet, in % of the sizes of the sheet.
 In the **Path** box the path to the image file can be entered. To select a file click on the

button . Possible file formats: **bmp, jpeg, gif, tif, png, wmf, emf.**

Below there are 4 identical panels where you can specify blocks of text.
 Checkboxes **Text 1..Text 4** include corresponded blocks of text on the cover.
X (%), Y (%) - the position of the text on the sheet in % of the sheet size.
Height (%) - the height of the text on the sheet in % of the size of the sheet.

By clicking  button, you can select color of the text block. In the **Alignment** combobox you can select text alignment.

The text itself can be entered in the box at the bottom of each panel.

Cameras

The tab is intended for adjusting information about the cameras that you want to include in the report.

If the **Layouts** checkbox checked, the report will include the names of layouts.

If the **Drawing** checkbox is marked, the report will include drawings of the layouts.

X (%), Height (%) - the position and height of the drawings on the sheet, in % of the size of the sheet.

If the **Cameras** checkbox is marked, the report will include parameters of cameras.

If the **Images** checkbox is marked, the report will include images from the cameras.

X (%), Height (%) - the position and height of the images from the cameras on the sheet, in % of the size of the sheet.

If the **Titles** checkbox is marked, the images from the cameras will include [titles](#)^[287].

Clicking on the  button starts updating the stored images. *Generation of images from the cameras can be time consuming.*

If the **Placement** checkbox is marked, then the report will include fragments of layouts with positions of the cameras.

X (%), Height (%) - the position and height of the fragments of the layouts on the sheet, in % of the size of the sheet.

If cameras occupy too small fragments of plans, reduce the [Maximum distance of drawing view area](#)^[265] in the camera parameters.

Below there are checkboxes, by which you can select the camera parameters that should be included in the report.

Other

On the tab additional information in the report can be adjusted.

Cameras summary - the number of cameras, the number of used [models of cameras](#)^[304], lens focal lengths, the camera resolutions in pixels, the total cost of the cameras (if the [cost](#)^[316] is assigned to the used camera models).

Cables summary - the sum of the lengths of the cables.

All [line segments](#)^[183] and [cables](#)^[193] made by **line types** with marked [Cable](#)^[320] box in the parameters of the line type will be calculated.

These **line types** are considered as **cable brands**. These line types can be assigned to the [Signal cable](#)^[341] and the [Power cable](#)^[342] of any camera.

You can simply draw cables as **line segments** on layouts using these line types. In this case, the cables are considered as **main cables** which are not attached to any camera.

The report includes the cables attached to cameras and the **main cables** as well. Cable lengths are calculated for each brand (line type) separately.

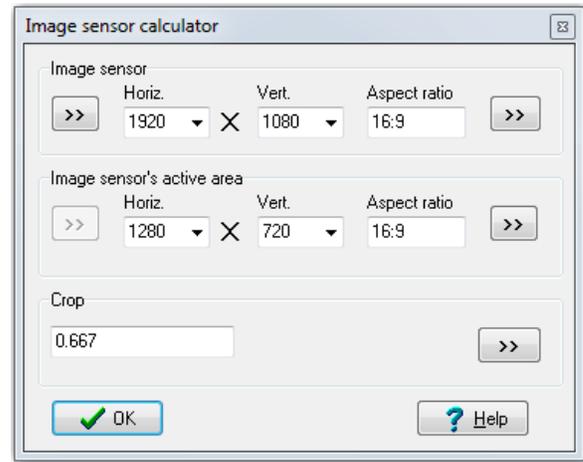
See also [Cable report](#)^[240]

Spatial resolution patterns - information about [Spatial resolution patterns](#)^[272] used in the project.

Date - the date and time of generating the report.

9.18 Image sensor calculator

Camera Geometry Sensor and Lens Calculator



The Calculator is intended for convenient calculation :

- Aspect Ratio of Image sensor;
- Aspect Ratio of active area of Image sensor (=Aspect ratio of the output image);
- Crop-factor.

About use of the calculator, see: [Specifying active area size of the image sensor](#)^[415]

The calculator can be invoked by the **Image sensor calculator**  button in the [Sensor and Lens](#)  box.

The calculator consists from the three lines:

Image sensor

As a result of click on the left button  numbers of pixels of image sensor horizontally and vertically are copied from the Sensitivity and resolution window to the **Hor.** and **Vert.** boxes. If the numbers are not specified, the left button is not available. To the **Hor.** and **Vert.** boxes you can type any values.

In the **Aspect ratio** box the calculated ratio of horizontal to vertical numbers of pixels of the Image sensor will be displayed.

Attention! To calculate the Aspect ratio of Image sensor you must divide **maximum** number of horizontal pixels to the **maximum** number of vertical pixels **in all possible modes of the camera**. In general, the maximum number of pixels may be different from those specified in the Sensitivity and Resolution window..

For example, a camera has the following resolution modes

1920 x 1080, 1280 x 720, 640 x 360, 320 x 180, 160 x 90

1600 x 1200, 1280 x 960, 800 x 600, 640 x 480, 400 x 300, 320 x 240, 160 x 120

The maximum horizontal number of pixels - 1920, The maximum vertical number of pixels - 1200. Probable Aspect ratio of the image sensor 1920/1200=1,6=16:10

Clicking the right button  the calculated aspect ratio of image sensor will be copied to the

[Aspect ratio](#)^[267] box in the **Sensor and Lens** box.

Image sensor's active area

As a result of click on the left button  numbers of pixels of output image horizontally and vertically are copied from the **Processing** tab of the Image parameter panel to the **Hor.** and **Vert.** boxes. If the numbers are not specified, the left button is not available. To the **Hor.** and **Vert.** boxes you can type any values.

In the **Aspect ratio** box the calculated ratio of horizontal to vertical numbers of pixels of the output image will be displayed.

Clicking the right button  the calculated aspect ratio of the output image will be copied to the [Aspect ratio](#)^[257] box in the [Camera Geometry](#)^[251] box.

Crop

The Crop factor value is calculated from the **Aspect ratio of the Image sensor** and **Aspect ratio of the output image**.

Attention! The calculated value of Crop has sense only if the **active area on the image sensor does not touch the edges of the image sensor**. Otherwise Crop = 1 and the result of calculation does not matter.

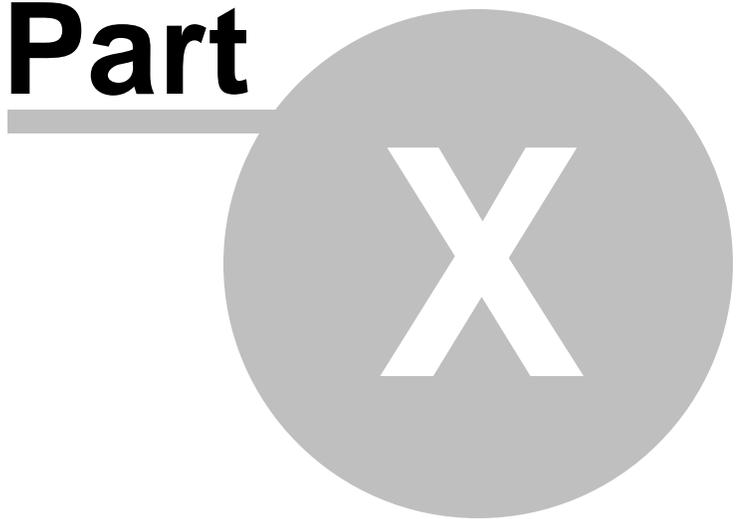


See more: [Specifying the crop factor](#)^[420]

To be able to calculate Crop it is necessary that numbers of pixels of image sensor are greater than or equal to the numbers in pixels of the active area. Otherwise, the **Crop** box displays **Error**.

Clicking the right button  the calculated **Crop factor** will be copied to the [Crop](#)^[268] box of the **Sensor and Lens** box.

Part



**Examples of work with
VideoCAD**

10 Examples of work with VideoCAD

[Example 1 Choice of camera installation height and parameters](#)^[355]

[Example 2 Choice of cameras' quantity and location](#)^[357]

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[Example 4 Calculation of camera view area parameters](#)^[360] (Professional version)

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[Example 9 Choice of camera model according to known scene illumination](#)^[366] (Professional version)

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[Example 19 Modeling megapixel images](#)^[378] (Professional version)

[Example 20 Selecting frame rate on the basis of known target's positions and velocities](#)^[379] (Professional version)

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[Example 29 Import of 3D models from SketchUp and Autodesk 3dsMax](#)^[397]

[Example 30 Work with layers and multi-level projects](#)^[398] (Professional version)

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[Example 38 Specifying active area size of the image sensor](#)^[415]

[Example 39 Teaching materials](#)^[424]

10.1 Example 1 Choice of camera installation height and parameters

Problem

We have a number of objects spread in a space.

The objects have certain locations and sizes.

It is required to determine the **height of installation** and **lens focal length of the camera** to display all the objects properly.

Solution

1. Place the objects in **horizontal** and **vertical** projections according to their actual sizes and location using the tools on the [Tool bar](#)^[164]. High-usage tools are:

-  [Line segment](#)^[183]
-  [Polyline](#)^[183]
-  [Rectangle](#)^[184]
-  [Inclined rectangle](#)^[184]
-  [Wall](#)^[186]
-  [Aperture in Wall](#)^[187]
-  [Circle](#)^[187]
-  [3D model](#)^[190]
-  [3D image](#)^[191]

It is necessary for **3D modelling** to place objects only in the **horizontal projection**, color of the objects preset in the [line type](#)^[320], by means of which the object is drawn. **Heights of the objects** can be specified on the [Current construction parameter panel](#)^[247] during drawing constructions.

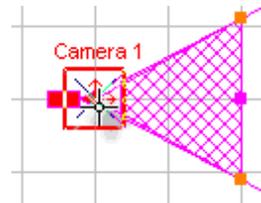
As the objects prepared **3D models**^[229]  can be used (people, cars). Choose necessary 3D model from the **Tool bar** then specify by clicking the place of the model on layout.

2. Open **3D Video**^[284] . Control image in the 3D Video during next operations.

3. Switch to **Select/Edit**^[177]  mode by successive pressing **ESC** key.

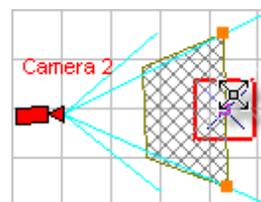
4. To move the camera:

- Select the camera by clicking on its lens;
- Move the cursor to the lens, then press the left mouse button;
- Keeping mouse button pressed, move the selected camera to a new place;
- Release the left mouse button.



5. For tilting and panning the **Active camera**^[162] on the layout in **Select /edit**^[177] mode:

- Move the cursor to the pink grip in the middle of the view area bound. Thereupon, the point will be outlined by red square;
- Click on it by mouse;
- Move the cursor;
- To stop tilting or panning click once again on a point



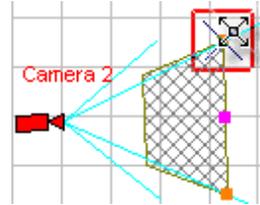
where the middle of the view area bound is to be located.

Current focal length value is displayed in the [Lens focal length](#)^[175] combo box on the [Tool bar](#)^[164].



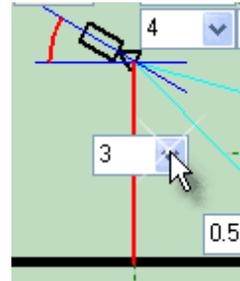
6. To change [lens focal length](#)^[256] of the active camera on the layout in [Select /edit](#)^[177] mode:

- Move the cursor to any orange grip on the ends of view area bound. Thereupon, the point will be outlined by red square;
- Click on it by mouse;
- Move the cursor;
- To stop changing focal length click Once again on a point where the end of view area bound is to be located.



7. You can change **Camera installation height** by choosing value from the [combo box](#)^[257] in the [Camera Geometry](#)^[176] box .

You can also specify the height by clicking in vertical projection after choosing the [Change installation height](#)^[195]  tool.



8. According to **the image in the 3D Video** and **view area projections** on the layout choose the optimal camera position and its [lens focal length](#)^[175].

External link: [The principles of CCTV design in VideoCAD. Part I. Camera view area \(*.pdf\)](#) .

10.2 Example 2 Choice of cameras' quantity and location

Problem

- It is required to monitor a room of arbitrary form and sizes.
- **Person detection** is required at all the space of a room.
- **Person identification** is required beside an entrance door, a safe and a manager's table.
- The manager's workplace itself must not hit in the view area.
- Cameras might be installed anywhere, though not lower than **2.5 m**.
- It is required to choose the **camera quantity, lenses, locations and cables**.

Solution

1. [Create project](#)^[199]  and [Camera](#)^[200] .

2. Using the tools of [Constructions group](#)^[187] create an **actual plan** of a room.
All the details are not to be kept, our task is to observe the sizes carefully.

It is possible to load as a [background](#)^[204] prepared drawing in any of the following formats:

- *.bmp - a bitmap (e.g., the layout scanned from a paper copy);
- *.dxf - AutoCAD format (created in AutoCAD or other program supporting export to *.dxf);
- *.dwg - AutoCAD format (created in AutoCAD or other program supporting export to *.dwg);
- *.jpg - the compressed image (e.g., a digital picture of the plan);
- *.wmf, *.emf - Windows Metafile (export to *.wmf is supported by the majority of the Windows graphics applications)

*It is necessary for **3D modelling** to place objects only in the **horizontal projection**. **Color of the objects** is specified in the [line type](#)^[320], by means of which the object is drawn.*

***Heights of the objects** can be specified on the [Current construction parameter panel](#)^[247] during drawing constructions.*

*For example to model a **grey wall** it is necessary to use lines with the **minimum height 0 m** and **maximum - 3 m (the height of the wall)**; to model a door draw a rectangle using a **line with the heights 0-2 m**; to model a table surface draw a rectangle in the **height range 0,73-0,75 m** etc.*

Windows and door apertures can be cut through walls made by the [Wall](#)^[186] tool with the help of the [Aperture in Wall](#)^[187] tool. Or model walls by several constructions: under aperture, on each side of aperture, above aperture.

*It is possible to put **3D models**^[229]  of people in some places.*

3. Create the essential quantity of cameras, using the [copying](#)^[180]  and [paste](#)^[180] .

4. By changing camera disposition in the **graphics window** and [lenses' focal lengths](#)^[175] we obtain the best location.

See. [Example 1](#)^[355].

5. In the [3D Video](#)^[284] we can see 3D models of camera images.

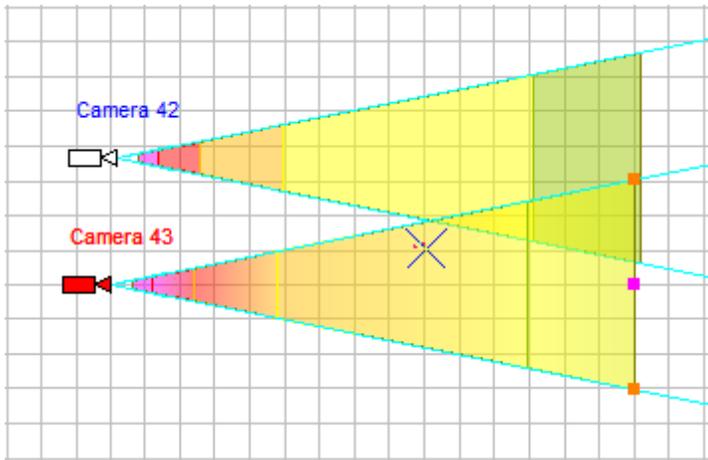
6. Choose **Filling**  in the drop-down menu of the [Fill projection](#)^[169] button on the **Tool bar**.

View area projection will be filled by blend color.

The color of filling is determined by the [line type](#)^[169] of the camera.

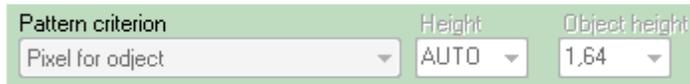
7. Choose **Discrete color**  in the drop-down menu of the  [Spatial resolution](#)^[176] button on the **Tool bar**.

*View area projection will be divided into the **regions**. The regions will be colored according to values of the [criterion](#)^[272] within the regions.*



8. Open the [Spatial resolution](#)^[176]  box.

In the [Pattern criterion](#)^[275] combo box you can see which criterion is chosen in the pattern assigned to the active camera.



Specify vertical number of pixel of camera in the [Number of pixels](#)^[277] combo box.



In the [Table of regions](#)^[277] you can see what color corresponds to each range of the criterion value. On the images in the [Resolution](#)^[278] column, you can see with which resolution people at the far bound of each region will be visible.

On the images in the [Field of view](#)^[278] column, you can see which part of the **field of view** people at the far bound of each region will cover.

	Resolution	Field of View
Observe 164pix/obj		

9. Create additional layouts if needed (e.g. several storeys).

[External link: The principles of CCTV design in VideoCAD. Part 1. Camera view area \(*.pdf\), The principles of CCTV design in VideoCAD. Part 3. 3D modeling in VideoCAD" \(*.pdf\).](#)

10.3 Example 3 Choice of cameras' quantity and location on the original layout

Problem

There is a **location plan of site** in any of the following formats:

- *.**bmp** - a bitmap (e.g., the layout scanned from a paper copy);
- *.**dxf** - AutoCAD format (created in AutoCAD or other program supporting export to *.dxf);
- *.**dwg** - AutoCAD format (created in AutoCAD or other program supporting export to *.dwg);
- *.**jpg**, *.**gif**, *.**tif**, *.**png** - the compressed image (e.g., a digital picture of the plan);
- *.**pdf** - cross-platform format of electronic documents developed by Adobe Systems;
- *.**wmf**, *.**emf**, *.**emf+** - Windows Metafile (export to *.wmf is supported by the majority of the Windows graphics applications)

The length of a building frontal wall - **80m**. (Or any other size) is known.
It is required to **create a project of site surveillance system**.

Solution

1. Choose menu item **Drawing** > [Load background > Horizontal projection](#)^[204].
2. In the appeared dialog box choose a **layout file** and click **Open**.
3. In the appeared dialog box [Adjust Background](#)^[205] click **Ruler**.
4. Click the beginning of the frontal wall in the loaded layout.
5. Then click on the end of the frontal wall.
6. After that enter the known length of the frontal wall - **80m** in the **Real distance** box.
7. Then click **OK** in the **Adjust background** dialog box .

If the loaded background is in PDF format, the Adjust background dialog includes fields for selecting page in the PDF document and to set resolution of the PDF document. If the loaded background is in DXF or DWG format, the dialog includes tools to select a layout and to control visibility of layers of the background, as well as a checkbox to hide texts.

8. To obtain [3D model of the site](#)^[284], draw out lines on the background by [Constructions](#)^[181] in VideoCAD.
9. Further place cameras and cables on the original layout as well as in previous [Examples](#)^[353].

See more: [Work with background in AutoCAD formats](#)^[413]

External link: [The principles of CCTV design in VideoCAD. Part I. Camera view area \(*.pdf\)](#)

10.4 Example 4 Calculation of camera view area parameters

Problem

It is required to calculate a horizontal projection of view area in a height range of **0.5-2 m** and projections of person detection and identification **areas** to a camera with **1/4" image sensor** and lens of **12-mm focal length**.

The camera is installed at **3,5-m height** above the ground. View area far bound is to be **10 m** away from the camera location.

The camera is designed to **detect a person**. It is required to determine **identification capacity**.

The lighting is adequate, camera resolution is high, and a digital system of high resolution is used for displaying and recording. Compression level is minimal.

The solution by calculating

Please see this Example in the VideoCAD 8 Professional [Help system](#).

10.5 Example 5 Calculation of cameras' parameters and choice of their relative locations

Problem

It is required to monitor a wall of building at a level of ground floor windows.

- Wall length - **60 m**.
- Height of windowsills - **1 m**.
- Height of windows - **2 m**.

*The minimal height to install cameras under the requirements of vandalism guard - **3.5 m**.*

- **Person detection** by the digital **video motion detector** for the wall space is required. The **video motion detector** can detect an object with no less than **5x5** pixel size.
- An entrance is situated within a **20-m** distance from the wall edge. It is required to identify all people coming in and out of the building.
- A busy highway is situated within a **10-m** distance from the wall. It is required to minimise the highway hitting in the camera view areas.
- The lighting is adequate and at night luminaires are used.
- The high-resolution cameras are used, with **1/3"** image sensor, **752x582** effective pixels.
- A digital system of the high resolution with the full frame input is used for displaying and recording. Output image size is **768x576 pixels**.
- The compression level is minimal.
- The image is color.
- Real horizontal resolution is 350 LPH

Solution

Please see this Example in the VideoCAD 8 Professional [Help system](#).

10.6 Example 6 Determining person identification criteria by a real image

Please see this Example in the VideoCAD 8 Professional [Help system](#).

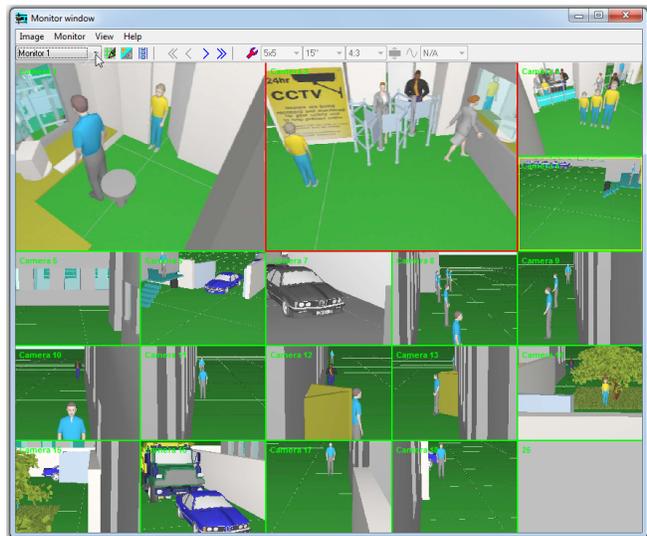
10.7 Example 7 CCTV design using Monitor window and PTZH frame

The [Monitor window](#)^[294] and the new tool in the [3D Video](#)^[284] - [PTZH frame](#)^[287] allow to project video surveillance system by a new method, working directly with images from video cameras. This method can be very convenient.

Order of work:

1. [Create](#)^[199] the project, [load background](#)^[204], by means of [constructions](#)^[181] create **3D model of environment** and place [3D models](#)^[190] of people and cars at control points.
2. Preliminary place cameras in the **Graphics window**.
3. Choose camera [models](#)^[304] if necessary.

4. [Open](#)^[176] the **Monitor window**, choose [Dimension](#)^[296] of monitor. This dimension must be a little bit greater than quantity of cameras. [Connect](#)^[302] all cameras to this monitor. On the monitor images from preliminary placed cameras will be visible.



5. Analyze images. If an image is not optimum, do the following:

- Double click the image. **3D Video** will appear.
- In the Main menu of **3D Video** choose item [View> PTZH frame](#)^[287].
- Using the frame, adjust position and parameters of the camera to get optimum image. At the same time, changes in the **Graphics window** are performed automatically.



- Thus adjust all cameras. If necessary [move](#)^[180] cameras in the **Graphics window**, create additional cameras and delete the cameras, which have become unnecessary.

- If one monitor is not enough to control video surveillance system, connect cameras to [other monitors](#)^[295] in the **Monitor window**.
6. As a result we receive ready project:
- Drawing of cameras' placement in the **Graphics window**;
 - Images of video surveillance system on monitors;
 - [Description](#)^[200] of all cameras for an explanatory note;

External link: ["The principles of CCTV design in VideoCAD. Part 3. 3D modeling in VideoCAD" \(*.pdf\)](#)

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10.8 Example 8 CCTV project

In the **Examples** directory you can find an example of a video surveillance system project of an administration building that **was designed in VideoCAD**.

In this project **locations and parameters**^[253] of cameras were chosen. **Models**^[304] are assigned to the cameras.

In the project a prepared **background**^[204] is used in the *.dxf format, walls and objects in the cameras view areas are outlined by VideoCAD constructions. There are **3D models**^[190] and **3D images**^[191] in the project.

You can look into each camera having activate it and opening **3D Video**^[284] .

*It is convenient to load camera by double clicking on its lens or by choosing in the **Active camera**^[167] combo box.*

You can display all cameras on the Monitor, by clicking the **Monitor window**^[176]  button.

External link: ["The principles of CCTV design in VideoCAD. Part 3. 3D modeling in VideoCAD" \(*.pdf\)](#)

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10.9 Example 9 Choice of camera model according to known scene illumination

Problem

There is a **black/white** mini camera with known sensitivity parameters: **Minimum scene illumination** 0.04 lx with lens **F1.2** at **signal/noise ratio**=10dB, **IRE30**.

Mini lens **F2.0** is mounted on the camera.

At night the scene is poorly illuminated by the illuminator with a **mercury high pressure lamp**, placed far from the scene. Illumination measured by the luxmeter is **0.1 lx**.

It is required to obtain and evaluate image model from the camera.

Solution

Please see this Example in the VideoCAD 8 Professional [Help system](#).

10.10 Example 10 Measuring camera sensitivity

Problem

There is a camera. It is necessary to measure its sensitivity.

*The matter of measurement of sensitivity is a measurement of scene illumination with which the camera image have Signal/Noise ratio = 17dB. To measure illumination a Luxmeter is used, to measure Signal/Noise ratio the **Image analyzer** or the **Video analyzer** from the **CCTVCAD Lab Toolkit** package can be used.*

*The **Video analyzer** reads out the Signal/noise ratio directly from the screen.*

*The **Image analyzer** uses the stored frames in *.bmp or *.jpg formats.*

*In most cases the **Video analyzer** is more convenient for measuring signal/noise ratio.*

Equipment:

Please see this Example in the VideoCAD 8 Professional [Help system](#).

10.11 Example 11 Measuring low illumination

Not expensive luxmeters which are presented on the market have the lower-range value about 0.1..0.5 lux, but minimum scene illumination for modern cameras reaches 0.04 lux. Therefore when [measuring sensitivity](#)^[367] of such cameras it is necessary to attenuate sensitivity in known number of times (it is convenient to attenuate in 50-200 times).

It is possible to attenuate sensitivity in the following ways:

- By limiting exposure time of electronic shutter;
- By calibrated manual iris lens;
- By calibrated attenuation filter.

Please see this Example in the VideoCAD 8 Professional [Help system](#).

10.12 Example 12 Measuring resolution of camera (lens)

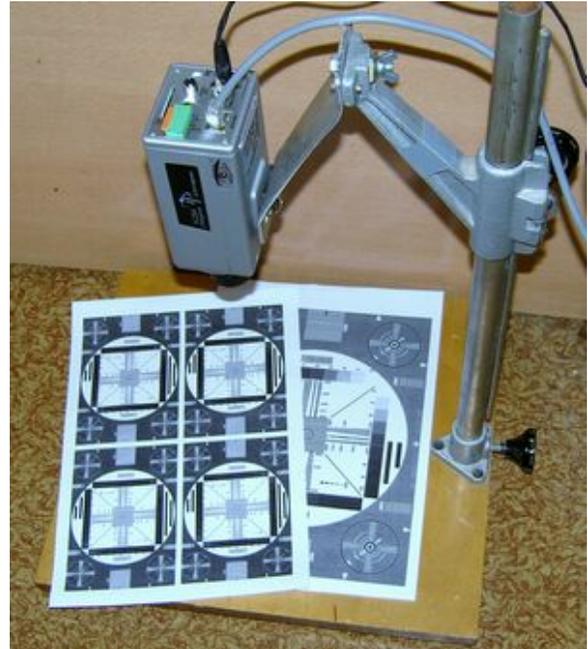
Problem

There is an image of the test chart EIA 1956, made by equipment under test (camera+lens+DVR). It is necessary to determine equipment resolution in LPH at contrast loss of 10%.

The test chart **EIA 1956** in full resolution allows to measure resolution up to 1600 LPH. To measure higher resolution you can also use the test chart **EIA 1956**, but it should not occupy the entire frame, but a part of the frame. For example, if the table will occupy by the area of a quarter of the frame (half the vertical and half of horizontal sizes), the range of measured values of resolution will be doubled.

By making measurements with the same camera, but with different lenses, we can compare **resolution of the lenses**. Lens resolution is very important for **megapixel cameras**.

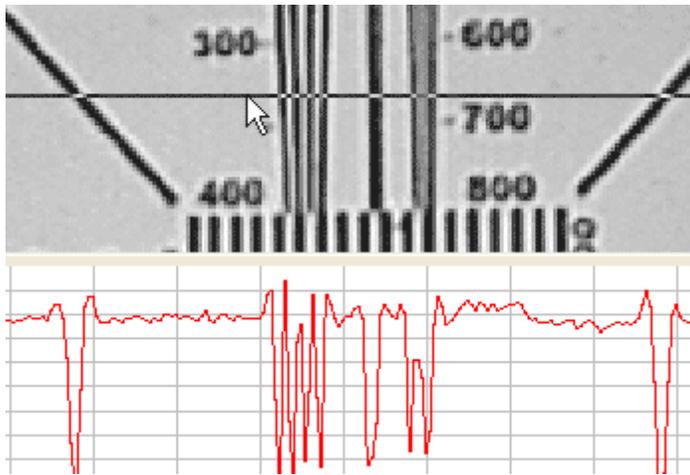
We can measure **resolution with a given drop of contrast** as well as **drop the contrast at a given resolution**.



To perform the measurements you need the software **CCTVCAD Lab Toolkit** (visit <http://cctvcad.com>).

Solution

1. Open the [Image analyzer](#)^[369] from **CCTVCAD Lab Toolkit**.
2. Click **Load** in the upper left corner of **Image analyzer** and select image file.
3. For conveniences it is recommended to increase image size in 2 times. To do this open the **Processing** tab, enter two times larger sizes on the **Image size** panel and click **Apply**.
4. Open the **TV lines** tab.
5. Click vertical wedge area of the test chart with lines corresponding to the minimal resolution (100-200 LPH). Record peak-to-peak amplitude of signal in the area of minimal resolution.
The peak-to-peak amplitude of signal can be seen on the oscillogram under the image.
6. Move the cursor with pressed mouse button to the side where the wedge becomes narrow up to the moment when the peak-to-peak amplitude of signal from the wedge makes 10% from the signal amplitude at minimal resolution.



7. Determine resolution according to the place of analyzing line on the test chart.

In case when resolution is close to the maximal possible one at specified image size and camera aperture corrector works, determining the point of the contrast loss of 10% could be difficult. Image pixel beating and chart lines beating as well as image digitization hinder from it. This problem refers equally to all ways of resolution measurement.

*Using **CCTVCAD Lab Toolkit** we can measure resolution of separate colors.*

10.13 Example 13 Measuring maximum scene illumination for a camera

Problem

There is a camera. It is required to measure maximum scene illumination, at which this camera produces image without brightness limitation.

Equipment:

- Luxmeter (a device for measuring illumination). Almost any kind of such a device with standard CIE spectral response will suit.
- Monitor.
- Projector with tungsten halogen lamp 220V, 1000W or more.

Such projector can create illumination up to 150000lx, what exceeds illumination in bright sunny day on mid-latitudes (100000-120000lx).

Work carefully with the projector. There is danger of overheating and inflammation of fire hazardous materials next to the projector.

- Lens with F1.2 aperture, parameters of which **are reliable**, focal length is 4-8mm.

If the camera allows to mount only mini-lenses (M12), the mini-lens with a known aperture (F2.0) is needed.

- A sheet of crumpled white paper.
- Stand. It is recommended for convenience and accuracy.



Order of work

1. Switch off all additional options of image processing. Only AESC and AGC should be switched on.
2. Mount lens F1.2, on the camera, mount the camera on stand, direct it towards sheet of paper, connect to computer, display image on the screen.

If the camera allows mounting only mini-lenses (M12), mount a mini-lens with known aperture (F2.0).

3. Reduce contrast of the monitor to 50-70% of maximum.
4. Close to the sensor window directly on the sensor, fix a small piece of crumpled white paper.
5. Switch ON the projector.

6. By changing the distance from the projector to the luxmeter sensor, obtain the image on the screen with a little bleeding whites on the bends of the ruffled sheet of paper.

You must not change the lamp supply voltage. It should be equal to nominal lamp supply voltage. Change Illumination only by means of distance variation between the lamp and the sheet of paper. Be sure, that the luxmeter sensor window and the small piece of paper on the sensor have visually equal illumination.

7. Record the maximum illumination according to the luxmeter reading.

Maximum illumination for black/white cameras with 1/3" CCD image sensor with exposure range of the electronic shutter up to 1/100000s and lens with the aperture F1.2 make approximately 20000..30000lx. It allows using these cameras indoor with any lenses or outdoor with auto iris lenses or lenses with maximal aperture no more than F2.5.

Maximum illumination for high-quality color cameras or day/night cameras exceeds 100000lx. For mini-cameras with image sensor format of 1/4" the maximum illumination can be considerably lower.

10.14 Example 14 Examples of luminaire calculation

Please see this Example in the VideoCAD 8 Professional [Help system](#).

10.15 Example 15 Choice of luminaire power and location

Please see this Example in the VideoCAD 8 Professional [Help system](#).

10.16 Example 16 Determining spectral efficiency of light source

Please see this Example in the VideoCAD 8 Professional [Help system](#).

10.17 Example 17 Measuring projector parameters

Problem

There is a visible light projector with close to round symmetrical light intensity distribution. It is necessary to create the model of this projector in VideoCAD.

Equipment:

- Luxmeter (a device for measuring illumination). Almost any kind of such a device with standard CIE spectral response will suit.
- Measure by the luxmeter and write down the **projector illumination on an axis of radiation** at the distance not less than in 20 times more than the geometrical size of the radiant window.

Order of work

Please see this Example in the VideoCAD 8 Professional [Help system](#).

10.18 Example 18 Measuring parameters of IR illuminator

Problem

There is an **IR illuminator**. It is necessary to measure efficiency of this illuminator for a black/white camera in relation to the halogen incandescent lamp and create model of this illuminator in VideoCAD.

Equipment:

To perform the measurements you need the software CCTVCAD Lab Toolkit (visit <http://cctvcad.com>).

- Luxmeter (a device for measuring illumination). Almost any kind of such a device with standard CIE spectral response will suit.
- Any PC-based video capture system, TV-tuner with video input, etc. The System should allow to display live video on the computer screen.
- **Video analyzer** utility. It is a part of [CCTVCAD Lab Toolkit](#)^[377].
- Compact tungsten halogen lamp 12V, 10W.
- Stabilized power supply unit for the lamp. 12V DC, without considerable ripples of output voltage.
- **Manual Iris Lens**, focal length is 4-8mm.
- Stand. It is recommended for convenience and accuracy.
- Measuring should be carried out in a dark room.

Order of work

Please see this Example in the VideoCAD 8 Professional [Help system](#).

10.19 Example 19 Modeling megapixel images

Problem

Because of the **Open GL** limitation, we can not create three-dimensional image with number of pixels more than the **screen number of pixels in Windows**. However, modern megapixel cameras already have a much higher number of pixels.

Even when the camera number of pixels is less than the screen number of pixels, it is inconvenient to work with images that occupy a large area on the screen and require a lot of time for regeneration.

In most cases, we need only to see how an object on the scene will look on image from a camera with the specified number of pixels.

VideoCAD offers 2 ways of solving this problem:

- with the help of **PiP** technology (Picture in Picture);
- with the help of pixel multiplication.

Please see this Example in the VideoCAD 8 Professional [Help system](#).

10.20 Example 20 Selecting frame rate on the basis of known target's positions and velocities

*The **frame rate** greatly affects the required bandwidth of communication channels, the capacity of the archives, computing power, and hence the total cost of video surveillance systems.*

At the same time, choosing optimal frame rate - not an easy task and criteria for selection are not always unambiguous. When the frame rate is too low, omission of important events are possible, too high frame rate leads to an unjustified rise in price of video surveillance systems.

*VideoCAD offers a tool for choosing frame rates based on the **desired frequency of getting in the frame objects with the known positions and velocity**. Additionally, you can create **animated images with the specified frame rate**.*

Problem

Place of camera installation, the probable locations and velocity of moving objects are known. We should choose an optimal frame rate to ensure that any moving object gets into the frame at least twice.

Order of work

Please see this Example in the VideoCAD 8 Professional [Help system](#).

10.21 Example 21 Creating animated model of monitor

*This example shows how to create an animated model of monitor as *.html file. This model may contain up to 100 animated images from different cameras. Each image has its own settings (frame rate, resolution, etc.). Obtained html file can be viewed by any Internet browser, edited with any text editor, etc.*

[See an example of animated monitor \(file size about 4 Mb\).](#)

Please see this Example in the VideoCAD 8 Professional [Help system](#).

10.22 Example 22 Visualization of cameras' control area projections and spatial resolution inside them

Read before: [Shadow](#)^[172],  [Spatial resolution](#)^[176],  [Spatial resolution box](#)^[272] 

Problem

We have a three-dimensional model of a complex environment.
We need to determine the areas controlled by cameras taking into account shadows arising from obstacles of the environment (camera control areas). Within the control areas, the **spatial resolution** of cameras must be visualized.

We should be able to estimate directly on the 2D site plan how people will look into the camera image at each point of the camera control area.

Order of work

1. Construct three-dimensional model of the environment using the tools of [3D modeling](#)^[181].

The constructions must be drawn by [line types](#)^[320] with marked [Shadow](#)^[320] box.

You can import the environment or its fragments in the form of one or several [3D models](#)^[190] imported from other graphics formats using [Autodesk 3ds Max or SketchUp](#)^[397].

2. Place a camera. Activate it.

3. Choose **Filling**  in the drop-down menu of the [Fill projection](#)^[169] button on the **Tool bar**.

View area projection will be filled by blend color.

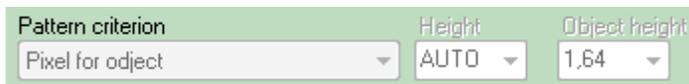
The color of filling is determined by the [line type](#)^[169] of the camera.

4. Choose **Discrete color** in the drop-down menu of the  [Spatial resolution](#)^[176] button on the **Tool bar**.

View area projection will be divided into the **regions**. The regions will be colored according to values of the [criterion](#)^[272] within the regions.

5. Open the [Spatial resolution](#)^[176]  box.

In the [Pattern criterion](#)^[275] combo box you can see which criterion is chosen in the pattern assigned to the active camera.



Specify vertical and horizontal resolution (number of pixel) of camera in the [Number of pixels](#)^[277] combo box.



In the [Table of regions](#)^[277] you can see what color corresponds to each range of the criterion value. On the images in the [Resolution](#)^[278] column, you can see with which resolution people at the far bound of each region will be visible.

On the images in the [Field of view](#)^[278] column, you can see which part of the **field of view** people at the far bound of each region will cover.

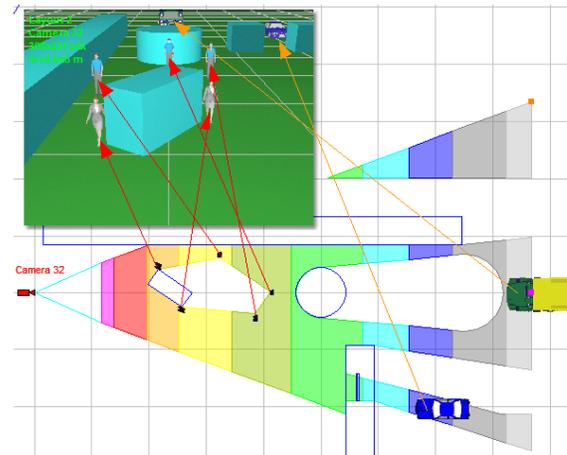
	Resolution	Field of View
Observe 164pix/obj		

See details: [Spatial resolution box](#)^[272].

Don't close the **Spatial resolution box**.

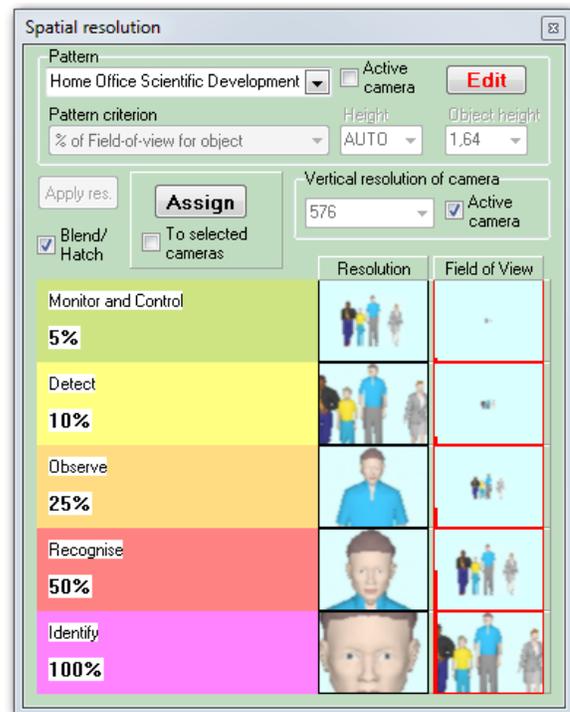
6. Choose **Within projection**  in the drop-down menu of the [Shadow](#)^[172]  button on the **Tool bar**.

After a while VideoCAD calculates the control area projection, taking into account shadowing from obstacles in environment.



7. Keep the **Spatial resolution box** opened.

It is convenient to keep the Spatial resolution box opened during the analysis of spatial resolution in the Graphics window. Comparing color of regions on the layout with colors in the [Table of regions](#)^[277] in the **Spatial resolution box**, on the images in the [Resolution](#)^[278] and [Field of view](#)^[278] columns you can immediately see the expected resolution and field of view size at every point of view area of each camera.



See also: [Shadows](#)^[172], [Main menu>View>Calculate shadows for active camera](#)^[215], [Main Menu>View>Recalculate shadows](#)^[215], [Line type>Shadow](#)^[320], [Options box>Miscellaneous>Shadow](#)^[333], [Choosing the best place for PTZ \(dome\) camera](#)^[384], [Visualization of the camera control area projections and spatial resolution within them](#)^[381]

10.23 Example 23 Choosing install location for PTZ camera

Problem

We have a three-dimensional model of a complex environment. We should choose the best install location for PTZ (dome) camera so that the areas you want to monitor, should be not shaded by objects of the environment.

Order of work

1. Construct three-dimensional model of the environment using the tools of [3D modeling](#)^[181].

The constructions must be drawn by [line types](#)^[320] with marked [Shadow](#)^[320] box.

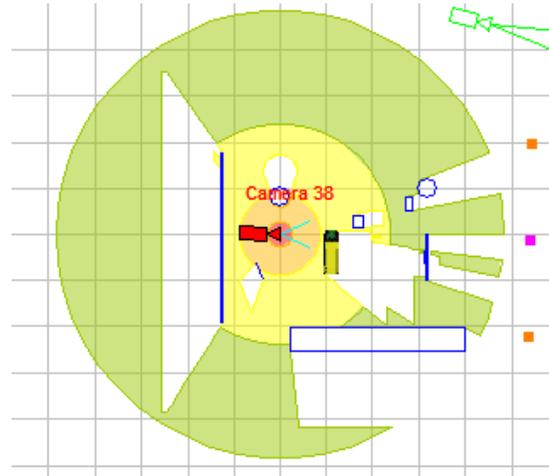
2. Place the PTZ camera preliminary. Activate it.

3. Choose **Dome**  in the drop-down menu of the [Shadow](#)^[172]  button on the **Tool bar**.

After a while VideoCAD calculates the control area projection, taking into account shadowing from all obstacles in environment.

*In the **Dome** mode all shaded areas from the specified camera position become visible.*

*The **Dome** mode is also useful for choosing the best installation place for fixed cameras to make required areas reachable for the cameras.*



4. By moving the camera between the possible installation locations, choose the best location in terms of control required areas.

You can add several cameras and instead of moving, to [hide](#)^[236] and show different cameras.

See also: [Shadows](#)^[172], [Main menu>View>Calculate shadows for active camera](#)^[215], [Main Menu>View>Recalculate shadows](#)^[215], [Line type>Shadow](#)^[320], [Options box>Miscellaneous>Shadow](#)^[333], [Choosing the best place for PTZ \(dome\) camera](#)^[384], [Visualization of the camera control area projections and spatial resolution within them](#)^[381]

10.24 Example 24 Simulating distortions of moving objects arising from Exposure time, Interlace scan and Rolling shutter

Problem

There are three cameras:

- Three-megapixel (3MP) (2048x1536) IP camera with CMOS sensor and Rolling shutter;
- 1.3 megapixel (1280x960) IP camera with CCD sensor and Global shutter;
- 0.4MP (768x576) analog camera with interlace scan.

We know camera exposure time at the scene light conditions.

- 3MP IP Camera - 100ms;
- 1.2MP IP camera - 50ms;
- analog camera - 20ms (PAL).

3MP camera employs Rolling shutter, the period between start reading successive rows = 50 microseconds.

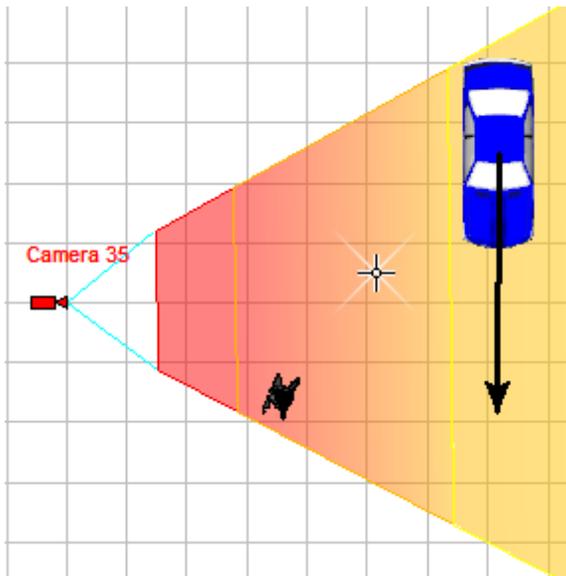
All cameras have the same sensor size $1/3''$ and a lens with a focal length = 4mm.

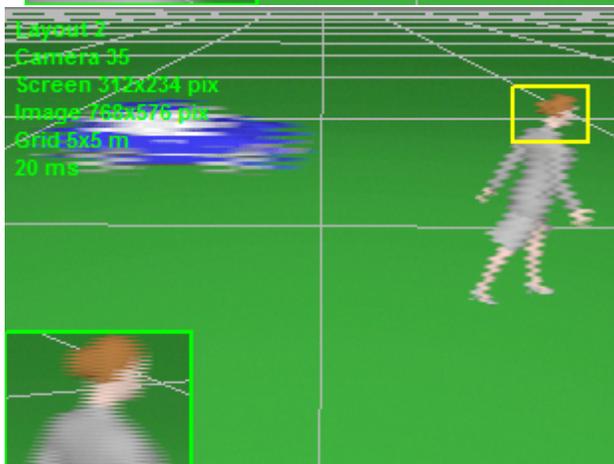
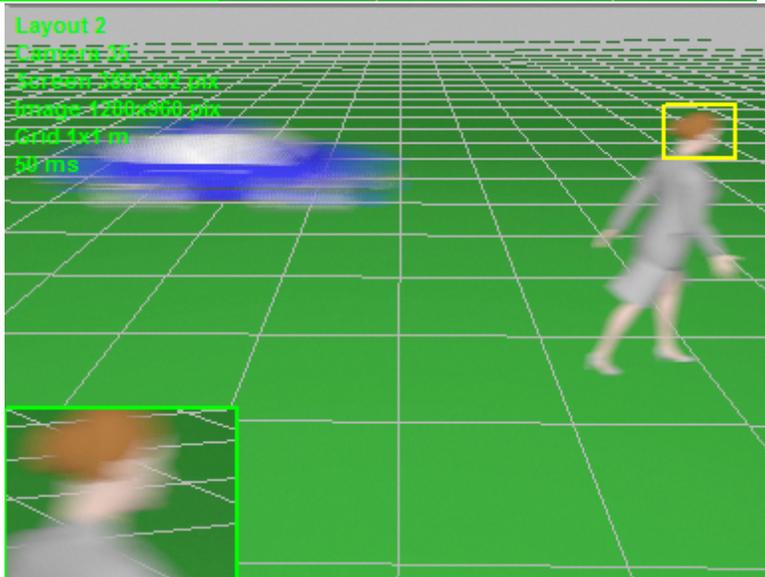
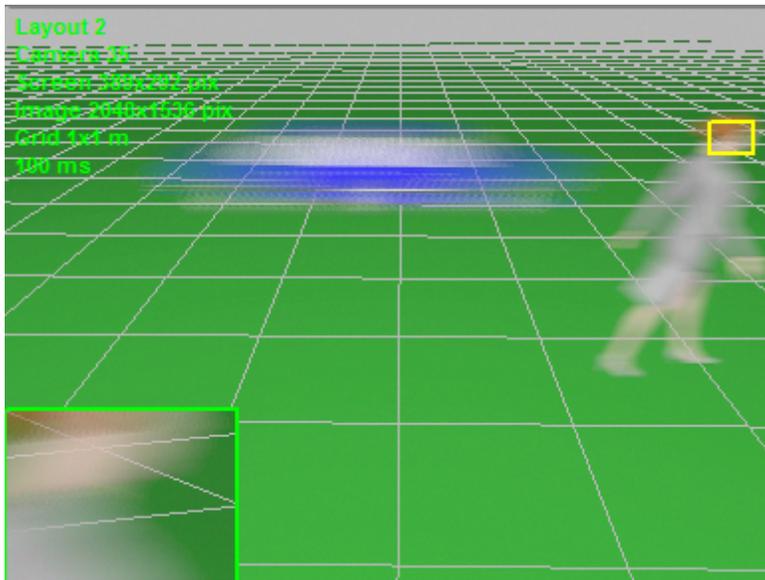
We know camera position, location and speed of moving objects on the scene.

We need to get the model images of moving objects from each camera at the same position and compare them.

See also: [Measuring exposure time of IP camera](#)^[391], [Measuring rolling shutter row time of IP camera](#)^[394]

Please see this Example in the VideoCAD 8 Professional [Help system](#).





See also: [Measuring exposure time of IP camera](#)³⁹, [Measuring rolling shutter row time of IP camera](#)

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[External link: "The principles of CCTV design in VideoCAD. Part 5. Video surveillance of moving objects"\(*.pdf\)](#)

10.25 Example 25 Calculating lengths of cables and getting Cable report

Problem

There is a layout with the placed cameras. We need to determine the required cable length separately for each brand of cable.

Order of work

1. Configure a separate line type for each brand of cables used in the project

- 1.1 Open the [Options box](#)^[319], switch to [Lines](#)^[320] tab.
- 1.2 In the **Number** box, select any unused number of **line type**.
Do not select line types, used as [system lines](#)^[321].
- 1.3 In the **Name** box, type a name of a cable brand, which will correspond to the selected line type.
- 1.4 Check the [Cable](#)^[320] box. Clear the [Shadow](#)^[320] box.
- 1.5 When necessary, adjust the line **Style**, **Color** and **Width** on the screen and at printing.
- 1.6 To make lines of this type invisible on the **3D Video**, set equal the **maximum** and **minimum** heights on the **3D** panel.
- 1.7 Repeat steps **1.2 .. 1.6** for all brands of cables used.
- 1.8 Click **OK** in the **Options box**.

2. Assign brands to cables of cameras

- 2.1 Activate any of cameras.
- 2.2 **Assign brand to the signal cable**
 - 2.2.1 Click the menu item **Main menu>Cables>Signal cable>Calculate**.
 - 2.2.2 In the appeared [Signal cable length calculation box](#)^[341] choose [Cable brand](#)^[341] from the adjusted at [p.1](#)^[388] line types.
 - 2.2.3 When necessary, adjust reserve for cable laying and connection.
 - 2.2.4 **Click** **OK** in the **Signal cable length calculation box**.
- 2.3 **Assign brand to the power cable**
 - 2.3.1 Click the menu item **Main menu>Cables>Power cable>Calculate**.
 - 2.3.2 In the appeared [Power cable electrical parameters and length calculation box](#)^[341] choose [Cable brand](#)^[341] from the adjusted at [p.1](#)^[388] line types.
 - 2.3.3 When necessary, adjust reserve for cable laying and connection. Specify electrical parameters.
 - 2.3.4 **Click** **OK** in the **Power cable electrical parameters and length calculation box**.
- 2.4 Repeat steps **2.1 .. 2.3** for all cameras, cables of which must be taken into account.

3. Draw cables of cameras in horizontal and vertical projection

- 3.1 Activate any of cameras.
- 3.2 Choose **Main menu>Signal cable**^[238] and draw the signal cable of this camera.
- 3.3 Choose **Main menu>Power cable**^[239] and draw the power cable of this camera. .

*When this item chosen, you can draw the **signal cable** of the **active camera** by successive clicks*

in the **graphics area**. The end of each segment is the start of the next one. To stop drawing cable, press **ESC**.

The [status bar](#)^[243] displays the segment length and its projection to distance and height.

Both clicks are to be made in the **same projection**. If the projections are different the measured values are incorrect, therefore when constructing a segment with its ends in different projections the values are not displayed in the **status bar**. In this case when changing the drawing the segment is attached to the projection with its **initial point**.

A cable consists of **segments**, allowing to draw it in different projections and layouts, representing an actual scheme of laying accurately.

When [copying](#)^[180] the **cable segments** between **cameras** and layouts a process of cable drawing is accelerated considerably even in complex CCTV systems.

When drawing a cable the menu item [Cable laying](#)^[239] might be used. When choosing it a float panel of the same name appears enabling to choose a shift of segment ends for a level parallel cable drawing along the walls, columns etc.

If the **Main menu>View>All cameras' cables**^[216] item is checked, **cables of all cameras** will be visible, but only **cables of the active camera** can be edited. If this item is not checked, **cables of the active camera** will be visible only.

4. Draw the Main cables (which is not associated with cameras)

4.1 Draw the **Main cables** with the help of tools [Line segment](#)^[183]  and [Polyline](#)^[183] , using the adjusted at [p.1](#)^[388] line types.

Line type can be assigned before drawing lines or during editing lines on the [Line type panel](#)^[245]. To change Line type of several [selected](#)^[177] lines at once, use the [Change line type](#)^[237] tool.

5. Get the Cable report

Choose Main menu>Cables>[Cable report](#)^[240]. The Cable report includes lengths of the cables attached to cameras and the **main cables** as well. Cable lengths is calculated for each brand (line type) separately.

See also: [Active camera's cables](#)^[216], [All cameras' cables](#)^[216], [Line segment](#)^[220], [Polyline](#)^[221], [Signal cable](#)^[238], [Power cable](#)^[239], [Cable laying](#)^[239], [Length calculation of line segments](#)^[239], [Cable report](#)^[240], [PDF Report](#)^[200].

10.26 Example 26 Checking Depth of Field in horizontal projection

Problem

We need to check that a camera has enough Depth of Field.

Order of work

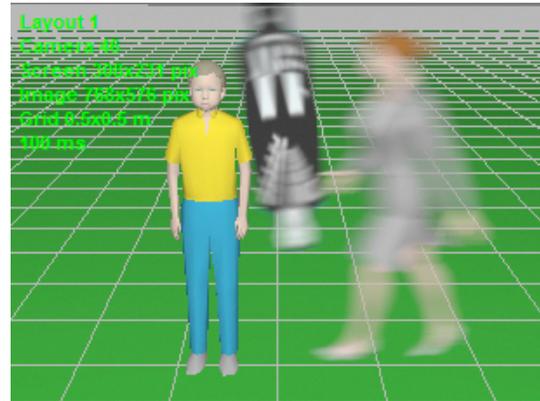
Please see this Example in the VideoCAD 8 Professional [Help system](#).

10.27 Example 27 Measuring exposure time of IP camera

The sensitivity of cameras depends on the exposure time. Within the validity of the **Reciprocity principle**, the camera sensitivity is **directly proportional to the exposure time**.

However, increasing exposure time leads to blurring of moving objects that is often unexpected. Usually, when measuring sensitivity of cameras and while accepting built CCTV system a customer looks only at static images, but moving targets are of interest.

The greater the exposure time and the greater the velocity of an object on the screen, the more the blur.



Automation of camera (AESC) constantly adjusts the exposure time (shutter speed) depending on the illumination on the image sensor. The more light is, the less exposure time is set. But from a certain threshold light AESC sets the maximum exposure time and further reducing light doesn't increase the exposure time. Knowing the maximum exposure time and the threshold illumination is very useful in designing CCTV systems.

VideoCAD offers a tool for modeling blur of moving objects in dependence of the exposure time. But to use this tool, you need to know the exposure time.

Knowing the maximum exposure time is also needed correct interpretation of results of measuring sensitivity and sensitivity values in the camera specification. With a minimum illumination the camera sets the maximum exposure time. Unless otherwise indicated, the sensitivity value in the camera specification can be achieved at the maximum exposure time.

The maximum exposure time of standard analog cameras without light accumulation is 20ms for PAL and 16,5 ms for NTSC. IP cameras and analog cameras with accumulation of light can use exposure time up to 200ms and more. With latent increasing the maximum exposure time, many manufacturers increase the certified sensitivity of their cameras.

Many cameras allow to modify the maximum exposure time, switching the "night", "supersensitive" modes, etc. But these settings don't report the real value of the exposure time. If the camera has several "night" modes, for their proper use it is necessary to know the maximum exposure time for each of them.

Problem

There is a camera. It is necessary to measure its **maximum exposure time** and the **threshold illumination** at which the camera switches to the **maximum exposure time**.

Equipment:

- Oscilloscope. Any analog oscilloscope will suit.
- Luxmeter (a device for measuring illumination). Almost any kind of such a device with standard CIE spectral response will suit.

- In case of testing analog cameras, we need any PC-based video capture system, TV-tuner with video input, etc. The System should allow to display live video on the computer screen and separate frames. *For testing IP cameras it is enough to have possibility to display video on the screen and separate frames.*
- Compact tungsten halogen lamp 12V, 10W.
- Stabilized power supply unit for the lamp. 12V DC, without considerable ripples of output voltage.
- Lens with F1.2 aperture, parameters of which **are reliable**, focal length is 4-8mm. *If the camera allows to mount only mini-lenses (M12), the mini-lens with a known aperture (F2.0) is needed.*
- Stand. It is recommended for convenience and accuracy.

*If you want to measure only the **maximum exposure time**, and measuring the **threshold illumination** is not required, then luxmeter, incandescent lamp and power supply are not needed. Instead, it is required a manual iris lens.*

Order of work

1. Set the lens on the camera, install the camera on the stand, point the camera at the screen of the oscilloscope, connect camera to computer, display image from the camera on the computer screen.
2. Place the luxmeter sensor near to the oscilloscope screen.
3. Enable a "night" mode in the camera setting.



4. Set the oscilloscope sweep time - **50ms/div**. Scan - automatic (If your oscilloscope has such settings).

On the oscilloscope screen a flying spot must be visible. On the computer screen instead of the spot, flickering segments will be seen.

5. Turn on the incandescent lamp. Turn off the ambient light.

If you need only to measure the maximum exposure time, then instead of changing light simple close iris on the lens.

6. Set the minimum brightness of the oscilloscope spot, to make the segments on the computer screen barely visible. Light of the spot should not affect operation of camera's automatics.

7. By moving the lamp away, reducing the illumination of the oscilloscope screen, detect a moment

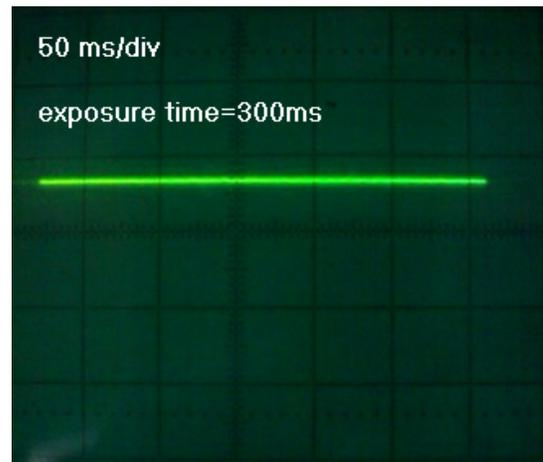
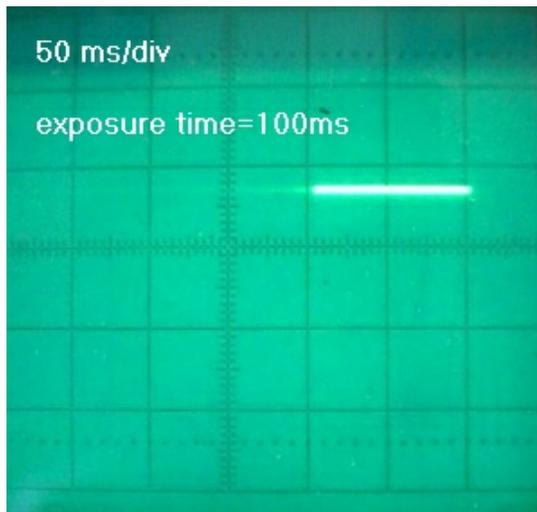
when the length of the segments on the computer screen becomes the maximum and no longer increases with further decreasing light until the appearance of strong noise on the screen.

At the moment when the length of the segments becomes maximum, luxmeter shows the threshold illumination.

As a result of our measurements, the threshold illumination was about 50lux. That is, when light is less than 50lux, the testing IP camera with 2 megapixel 1/3" CMOS sensor began to use the maximum exposure time.

8. Save and view a frame in which a segment of the maximum length gets wholly. If you can not get such frame, increase the oscilloscope sweep to 100ms/div.

The length of the segment in the frame in the scale of oscilloscope screen equals to the camera's exposure time.



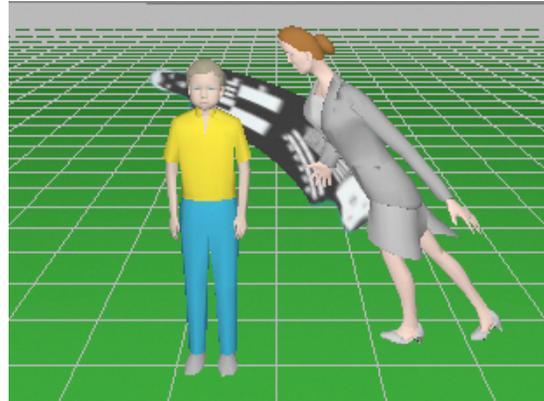
9. If necessary, by the method described above you can take a function of the exposure time in dependence of the light.

See also: [Image parameter panel>Camera>Exposure](#)

External link: ["The principles of CCTV design in VideoCAD. Part 5. Video surveillance of moving objects" \(*.pdf\)](#)

10.28 Example 28 Measuring rolling shutter row time of IP camera

As a result of Rolling Shutter work, exposure of different rows of the image sensor begins and ends sequentially at different times, which causes a horizontal shift of moving objects. This effect occurs with many **IP cameras** with **CMOS** image sensor and usually doesn't occur with cameras with **CCD** image sensor.



An important parameter of the rolling shutter is the **Row time** - the difference in time between the beginning exposure of neighboring rows. The less the **row time** is, the smaller the camera distorts moving objects. Unfortunately this parameter is not given in the camera specification. But it is not difficult to measure the row time in practice.

The **row time** may vary with different settings of the same camera.

VideoCAD offers a tool for modeling distortions of moving objects depending on the row time. But to use this tool, you need to know the row time.

Problem

There is a IP camera with Rolling shutter. It is necessary to measure its **row time** - the difference in time between the beginning exposure of neighboring rows.

Equipment:

- Oscilloscope. Any analog oscilloscope will suit.
- Low-frequency oscillator. Use any sine wave signal generator of any frequency in the range from 200 Hz to the upper limit of the oscilloscope bandwidth. You can use any homemade generator, software generator for a computer, etc.
- *For testing IP cameras it is enough to have possibility to display video on the screen and separate frames.*
- A Lens, focal length is 4-8mm.
- Stand. It is recommended for convenience and accuracy.

Order of work

1. Set the maximum image size in pixels in the camera setting.
2. Set the lens on the camera, install the camera on the stand, point the camera at the screen of the oscilloscope, connect camera to computer, display image from the camera on the computer screen. *The oscilloscope screen must completely cover the field of view in vertical. But it is not necessarily that the oscilloscope screen placed in the frame entirely. It is important that between the oscilloscope screen and the field of view of the camera must not be skew. On the computer screen,*

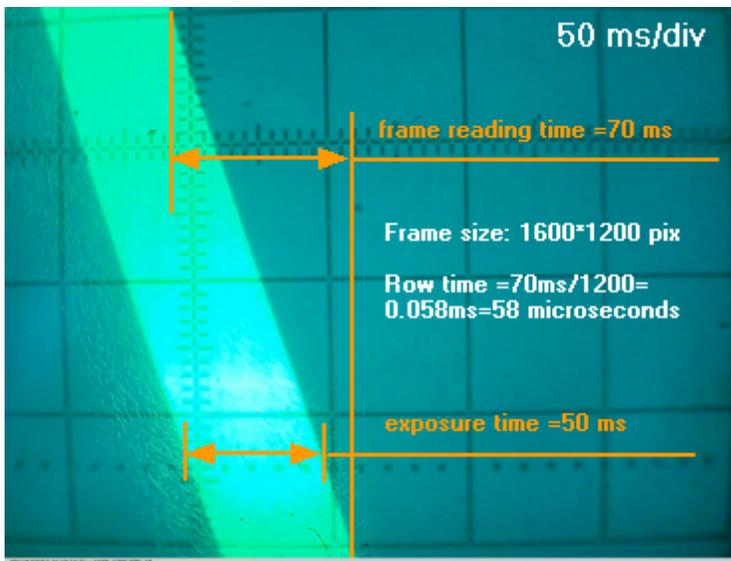
lines of the oscilloscope scale should be strictly parallel to the sides of the frame.



3. Set the oscilloscope sweep time - **50ms/div**. Scan - automatic (If your oscilloscope has such settings). Connect the Low-frequency oscillator to the oscilloscope. On the oscilloscope screen a flying thin vertical line must be visible. On the computer screen instead of the thin vertical line, thick inclined line will be seen. **The thickness of the line in the scale of oscilloscope screen equals to the camera's exposure time. The inclination of the line is determined by the row time of camera's rolling shutter.**

4. Save and view a frame in which the inclined line gets wholly. If you can not get such frame, increase the oscilloscope sweep to 100ms/div. If inclination is not enough, decrease the oscilloscope sweep to 20ms/div.

5. To calculate the **row time**, first read a difference between the edge of the line on the top and on the bottom of the frame in the scale of the oscilloscope screen - frame reading time = 70ms. And then divide the resulting time by the number of rows in the image (1200) and get the **row time = 58 microseconds**.



6. Repeat measurements for other frame sizes of the same camera.

*In the tested by us IP camera the frame reading time wasn't changed when changing the frame size from 640*480 to 1600*1200, and was about 70ms. Thus, the row time was from 58 to 146*

microseconds depending on the number of rows in the frame.

Perhaps the opposite situation, when the row time is stable, but the frame reading time depends on the number of rows in the frame.

See also: [Image parameter panel>Camera>Rolling shutter](#)

External link: ["The principles of CCTV design in VideoCAD. Part 5. Video surveillance of moving objects"\(.pdf\)](#)*

10.29 Example 29 Import of 3D models from SketchUp and Autodesk 3dsMax

VideoCAD has an opportunity of 3D modeling video surveillance scenes using constructions and [3D models](#)^[190] distributed with the program.

The distribution kit of VideoCAD includes several most relevant **3D models** for CCTV design. Though the standard package tends to be enough for accomplishing most of tasks, there may appear a need for library supplement.

Any 3D models and scenes which can be opened in **SketchUp** or **Autodesk 3ds Max** can be added to the VideoCAD library.

For exporting 3D models to VideoCAD the **Free SketchUp** version is suitable. <http://sketchup.com/>

Lots of 3D models can be downloaded from Internet for free <https://3dwarehouse.sketchup.com/>. You can also create models and scenes in **Google SketchUp** or **Autodesk 3ds Max** independently.

Import 3D models is supported by [VideoCAD Starter II](#)^[45], [VideoCAD Lite](#)^[31] and [VideoCAD Professional](#)^[3] versions. It is not supported by [VideoCAD Starter](#)^[49] version.

We offer two special packages for importing 3D models into VideoCAD.

These packages contain:

- Plugin file;
- User Manual with step-by-step description how to insert a new 3D model into the VideoCAD library;
- Example of ready 3D model files.

The first package for importing 3D models and scenes from **Autodesk 3ds Max** is free. You can download it here: [Import of 3D models and scenes from 3ds max to VideoCAD](#)

The second package for importing 3D models and scenes from **SketchUp** is paid. Here is the [User manual](#). [Click here to order the package](#).

* *This package is included in the [VideoCAD Starter II Kit](#)*^[45].

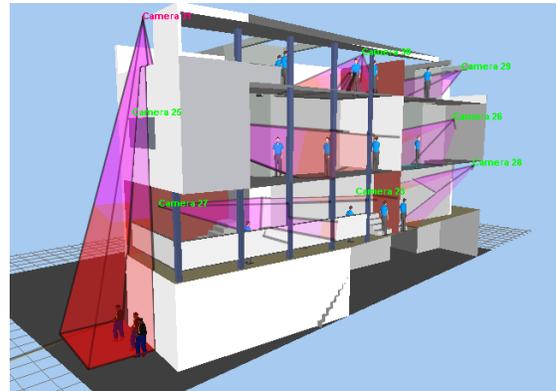
** *Plugin for SketchUP has several advanced features: export textures, transparent textures, semi-transparent polygons and scale adjusting.*

See also: [3D mode](#)^[190], [Drawing>Import DXF/DWG background](#)^[199], [Work with 3D models-territories](#)^[399], [Work with layers and multi-levels projects](#)^[398], [Export 3D view areas to general 3D design software](#)^[400]

10.30 Example 30 Work with layers and multi-level projects

It is convenient when the project can be divided into horizontal layers, unrelated, such as the floors of building.

But there are problems with complex organization on vertical when one camera should work on several levels. In these cases, the levels are interconnected and 2D planning is not enough. In such cases, 3D modeling can be indispensable.

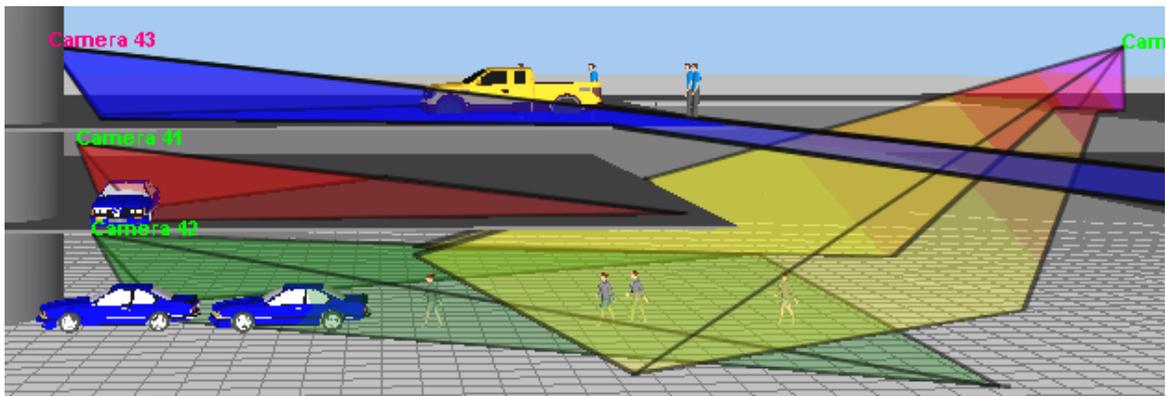


Problem

There is a project, divided into floor plans. We need to make CCTV project in which some cameras are located between floors.

Order of work

Please see this Example in the VideoCAD 8 Professional [Help system](#).



See also: [Drawing>Import DXF/DWG background](#)^[199], [Import of 3D models from SketchUp and Autodesk 3dsMax](#)^[397], [Work with 3D models-territories](#)^[399], [Layers](#)

10.31 Example 31 Work with 3D models-territories

VideoCAD can use not only 3D models of individual objects (people, cars, etc.), but also 3D models-territories (buildings, stadiums, airports, towns, etc.).

Within the 3D models-territories cameras and other 3D models can be placed.

Problem

There is a 3D model of the stadium. You need to place a camera in the room under the stands.



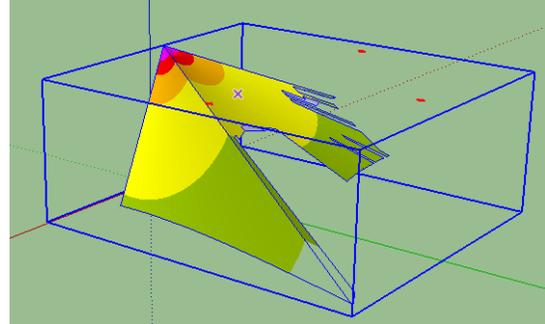
Please see this Example in the VideoCAD 8 Professional [Help system](#).

10.32 Example 32 Export 3D view areas to general 3D design software

In many enterprises, projects of all building systems are executed in a single software environment of 3D design.

However, despite the enormous number of tools of modern 3D design software, a lot of CCTV design problems are outside of their opportunities.

For example, creation of image models from cameras with known parameters in certain conditions, modeling camera view areas with the spatial resolution, lens distortion and shadowing from obstacles etc.



These and other useful in CCTV design opportunities are available in VideoCAD. Furthermore, VideoCAD has means of import and export, which allows to use VideoCAD as addition to other 2D/3D design software.

Means of import and export in 2D are described in the [Example^{\[413\]}](#). Saving images of individual cameras is [easy^{\[286\]}](#). Saving monitors is discussed [here^{\[380\]}](#). In this example we consider import of 3D project from SketchUP and export of 3D models of the view areas to DXF format and import them into SketchUP.

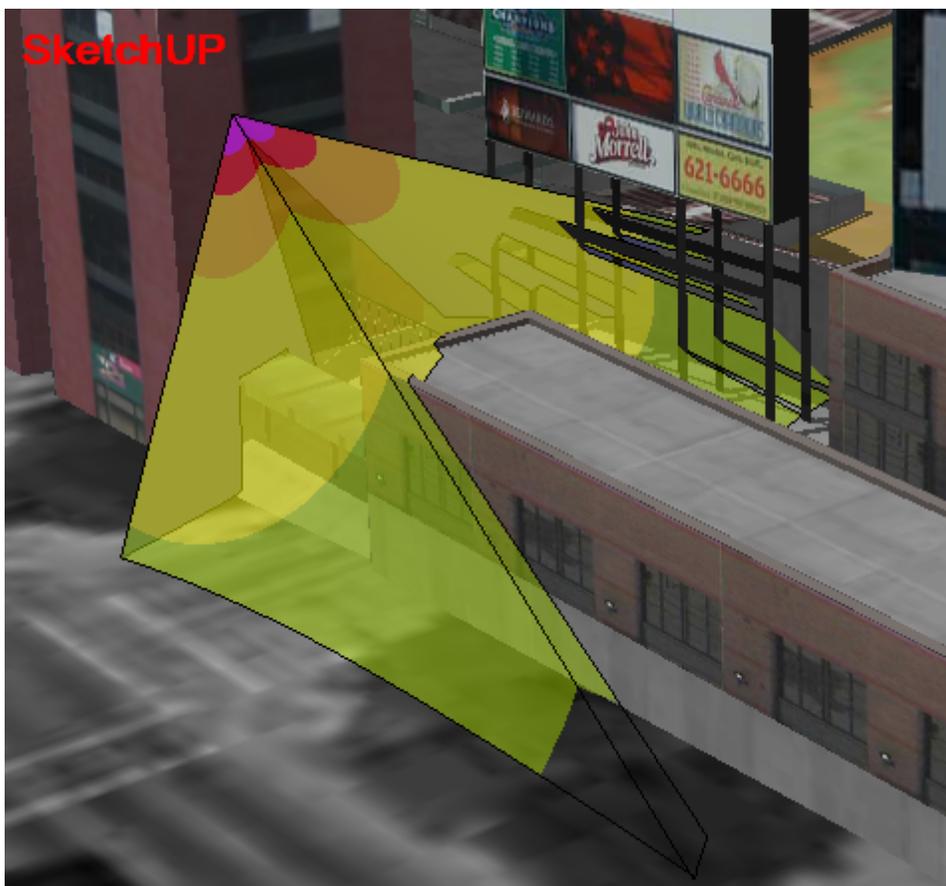
Free version of SketchUP does not support importing DXF format. To import DXF you need SketchUP paid version or you can search an appropriate plugin for importing DXF format for the free version of SketchUP.

Problem

There is a project of a building in 3D. The project must be supplemented by view areas of CCTV cameras, made with visualization of spatial resolution, taking into account lens distortion and shadowing from obstacles.

Order of work

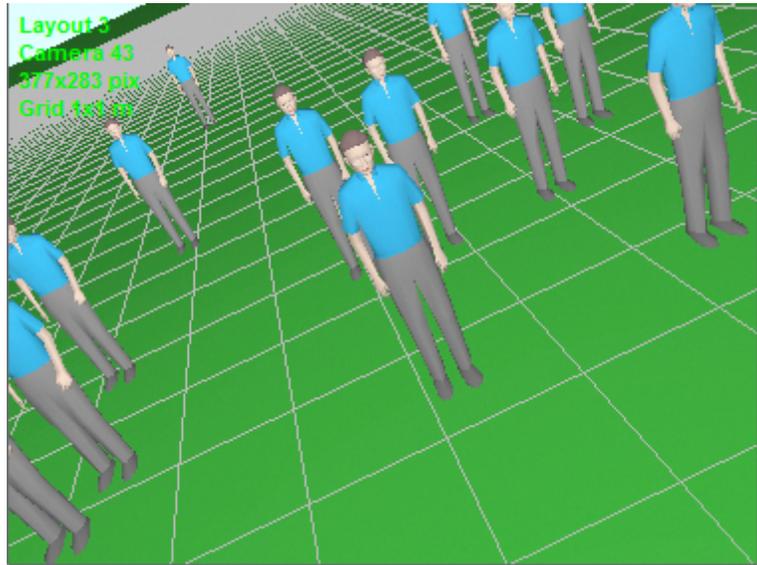
Please see this Example in the VideoCAD 8 Professional [Help system](#).



See also: [Drawing>Save as](#)^[202], [Drawing>Import DXF/DWG background](#)^[199], [Options box>Export](#)^[329], [Work with background in AutoCAD format](#)^[413], [Work with 3D models-territories](#)^[399], [Import of 3D models from SketchUp and Autodesk 3dsMax](#)^[397]

10.33 Example 33 Using camera rotation around its own axis

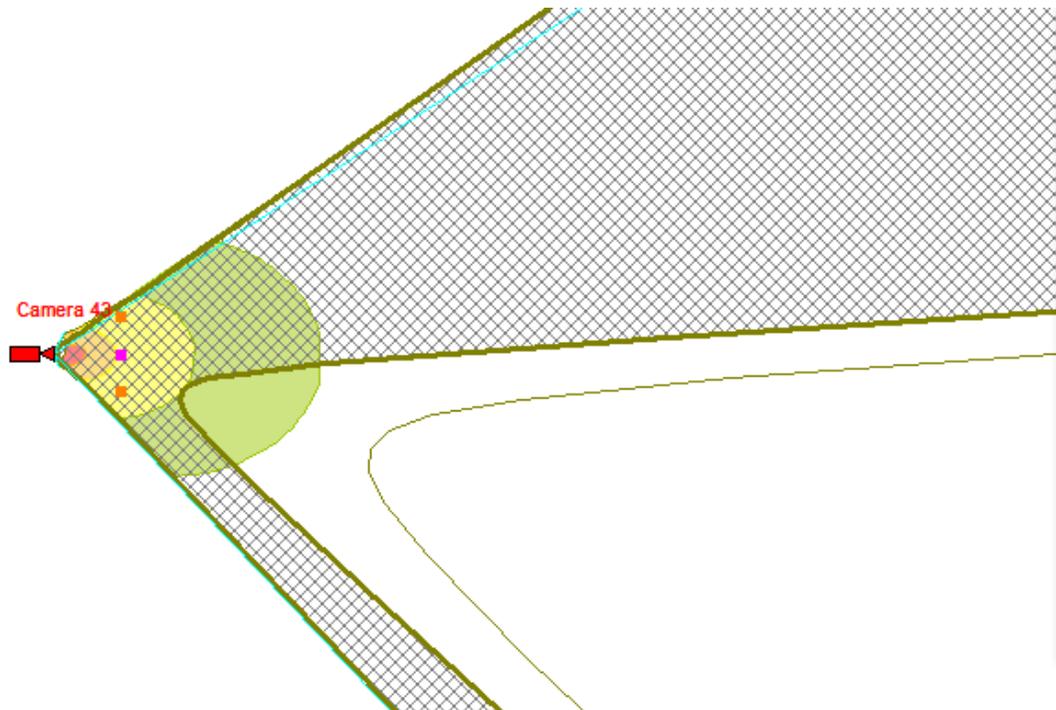
Rotation of camera around its own axis allows the change the shape of the view area projection. This feature can be useful in CCTV design. By turning a camera you can exclude from the view area unnecessary objects or vice versa expand the view area in the needed direction, without replacing the lens to a short-focus one, so without sacrificing the spatial resolution. At this a little rotation doesn't worsen readability of camera image for an operator.



Problem

Study the effect of camera rotation around its axis on the form of the view area projection.

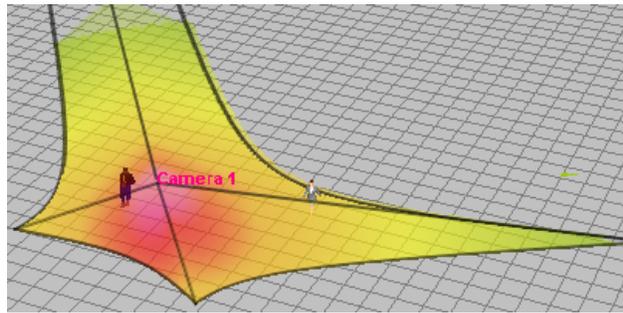
Please see this Example in the VideoCAD 8 Professional [Help system](#).



10.34 Example 34 Modeling lens distortion

There is a difference between the actual values of view angles given in the specification of cameras (lenses) and angle values obtained by calculation. The reason for the difference is the lens distortion. Distortion can lead to a significant deviation of the view area from a regular pyramid and warping of the spatial resolution distribution.

See more: [About lens distortion](#)^[429]



Accounting distortion when designing CCTV provides models of the view areas and images more close to reality, and thus more fully use cameras in the project.

Problem

There is a camera **AXIS M1004-W/M1014/M1034-W**. It is required to obtain a model of the view area, the distribution of the spatial resolution and image from this camera with taking into account lens distortion.

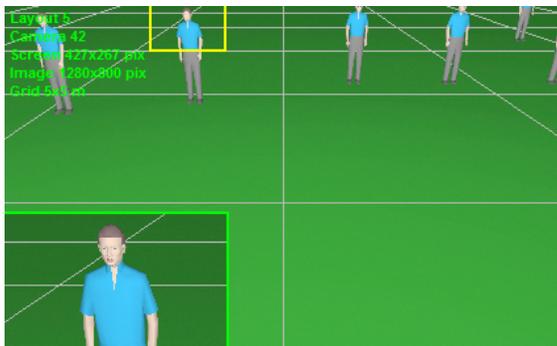
Camera parameters according to manufacturer's specification:

- Sensor format - 1/4";
- Lens focal length - 2,8mm;
- Real horizontal view angle - 80 degrees.
- Number of pixels 1280x800 (max)

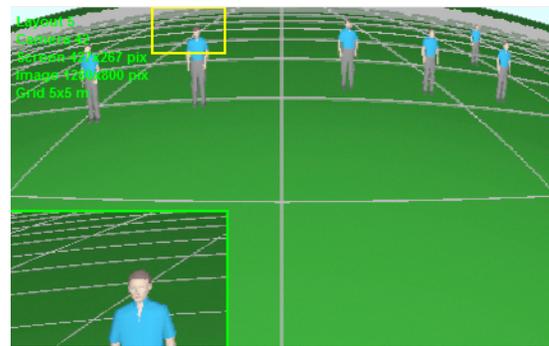
It is recommended to measure real view angles [practically](#)^[405].

Order of work

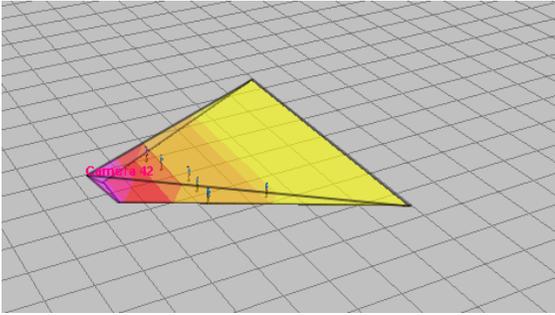
Please see this Example in the VideoCAD 8 Professional [Help system](#).



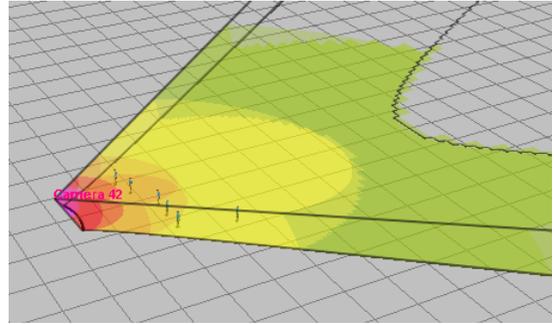
Without simulating distortion



With simulating distortion



Without simulating distortion

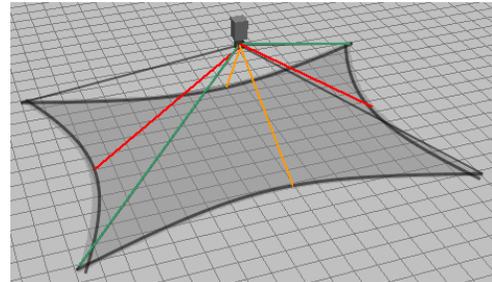


With simulating distortion

10.35 Example 35 Measuring real view angles

Starting from the eighth version of VideoCAD, the simulation accuracy of view areas of cameras in VideoCAD is greatly improved because of the possibility of simulating [lens distortion](#)^[429].

Three view angles (horizontal, vertical, diagonal) are computed inside VideoCAD from the [lens focal length](#)^[256] and [image sensor size](#)^[256] without accounting distortion. For most long-focus lenses distortion can be ignored, but in case of short-focus lenses the distortion introduces significant error in the calculation. To simulate distortion we need to know the lens focal length, image sensor size and at least one of the real angles.



The value of the real angle can be taken from the manufacturer's specifications, as in the [Example](#)^[403]. But not all manufacturers measure the real view angles of their cameras.

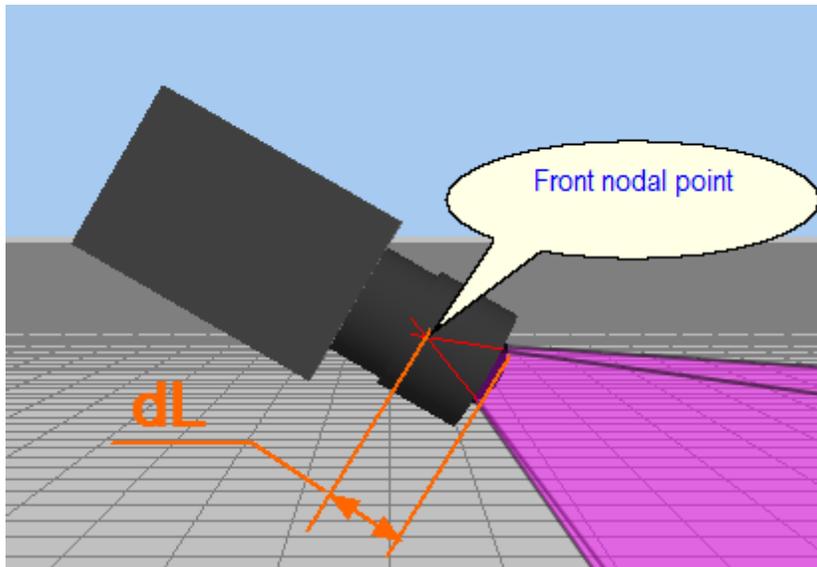
Lets consider a simple technique of practical measurement of camera view angles. Many variants of the technique are possible depending on the conditions.

Problem

There is a camera with a lens. It is necessary to measure the real angles: horizontal, vertical and diagonal. To accurately modeling the view area, taking into account lens distortion.

▣ The front nodal point of a lens and measurement inaccuracy

If the camera view area is in the form of a pyramid, the top of the pyramid will be in the **front nodal point of the lens**. The front nodal point of the lens is located on the front principal plane within the length of the lens on the main optical axis, but its exact position is unknown to us.



If we assume that the front nodal point of the lens is in the middle, the possible error of measuring the dimensions of the view area will be the ratio of half of the length of the lens by the distance from the middle of the lens to the screen.

For example, if the physical length of the lens = 40mm, and the distance from the middle of the lens to the screen = 1 meter, then the inaccuracy of measuring the size of the field of view = $40/2/1000 = 0.02$, ie + -2%.

The inaccuracy of measurement of an angle will be less depending on the angle. For example, if the angle is 90 degrees, the inaccuracy will be + -1.3%.

If this accuracy is not sufficient, you should use more distance from the camera to the screen, but it will require a larger screen, that is not always convenient.

Another way of reducing the inaccuracy is locating the front nodal point of the lens within the length.

To do this, perform 2 measurements at different distances between the front edge of the lens and the screen, for example 0.5 and 0.25 meters. Then, assuming that the view angles are constant, solve the system of equations, where the unknown is the distance from the front edge of the lens to the front nodal point.

Omitting the course of the solution, we present the resulting formula for the calculation.

$$dL = (S2 * L1 - S1 * L2) / (S1 - S2);$$

where:

- **dL** - unknown distance from the front edge of the lens to the front nodal point;
- **L1** - distances between the front edge of the lens and the screen at the first measurement;
- **L2** - distances between the front edge of the lens and the screen at the second measurement;
- **S1** - width (at measuring horizontal angle) of the field of view at the first measurement;
- **S2** - width (at measuring horizontal angle) of the field of view at the second measurement.

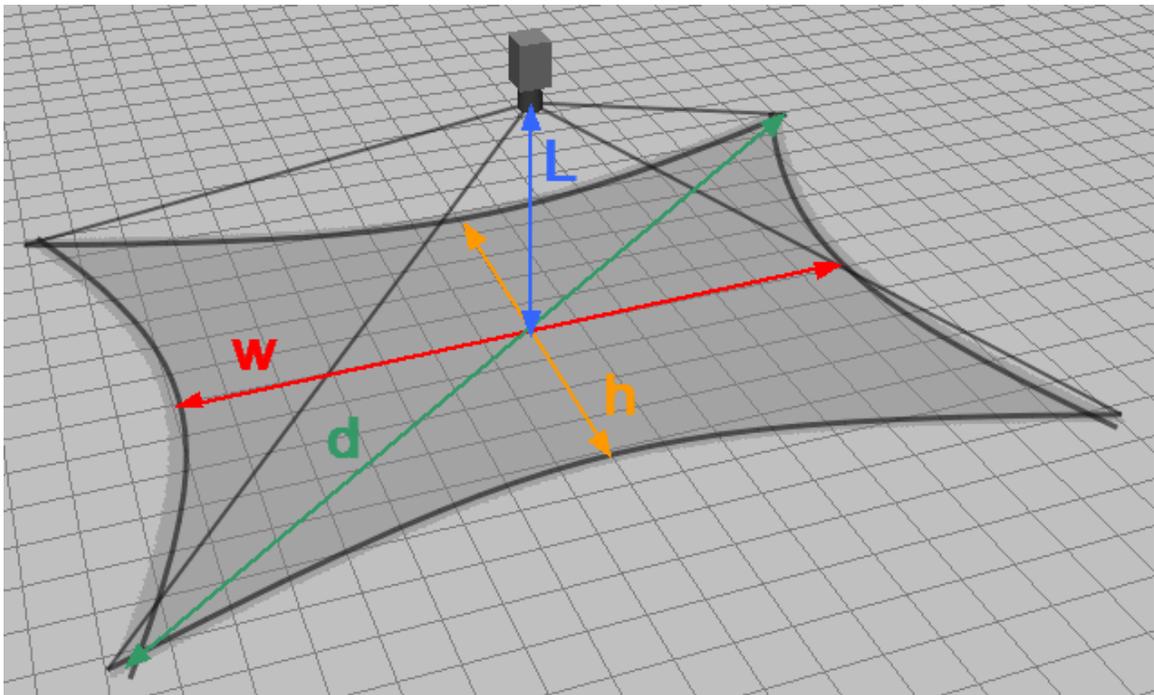
Order of work

1. Fully open the lens aperture, if possible.
2. Focus the lens on the camera working distance.

You should focus not on the distance to the screen but on a distance that will work the camera on. In most cases, this distance is the hyperfocal distance at maximum aperture. Focusing on the

working distance is performed for a case, if the angles of view or the position of the front nodal point will depend on the focus distance.

3. Secure the camera in front of a flat screen.
4. Close the aperture as possible to obtain a sharp image from the camera.
5. Adjust the camera position so that the main optical axis of the camera will be strictly perpendicular to the screen. Mark the center of the image on the screen.
6. Watching the image, mark the extreme points on the screen width, height, and diagonal field of view.
7. Measure the distances on the screen between the points on the boundaries and the marked center of the image. Boundary points must be strictly symmetrical relative the center. If it is not the case, then adjust the position of the camera and go back to **step 5**
8. Measure the distances between the points (field of view size in width, height and diagonal).
9. Measure the distance from the [front nodal point of the lens](#)^[405] to the screen.



10. Calculate the view angles using the formulas:

$$A_h = 2 * \text{ARCTAN}(h / (2 * L));$$

$$A_w = 2 * \text{ARCTAN}(w / (2 * L));$$

$$A_d = 2 * \text{ARCTAN}(d / (2 * L));$$

where (see image):

- **ARCTAN** - arc tangent, inverse tangent function;
- **A_h, A_w, A_d** - obtained real view angles in height, width and diagonal respectively;
- **h** - distance between extreme points on height of the field of view;
- **w** - distance between extreme points on width of the field of view;
- **d** - distance between extreme points on diagonal of the field of view;
- **L** - distance between lens front nodal point and the screen.

You can use the obtained angles in the [Sensor and Lens](#)^[267] box for precise modeling view area of

this camera.

It is possible to make very simplified test on a camera already installed.

- 1. Firstly measure sized and distances of real objects in cameras view area.*
- 2. Then construct 3D model in VideoCAD, place a camera.*
- 3. Then choose angles of view to obtain image model equal to real image from the camera.*

See also: [Sensor and Lens>Lens distortion](#)^[267], [About lens distortion](#)^[429], [Modeling lens distortion](#)^[403]

10.36 Example 36 Modeling panoramic cameras (Fisheye, 360°/180°)

Panoramic cameras are useful for monitoring small spaces.

The view area of such cameras is a hemisphere. Field of view is projected on the image sensor in the form of a circle.

Therefore, the original image produced by the image sensor is a circle in which the image of the scene subjected to a strong barrel distortion. Then, in the original image a target area is cut out, distortion is corrected in this area and in result an usual frame is obtained.

Users are interested in the output frame. The original image in the form of a circle is used as an intermediate.



VideoCAD allows to:

- Simulate the output frames without distortion with calculated pixel density;
- Simulate camera field of view and distribution of the spatial resolution in the Graphics window and the [3D Video](#)^[284].

See more [Panoramic](#)^[269]

Problem

There is a camera **AXIS M3007-PV**. The camera is mounted on a bracket at 3m height at a distance of 10 meters from a wall of 10 meters height. Camera is pointed down.

It is required to obtain a model of the control area, the distribution of the [spatial resolution](#)^[272] and [image](#)^[284] from this camera.

Camera parameters according to manufacturer's specification, crucial for modeling:

- Number of pixels 2592x1944 (5 MP)

Order of work

1. Create a camera by clicking the [New camera](#)^[166]  button. In the **New camera** box, in the **Camera icon** combobox choose an icon for the new camera with panoramic, for example **indoor/panoramic** .

A special icon is not obligatory. In the future it will be possible to change the icon in the  [Camera list](#)^[167] box.

2. Place the camera on the layout. At a distance of 10 meters from the camera create a wall of 10 m height using the  [Rectangle](#)^[184] tool.

3. Open the [Sensitivity and resolution](#)^[166]  box and specify number of pixels on Horizontal - **2592** and on Vertical - **1944**. Close the box and save changes.

*The most important parameter that determines the image resolution of panoramic cameras, is the **number of pixels of the image sensor**.*

Since the image sensor is rectangular in shape and view area of the camera is projected into a circle, not all pixels are involved in image formation.

In VideoCAD the **number of physical pixels** on the sensor horizontally and vertically are required. The number of pixels involved in the formation of the image (active pixels) will be calculated by VideoCAD.

High precision of specifying the number of pixels is not required. So for a 2-megapixel camera, you can enter 1200 * 900, for 3MP -1600 * 1200, for 5MP -2500 * 2000. Standard aspect ratio should be supported.

[Lens focal length](#)^[256] and [Image size at image processing](#) have no affect on the image resolution of a panoramic camera.

4. Open the [Camera geometry](#)^[251]  box and specify [camera installation height](#)^[257] of 3 meters.

5. Click on the  button to open the [Sensor and Lens](#)^[267] box.

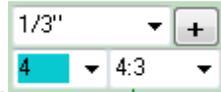
On the **Panoramic** panel mark the checkbox and specify angles of installation of the panoramic camera. To point the camera down, choose:

Pan angle = 0; (this value is not important when the camera is pointed down);

Tilt angle=90.



The lens focal length boxes in the Graphics window and the Camera Geometry box will be



colored by aqua-green.

To limit too big size of the view area projection use the [Maximum distance of drawing view area](#)^[265] box in the [Camera geometry](#)^[251]  box.

6. Assign to the camera a [Spatial resolution pattern](#)^[274] to visualize the spatial resolution (pixel density distribution). For this purpose open the  [Spatial resolution box](#)^[176]. Clear the [Active camera](#)^[274] checkbox, then choose the pattern "Home Office Scientific Development Branch 2009 (arbitrary resolutions)" in the [Pattern](#)^[274] list. Then click [Assign](#)^[277] to assign the chosen pattern to the active camera.

[Pattern criterion of spatial resolution](#)^[275] for panoramic cameras must be based on the spatial resolution (**Pixel per meter (Pixel per foot), Pixel for object**), but not on the field of view size. Criterion **Field-of-view height, % of Field-of-view for object** are not suitable to panoramic cameras, because of panoramic cameras have not a stable field of view.

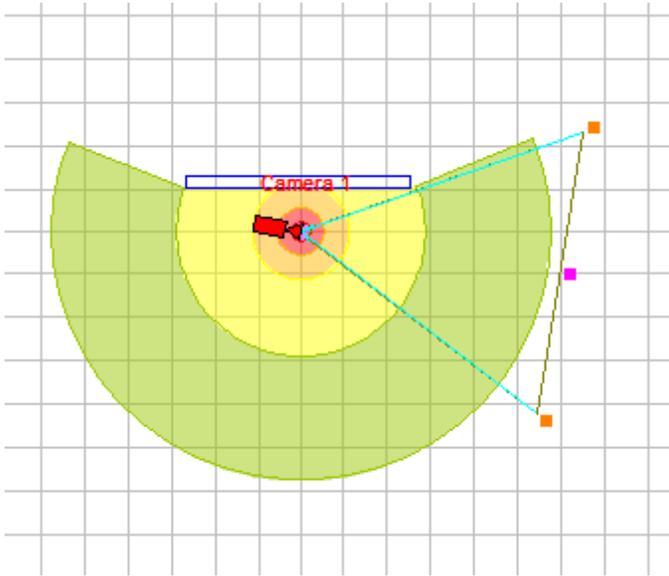
7. Enable and adjust the spatial resolution visualization in the Graphics window.

In the popup menu of the  [Shadow](#)^[172] button on the [Toolbar](#)^[164] of the Graphics window choose **Within projection**.

In the popup menu of the  [Fill projection](#)^[169] button choose **Filling**

In the popup menu of the  [Spatial resolution](#)^[176] button choose **Discrete color**.

As a result we will see in the Graphics windows the spatial resolution distribution of the camera **AXIS M3007-PV** on the [height](#)^[275] specified in the [Spatial resolution pattern](#)^[274] assigned to the camera.

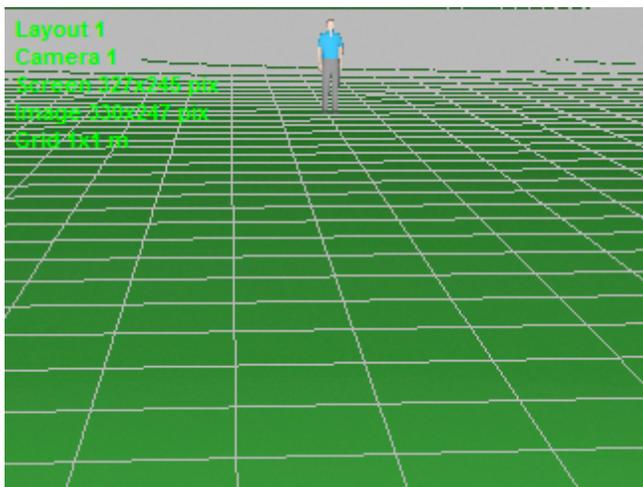


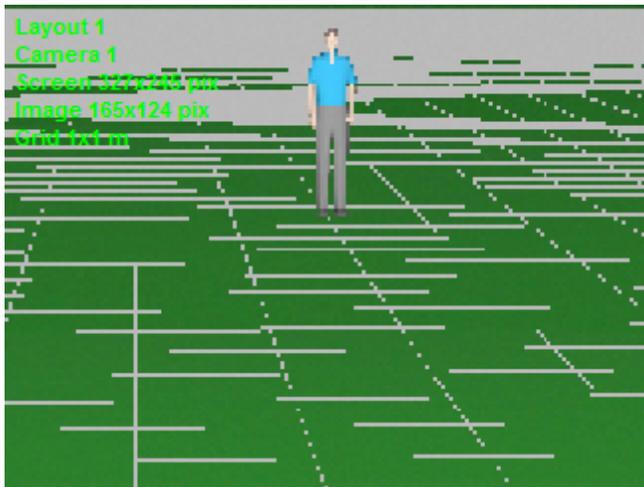
Considering the projection can be said, for example, that at a distance of **28 meters** from the camera at a height of $(2 + 0.5) / 2 = 1.25\text{m}$ the yellow region ends, and hence the pixel density, according to the selected pattern, equals 39 pixels per object of 1,64m height or $39 / 1.64 = \mathbf{24 \text{ pixels/meter}}$.

9. Open the  [3D Video](#)^[176] window. In VideoCAD Lite mark the main menu item Processing > [Resolution](#)^[287]. By directing the camera on regions of interest on the scene, we can see with what resolution these regions will be displayed by our camera.

10. Place  [3D model](#)^[190] of a man on the far border of yellow region, that is, where the pixel density is 24 pixels / meter. And direct the camera on the 3D model.

Let's try to change the [lens focal length](#)^[256] and make sure that only the size of the field of view is changed. Resolution of the image will remain constant.





Pan, tilt, made in the usual way does not affect the position of the panoramic camera. By rotation the camera in the usual way, you can view images from the panoramic camera in different directions in the [3D Video](#)^[284]. In this case, the view area will be limited at 180 degrees from the main optical axis of the lens. Beyond this limit the image is cut

You can change the **Lens focal length**, thereby changing the field of view size, but the image resolution in the 3D Video will always be limited by the calculated resolution of the panoramic camera.

If the calculated resolution is worse, the resolution of the **3D Video** will be artificially reduced. The **Image** line in the [Titles](#)^[287] displays a virtual number of pixels for correct simulation of the resolution.

The simulated resolution is exact only at the center of the frame. Towards the edges of the frame the actual resolution is slightly worse than simulated, but this error is negligible. The smaller the view angle, the more accuracy of simulating resolution on the edges of the frame.

For a more realistic model of the image, turn on modeling [compression](#)^[286].

See also: [Panoramic](#)^[269]

10.37 Example 37 Work with background in AutoCAD formats

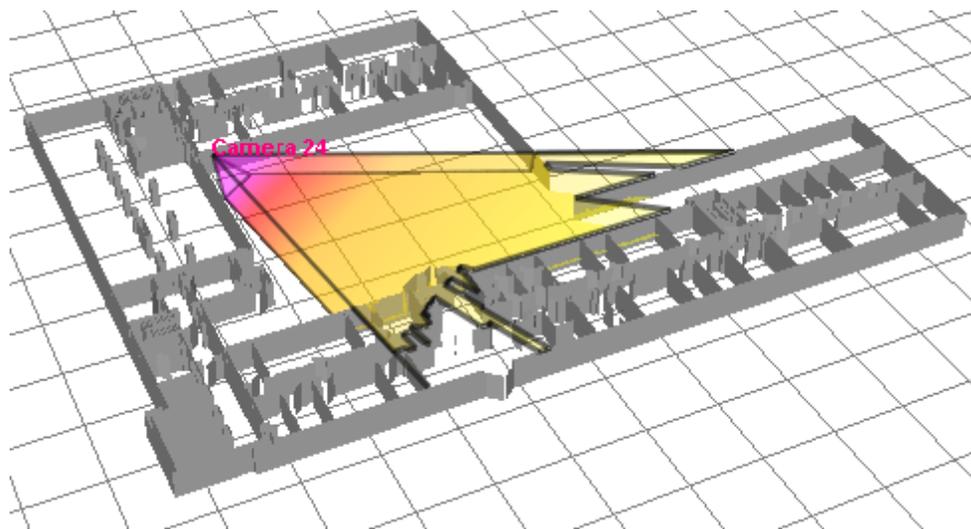
Normal sequence of actions at work in VideoCAD is:

1. Loading a background
2. Placing cameras, constructions, 3D models on the background.
3. Printing or exporting result of the work.

See more: [Choice of cameras' quantity and location on the original layout](#)^[359]

When the background is in AutoCAD format (DXF or DWG), the additional possibilities are offered:

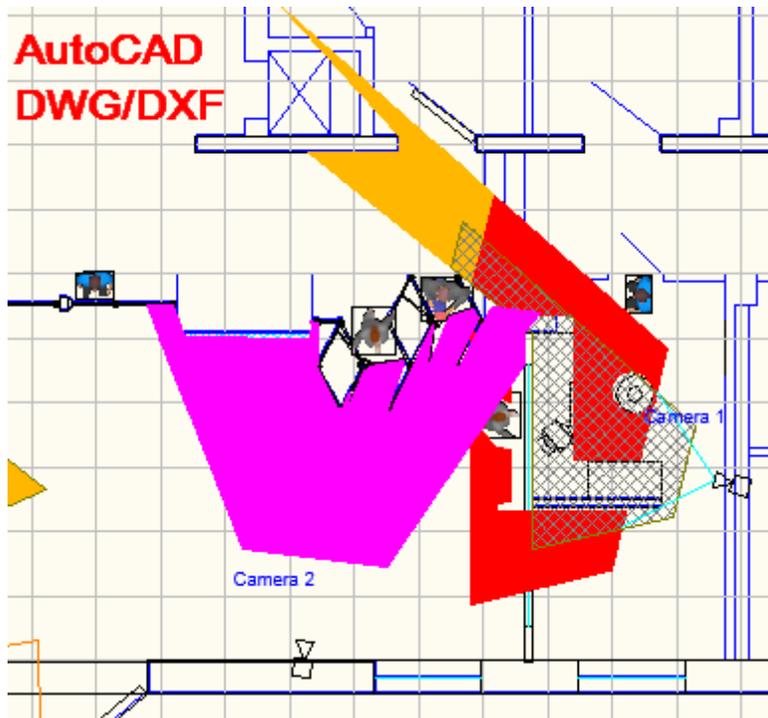
- Adjusting visibility of layers of the background, choosing layout, hiding texts .
- [Import constructions](#)^[199] from a 2D background in AutoCAD formats to 3D VideoCAD constructions automatically. Use of this tool allows to reduce efforts of outlining background to convert it to 3D constructions.
- Adding cameras and constructions of VideoCAD to the background in AutoCAD format on additional layers and then save the background to a file to work with it in AutoCAD.



Problem

There is a floor plan in DXF format. We need to place cameras on it and save the file with the cameras and their view area projections in the same format - DXF.

Please see this Example in the VideoCAD 8 Professional [Help system](#).

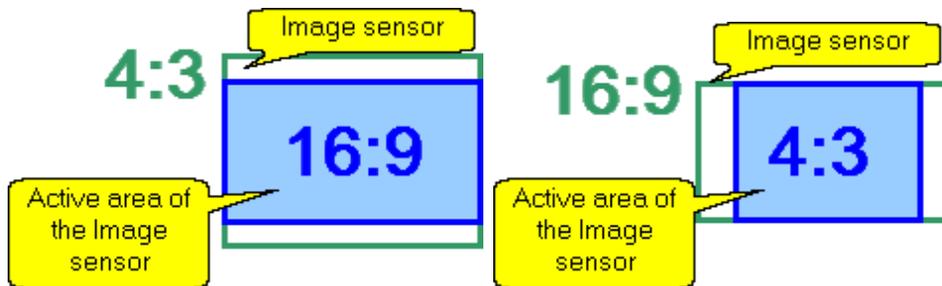


See also: [Drawing>Load background^{\[204\]}](#), [Drawing>Adjust background^{\[205\]}](#), [Drawing>Save as^{\[202\]}](#), [Drawing>Import DXF/DWG background^{\[199\]}](#), [Options box>Export^{\[329\]}](#), [Export 3D view areas to general 3D design software^{\[400\]}](#)

10.38 Example 38 Specifying active area size of the image sensor

The **Image sensor size** in VideoCAD implies the size of the entire light sensitive area of the image sensor, which can form an image with the maximum number of pixels horizontally and vertically.

Active area of the image sensor in VideoCAD implies an area of the image sensor on which the image is formed in a given mode of the camera. The sizes of the active area may be less than or equal to the **image sensor size**. Active area can differ in different modes of operation of the same camera.

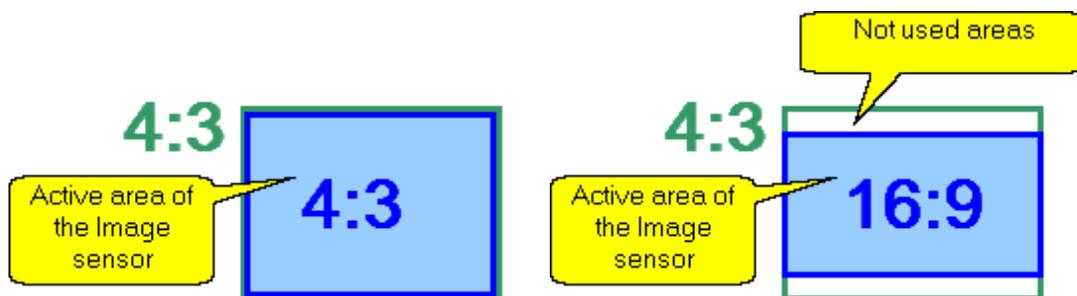


Exactly the **active area size** and **lens focal length** determines the **angles of view**, and through them influences on the results of camera modeling. Accuracy of specifying the active area size greatly affects the accuracy of modeling the camera.

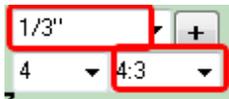
▣ The traditional method of specifying the active area size of the image sensor

In the past, specifying the active area size was a simple task. Each camera specification includes the **image sensor format (type)** in "vidicon" inches from the standard series ($1/4$ ", $1/3$ ", $1/2$ "..) which determines the size of image sensor. Although the translation of the format to the size is not accurate, the accuracy was acceptable for most practical purposes.

Native Aspect ratio of image sensors used in CCTV cameras was **4:3**. When camera's output image had the same aspect ratio of **4:3**, the active area occupied the entire image sensor. To get image with the Aspect ratio of **16:9** only central area across the width of the image sensor was used, and areas on the top and bottom of the image sensor was not used. Reducing the number of pixels of the output image had no affect on the active area size.



In such circumstances, to uniquely specify the active area of the image sensor it was enough to choose in the [Image sensor size](#)^[255] box the Image sensor format from a list of standard formats ($1/4$ " , $1/3$ " , $1/2$ " ..) and choose the Aspect ratio of the output image in the [Aspect ratio box](#)^[257] (**4:3, 16:9 ...**).



Now this way might be used for specifying active area size of the image sensor of cameras of previous generations, or in cases when accuracy of the simulation is not important. For modern cameras, this method is not sufficiently accurate. An error may exceed 20-30%.

- Image sensors with non-standard sizes have appeared, with fractional inch formats that do not fall into the list of the standard formats (eg, 1/2.8", 1/2.9", 1/3.2", 1/1.9" ..).
- Image sensors with aspect ratio different from **4:3** have appeared.
- In specifications of some cameras the sensor size is indicated more accurately in the form of diagonal length or side lengths, in millimeters.
- Cameras can form images with different numbers of pixels and aspect ratios.
- Some cameras in some modes use active area of the image sensor which does not touch the edges of the image sensor.

Examples of errors during specifying size of the active area of image sensor by the traditional way

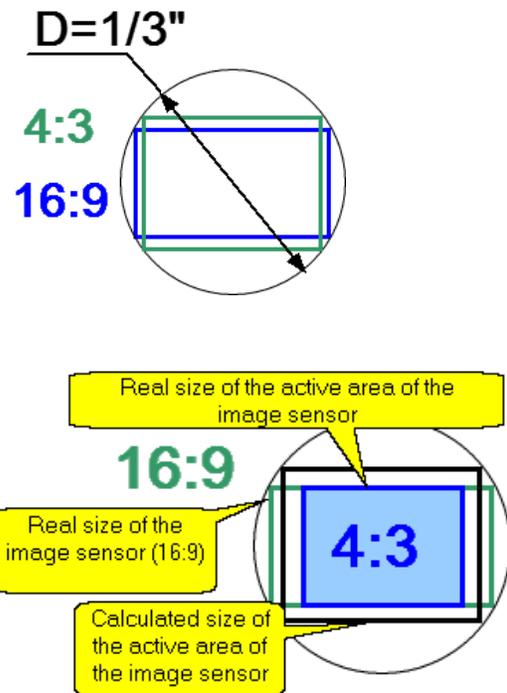
Example 1: A camera has an image sensor of 1/3" with aspect ratio of 16:9, but the output image has aspect ratio of 4:3.

The Image sensor format (1/3") determines the length of diagonal (6mm). Aspect ratio of any image sensor in the traditional way is always assumed to be 4:3. Therefore, in camera simulation the active area with diagonal of 6 mm and aspect ratio of 4:3 will be used, ie 4,8 * 3,6mm.

However, the real aspect ratio of the image sensor is 16:9, so the actual size of the image sensor with diagonal of 6mm will be 2,94mm to 5,23mm.

At the same time, the aspect ratio of the output image (=aspect ratio of the active area) is 4:3, so that the active area is formed by "cutting" side areas from the Image sensor of 16:9 laterally. Therefore, the actual size of the active area is 3.92 * 2,94mm.

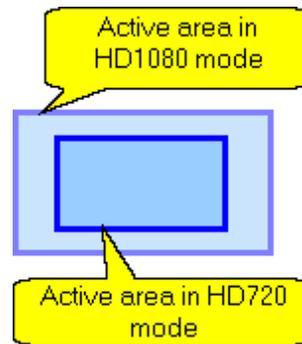
Thus, the actual size of the active area image sensor, and hence the field of view will be **20% less** than the calculated values.



Example 2: Some cameras can produce images with reduced number of pixels using the active area in the central part of the image sensor. The active area does not touch the edges of the image sensor. The size of the active area may depend on the number of pixels of the output image.

For example, the same image sensor SONY Exmor R IMX291LQR has format 1/2.8" (diagonal 6.46 mm) in the full HD1080 mode and 1/4.2" (diagonal 4.31 mm) in the HD720 mode. In the HD720 mode the image sensor uses only the central part of pixels.

If you use format 1/2.8" in the HD720 mode, the actual size of the field of view will be **33% less** than calculated one.



Problem

For accurate camera modeling we must specify the sizes of the active area of the image sensor in a given mode of the camera.

Order of work

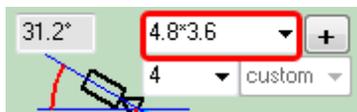
1. If **side sizes of the active area of the image sensor** in a given camera mode are known, then enter them directly.

Direct specifying side sizes of active area of the image sensor

If you know the side sizes of active area of the image sensor in a given mode of the camera, simply enter them in the [Image sensor size](#)^[255] box separated by asterisk in the form **W*H**. Where W and H - width and height of the active area of the image sensor in millimeters.

For example: **4.8*3.6**

Thus the size of the active area image sensor was specified and the problem is solved.



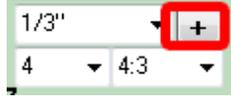
However, in most cases, camera specifications don't give the side sizes of the active area for each camera mode separately, so the program will have to calculate them. For the calculation it is necessary to set the following parameters, are known in the most cases:

- Image sensor size (it is better to set [side sizes in millimeters](#)^[418], but possible via the [length of diagonal](#)^[418] (format, type) and aspect ratio of the image sensor).
- [Aspect ratio of the output image](#)^[420].
- [Crop](#)^[420] - a factor of decreasing active area size. The Crop is provided for cases when the active area does not touch the edges of the image sensor. In other cases Crop=1.

On the basis of this information, VideoCAD will calculate size of the active area of the image sensor, which will be used in camera modeling.

You can specify the required parameters in the [Image sensor size](#)^[255] and the [Aspect ratio](#)^[257] boxes in the [Camera Geometry](#)^[251] box, but it is more convenient to do it in the special [Sensor and Lens](#)^[267] box .

Open the [Camera Geometry](#)^[251] box, and then clicking on the **Sensor and Lens** button



, open the [Sensor and Lens](#)^[267] box.

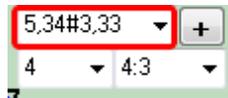
2.1.1 If the **image sensor side sizes** in millimeters are known, then enter them directly.

☐ Direct specifying the image sensor side sizes

If the camera specification contains the sensor side sizes (that is the maximum size of the active area), then enter them to the [Image sensor size](#)^[255] box separated by hash, in the form W#H. Where W and H - width and height in millimeters of the image sensor.

For example: For the camera WV-SFV631L the sensor sizes can be found in the string: **Scanning area 5.346 mm (H) x 3.336 mm (V)**

Enter to the **Image sensor size** box **5.346#3.336**



2.1.2 When the image sensor side sizes are unknown, specify them via the **length of diagonal** (format, type) and **aspect ratio** of the image sensor.

☐ Specifying image sensor size via the length of diagonal and the aspect ratio

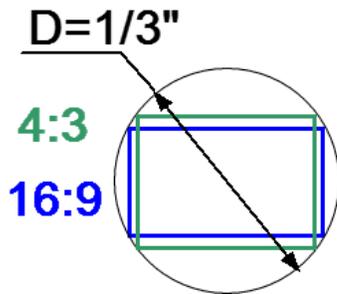
The length of diagonal in "vidicon" inches as a format (type) almost always exists in camera specification. For example, **1/2"**, **1/2.9"**. Enter the format to the [Image sensor size](#)^[255] box. In the box choose format from the list or type any value, for example, **1/3.15"**, **1/2.75"**. If you enter a value which not found in the standard list, the Image sensor size box **turns yellow** and VideoCAD will calculate diagonal from the format.

If a specifications give diagonal length in millimeters, it is preferable to use it. The value in millimeters is usually more accurate. The diagonal length in millimeters must be typed with the letter **d**, for example **d6.0** - the length of diagonal is 6mm.

*For example: For the camera WV-SFV631L the image sensor format can be found in the line: **Image Sensor Approx. 1/3 type;***

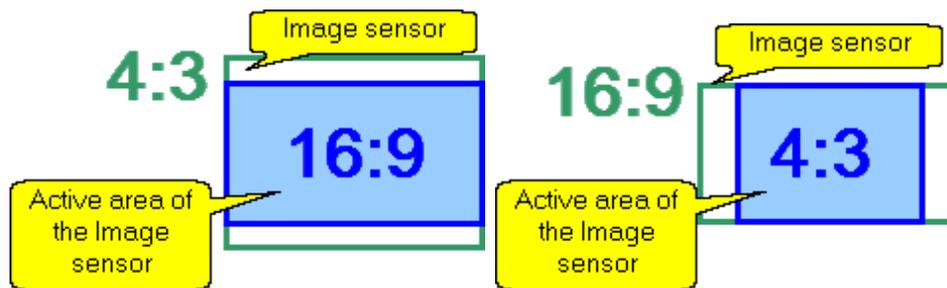
*In the specification of the image sensor SONY Exmor R IMX291LQR the length of diagonal line can be obtained from the line: **Diagonal 6.46 mm (Type 1/2.8)***

To set the size of image sensor through the format or length of diagonal you must also specify the **aspect ratio of the image sensor**, since Image sensors with the same diagonal, but different aspect ratios will have different sizes.



One should distinguish between the **aspect ratio of the image sensor** and the [aspect ratio of the output image](#)^[257].

Aspect ratio of the output image is the ratio of sides of the image produced by the camera in the given mode. It equals to the ratio of sides of the active area of image sensor in the given mode. The aspect ratio of the output image can be different from the aspect ratio of image sensor. A camera with the same image sensor in different modes can produce images with different aspect ratios.



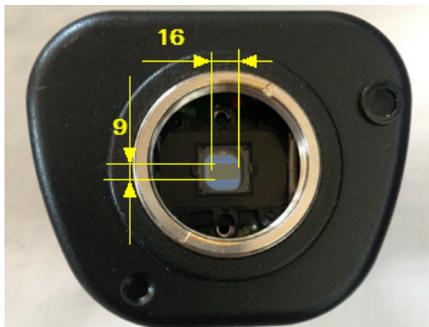
You can learn the aspect ratio of image sensor by several ways:

1. From the camera specification.

For example: In the specification of the camera WV-SFV631L sensor sizes can be found from the string: **Scanning area 5.346 mm (H) x 3.336 mm (V)**

Aspect ratio of the image sensor: $5.346 / 3.336 = 1.60 = 16:10$

2. You can learn the aspect ratio of the image sensor visually, if you remove the camera lens. To determine the aspect ratio of the image sensor, photograph it and calculate the ratio of the number of pixels in the image of the image sensor vertically and horizontally.



3. It is possible to calculate a ratio of the maximum number of horizontal pixels to the maximum number of vertical pixels in all possible modes of the camera.

For example, a camera can produce images with the following number of pixels:

1920 x 1080, 1280 x 720, 640 x 360, 320 x 180, 160 x 90

1600 x 1200, 1280 x 960, 800 x 600, 640 x 480, 400 x 300, 320 x 240, 160 x 120

The maximum number of horizontal pixels - **1920**, the maximum number of vertical pixels - **1200**.

Expected **aspect ratio of the image sensor** $1920/1200=1,6=16:10$

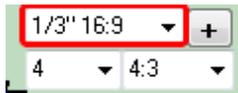
Enter the obtained values of the **diagonal (format)** and the **aspect ratio of the image sensor** to the [Image sensor size](#)^[255] box in the [Camera Geometry](#)^[251] separated by space character. If the aspect ratio of the image sensor is **4:3**, it can be omitted.

For example:

1/3"

1/3" 16:9

d6.0 16:9



Or enter the **diagonal (format)** and the **aspect ratio of the image sensor** separately to the **Image sensor>Size** and **Image sensor>Aspect ratio** in the [Sensor and Lens](#)^[267] box.



2.2 Then you need to specify the **aspect ratio of the output image**.

☐ Specifying aspect ratio of the output image

The **Aspect ratio of the output image** equals to the aspect ratio of the active area of the image sensor. It equals to the ratio of number of pixels of the output image horizontally and vertically in the given camera mode. The **aspect ratio of the output image** can be different from the [aspect ratio of image sensor](#)^[419]. A camera with the same image sensor in different modes can produce images with different aspect ratios.

For examples for the following number of pixels:

$1920 / 1080=1.78=16:9$. In the mode **1920 x 1080** the aspect ratio of the output image = **16:9**

$1600 / 1200=1.33=4:3$. In the mode **1600 x 1200** the aspect ratio of the output image = **4:3**

Enter the **Aspect ratio of the output image** to the [Aspect ratio](#)^[257] box in the **Camera Geometry**.



It is convenient to use the [Image sensor calculator](#)^[349], which can be invoked by the **Calculator** button  in the **Sensor and Lens** box.

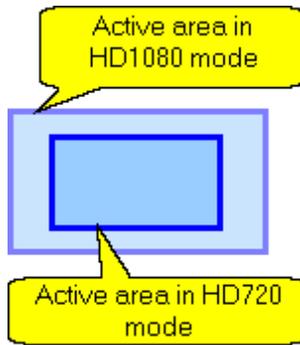
2.3 If it is possible that the active area does not touch the edges of the image sensor, you must set the **crop factor**.

☐ Specifying the Crop factor

Crop is a factor of decreasing active area size provided for case when the active area does not

touch the edges of the image sensor. In other cases Crop=1.

For example, the same image sensor has format 1/2.8" (diagonal 6.46 mm) in the full HD1080 mode and 1/4.2" (diagonal 4.31 mm) in the HD720 mode. In the HD720 mode the image sensor uses only the central part of pixels.



When setting the crop factor one should be guided by the rules:

1. If, in a given mode, the camera uses the maximum number of pixels of at least one dimension (horizontal and (or) vertical), it is used the whole width or height of the image sensor, then the Crop factor equals one.

For example, a camera can produce images with the following number of pixels:

1920 x 1080, 1280 x 720, 640 x 360, 320 x 180, 160 x 90

1600 x **1200**, 1280 x 960, 800 x 600, 640 x 480, 400 x 300, 320 x 240, 160 x 120

The maximum number of horizontal pixels - **1920**, the maximum number of vertical pixels - **1200**.

The modes with maximum numbers of pixels: **1920** x 1080 and 1600 x **1200**.

2. If in the given camera mode **not the maximum number of pixels is used**, it is necessary to get know how the camera produces images with less than the maximum number of pixels. The 3 ways are possible:

1. By resizing the image with the maximum number of pixels of at least one of the direction.
2. Using only the central part of the image sensor, do not touch sides of image sensor.
3. Simultaneous use of 1 and 2 ways. The intermediate image is produced using the center area of the image sensor, and then the resulting image is resized.

In the first case, the size of the active area of the image sensor is not dependent on the number of pixels of the output image, therefore the Crop = 1.

In the second and third cases, the size of the active area of the image sensor decreases with the number of pixels of the output image.

First of all it is necessary to search the specification information whether the image sensor size (format) or angles of view depend on the number of pixels of the output image. If such information is not available, it is likely that the Crop = 1. But if there is a suspicion that the camera reduces the size of the active area, you can check the camera practically:

1. Display the image from the camera in the mode with the maximum number of pixels of the output image.
2. Switch to the mode with reduced number of pixels and note whether the size of the field of view is reduced.

If the size of the field of view is not reduced or it is reduced only in one direction, then the Crop = 1.

If the size of the field of view is reduced in both directions in proportion of reduction in the number of pixels of the output image, it is necessary to separately calculate the horizontal and vertical

ratio of the number of pixels in the given camera mode to the maximum number of pixels in appropriate direction. **Crop equals to the minimum of these ratios.**

For example, if the camera has modes of 1920 x 1080 and 1280 x 720, and the image in 1280 x 720 mode is formed by a central area of the image sensor, then the **Crop = 720/1080 = 1920/1280, or 0.67.**

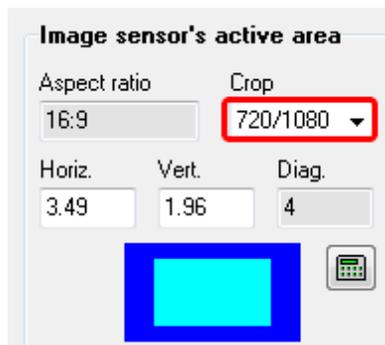
If the size of the field of view is reduced in both directions less than the reduction of the number of pixels of the output image, it is necessary to separately calculate the horizontal and vertical ratios of the field of view size in the given mode of the camera to the size the field of view in the mode with the maximum number of pixels. **Crop equals to the minimum of these relations.**

As you can see, in the most cases the Crop = 1. But on those rare occasions when the Crop <> 1 ignoring this fact can result to significant error. To calculate the crop factor it is convenient to use the [Image sensor calculator](#)^[349] that can be invoked by clicking on the Calculator button  in the [Sensor and Lens](#)^[267] box.

Enter the Crop to the [Image sensor's active area> Crop](#)^[268] box in the [Sensor and Lens](#)^[267] box. You can enter a number with decimal point or ratio separated by slash /.

For example:

0.67
720/1080



You can enter the Crop to the [Aspect ratio](#)^[257] box in the [Camera Geometry](#)^[251] separated by space after the aspect ratio of the output image.

For example: **16:9 0.67**



As a result of specifying all parameters, on the [image in the Sensor and lens box](#)^[268] the aspect ratios, relative position and size of the active area on the image sensor will be schematically displayed.

Examples of image sensor images of real cameras:

Aspect ratio of Image sensor	4:3	16:9	4:3	16:9	16:10	16:10	16:9 (1920*1080)
Aspect ratio of Active area of Image sensor	4:3	16:9	16:9	4:3	16:9	4:3	16:9 (1280*720)

							20)
Crop	1	1	1	1	1	1	720/10 80=0.6 7
Image							

In the [Image sensor's active area](#)^[268] **Hor. Vertical Diag.** boxes the calculated sizes of the active area of the image sensor will be displayed.

In the [Lens](#)^[269] **Calculated angles> Hor. Vertical. Diag.** the calculated view angles will be displayed.

The sizes of the active area may be adjusted or typed new values.

After setting all parameters for recording the result to the active camera, click **Save**.

3. After specifying all parameters it is recommended to verify correctness of the set active area size using the obtained angles of view.

Verifying correctness of the set active area size using camera view angles

Sometimes camera specifications include view angles with a lens with known focal length. Considering these angles as a result of practical measurements, it is possible to verify correctness of the set active area size by comparing the angles from specification with the angles calculated by VideoCAD in the [Sensor and Lens box>Lens> Calculated angles> Hor. Vertical. Diag](#)^[269]. The comparison may confirm the correctness of the obtained size of the active area of the image sensor or show an error. If an error will be detected, please carefully check all parameters you specified.

When verifying it is necessary to bear in mind the following:

- You need to know which angle is given in the specification of the camera (horizontal, vertical or diagonal) and compare it with the same calculated angle.
- You need to know in what mode of the camera the angle is obtained and simulate this particular mode.
- When the lens focal length is less than 6mm possible discrepancy between the calculated angles and angles from the specification because of [lens distortion](#)^[429].
- The difference between the calculated and specification's values of angles within 5% is normal, due to measurement error, error of specifying the size of image sensor and lens focal length.

You can measure the view angles [practically](#)^[405].

See also: [About Lens distortion](#)^[429].

10.39 Example 39 Teaching materials

When studying VideoCAD the educational article series **The principles of CCTV design in VideoCAD** is very useful.

[The principles of CCTV design in VideoCAD. Part 1. Camera view area](#) (*.pdf)

[The principles of CCTV design in VideoCAD. Part 2. Person detection area, person identification area, license plate reading area. Spatial resolution.](#) (*.pdf)

[The principles of CCTV design in VideoCAD. Part 3. 3D modeling in VideoCAD](#) (*.pdf)

[The principles of CCTV design in VideoCAD. Part 4. Illumination and camera sensitivity in CCTV](#) (*.pdf)

[The principles of CCTV design in VideoCAD. Part 5. Video surveillance of moving objects.](#) (*.pdf)

[The principles of CCTV design in VideoCAD. Part 6. Lens distortion in CCTV design.](#) (*.pdf)

... to be continued...

These articles contain a short theoretical material and illustrated step by step instructions on how to use VideoCAD.

You can download the articles here <http://www.cctvcad.com/CCTVCAD-Download.html>

There you can also find:

VideoCAD User's Guide in *. pdf format

Package to import 3D models.

Other useful programs for CCTV design.

Part



XI

**Recommendations on
the program use**

11 Recommendations on the program use

▣ Precision in calculations

VideoCAD calculates results on the base of laws of geometrical optics, video sensor's characteristics, lighting engineering and radiometry. Mathematical precision in VideoCAD calculations is not less than $\pm 1\%$.

At the same time, parameters of real cameras and lenses are not so precise.

The difference with reality depends on the accuracy of the input data.

A big influence on the accuracy of camera modeling has accuracy of [specifying image sensor sizes](#)^[415]. For wide-angle lens consideration of [lens distortion](#)^[429] is very important.

Nobody can guarantee that just your camera and lens have no significant inequality of focal length value with the one declared in the specification. It is advisable to test a camera with a lens [practically](#)^[405] in especially crucial cases.

If not performing such a test, it is recommended to leave a reserve about 10-15 % in the results.

▣ Program speed and system requirements

Recommended system requirements:

- IBM compatible computer with 2 Core processor;
- 1 Gb of RAM;
- 40 Mb of free hard disk space;
- SVGA video adapter with Open GL 3D Hardware support;
- Windows 2000, Windows XP, Windows Vista, Windows 7, Windows 8, Windows 10 operating system;
- Wheel Mouse;

As with other CAD software, real system requirements greatly depend on complication of your working materials.

If you use a lot of 3D models, background file of tens of megabytes, you need more productive hardware.

But you can simplify your materials and make the same work on outdated computer. Thus there can't be clear system requirements which are correct in all cases.

Program speed depends on several factors.

Redraw speed of the image depends on number and complexity of displayed 3D models and the size of opened 3D Video. VideoCAD offers powerful but resource-intensive operations for image processing, which can be enabled or disabled.

The [3D Video](#)^[284] and 3D World windows opened simultaneously decelerate program speed.

It is recommended to enable the resource-intensive operations only when needed and disable them during normal operation.

[VideoCAD Lite](#)^[31] and [VideoCAD Starter](#)^[45] may seem less demanding of computer resources because of absence of resource-intensive tools. However, these tools when they are not needed, can be disabled in version Professional too.

See details: [Errors in rendering 3D images](#)^[290]

▣ Mastering VideoCAD

To master the program it will be very useful to get acquaintance with [The principles of CCTV design in VideoCAD](#) articles. See also [Examples of work with VideoCAD](#)³⁵³.

11.1 About lens distortion

Studying the manufacturers specifications of lenses and cameras we can see that in many cases the actual view angles obtained by measurement and listed in the specification do not coincide with the calculated view angles for an ideal lens, based on the [lens focal length](#)^[256] and the [size of the image sensor](#)^[258].

For example, the specification of the lens **T2314FICS-3** (Computar) contains the following values:

Model No.	T2314FICS-3		Effective Lens Aperture	Front	Ø22.8mm
Focal Length	2.3mm		Rear		Ø7.0mm
Max. Aperture Ratio	1:1.4		Back Focal Length	7.1mm	
Max. Image Format	4.8mm x 3.6mm(Ø6mm)		Flange Back Length	12.5mm	
Operation Range	Iris	F1.4 - F16C	Mount	CS-Mount	
	Focus	0.2m - Inf.	Filter Size	—	
Control	Iris	Manual	Dimensions	Ø34.5mm x 35.4mm	
	Focus	Manual	Weight	43g	
Object Dimension at M.O.D.	60.8cm x 37.5cm				
Angle of View	D	1/3 type	1/4 type	106.7°	
	H			86.3°	
	V			65.3°	
Operating Temperature	-20°C - +50°C				

With lens focal length of 2.3 mm and the size of the image sensor **1/3"** real horizontal view angle is **113.30 deg.**, and the vertical view angle is **86.30 deg.** But calculation gives lower values - **92.40 deg.** and **76.10 deg.**

The form of the camera view area with this lens differs from the standard pyramid and therefore can not be accurately calculated by lens calculators or modeled by CCTV design programs of previous generation.

The cause of warping the view area is the **Lens distortion**. The Lens distortion arises from the fact that the optical magnification of a real lens is not constant over the entire field of view. Optical magnification varies depending on the distance from the center to the edges of the field of view.

Depending on whether the optical magnification of a lens is decreased or increased with distance from the center of the field of view, the **barrel distortion** and the **pincushion distortion** is distinguished.

*The titles **barrel** and **pincushion** are associated with the distortion of the **image**. But the shape of the field of view varies oppositely the title. Thus, with the **barrel distortion** the image resembles a barrel, and the shape of the field of view resembles a pillow. With the **pincushion distortion**, the image resembles a pillow, and the shape of the field of view - a barrel.*

Lens distortion leads to warping:

- shape of view area and field of view;
- image from the camera;
- distribution of the [spatial resolution](#)^[272].

*The **Lens distortion** should not be confused with the **Perspective distortion** (Fig. 7^[431]), which is natural on all images obtained with wide-angle lenses. **Perspective distortion** does not change pyramidal shape of the view area, rectangular shape of field of view and distribution of the [spatial resolution](#)^[272].*

Barrel distortion

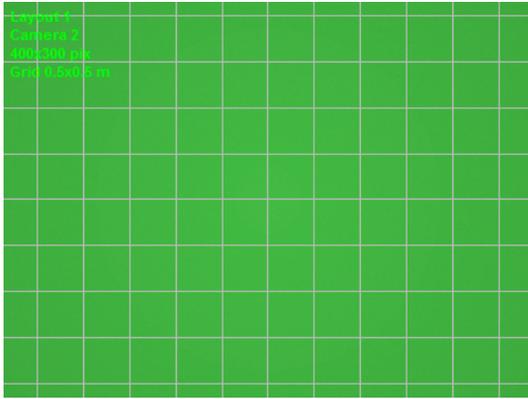
If by moving away from the center of the field of view the **optical magnification** decreases, then

objects at the edges of the field of view seem compressed, and the **spatial resolution** decreases from the center to the edges, and the field of view is stretched to the edges. **Real angles** in this case are more than the **calculated angles**. This is called **Barrel distortion**. The Barrel distortion is most common and usual for wide angle lenses.

In particular, the lens **T2314FICS-3** has just the Barrel distortion. Let's consider a model of image from this lens, the model of field of view, view area projections built with and without simulating distortion. Position of the camera in both cases is constant.

*Note the warping of distribution of the **spatial resolution** (Fig. 4⁴³⁰). Barrel distortion increases the field of view, but reduces the spatial resolution, the farther from the center of the field of view, the stronger.*

Without lens distortion simulation



With simulation of barrel distortion

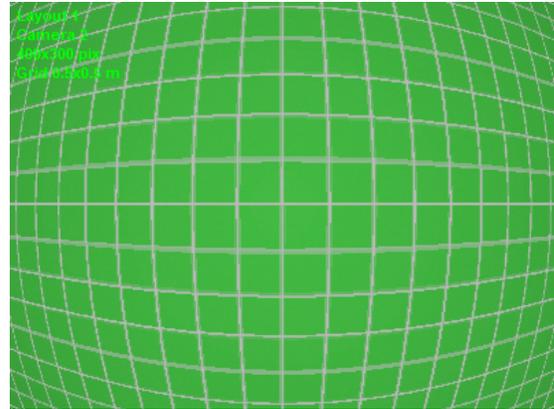


Fig. 1,2. View of a cross-hatch. With barrel distortion the cross-hatch resembles a barrel.

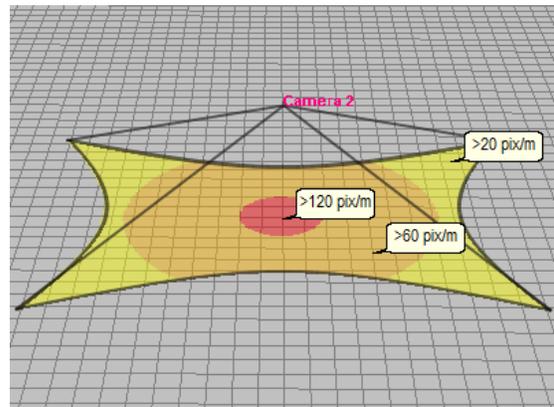
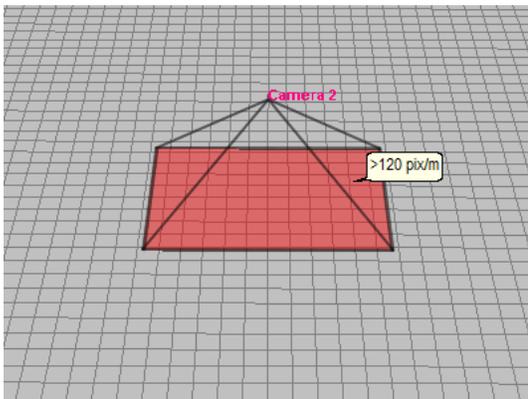


Fig. 3,4. Field of view. With barrel distortion the cross-hatch resembles a **pillow**. The **spatial resolution** decreases from the center to the edges.

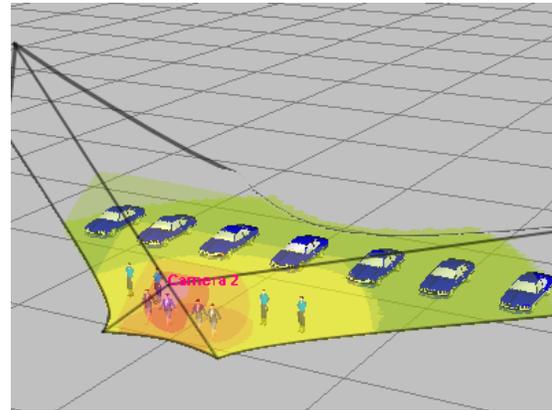
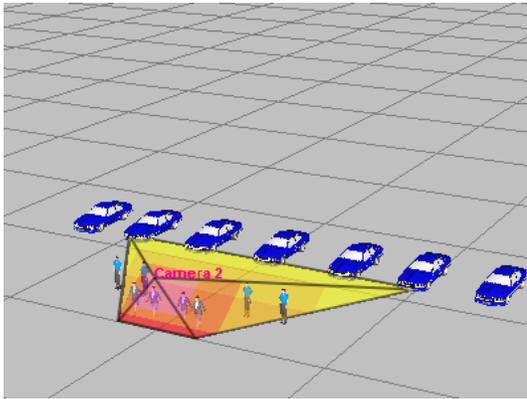


Fig. 5,6. View are and scene model.

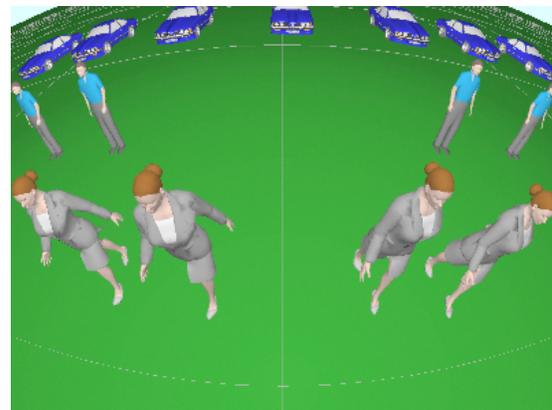
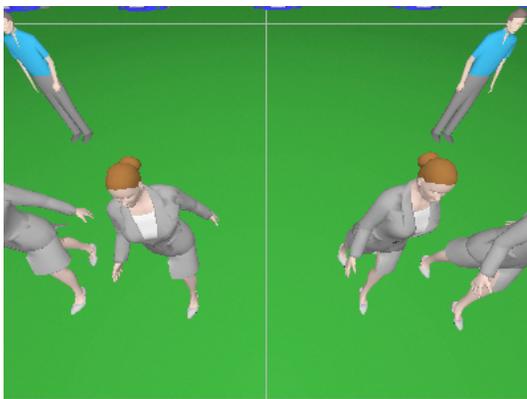


Fig. 7,8. Camera image model. The slope of the men in the upper corners (**Fig. 7**) is caused not by the lens distortion but by the **perspective distortion**, which is natural for any wide-angle lens.

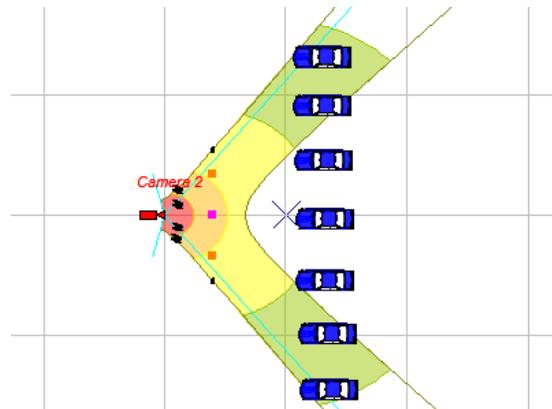
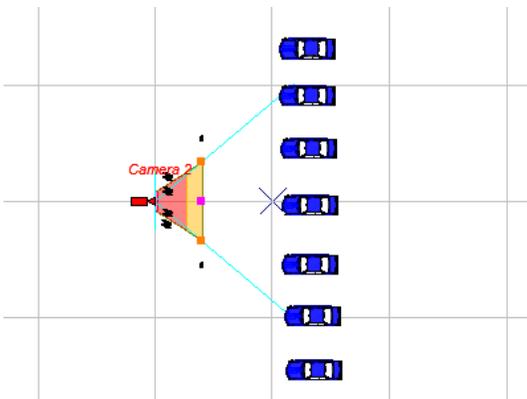


Fig. 9,10. View area projection. [View area projection bounds](#)¹⁶⁸ in the **Projection** mode.

▣ **Pincushion distortion**

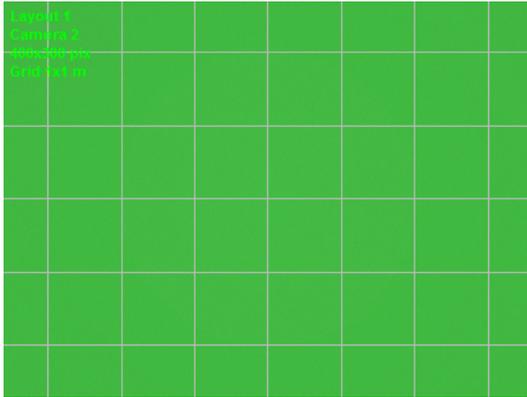
If by moving away from the center of the field of view the **optical magnification** increases, then objects at the edges of the field of view seem stretched, and the **spatial resolution** increases from the center to the edges, and the field of view is compressed to the edges. **Real angles** in this

case are less than the **calculated angles**. This is called **Pincushion distortion**. The **Pincushion distortion** occurs seldom with teleobjective lenses.

Let's consider models built with and without simulating distortion. The models are given to illustrate the pincushion distortion, they are not associated with a certain model of lens. Position of the camera in both cases is constant.

*Note the warping of distribution of the **spatial resolution** (Fig.14⁴³²). **Pincushion distortion** decreases the field of view, but increases the spatial resolution, the farther from the center of the field of view, the stronger.*

Without lens distortion simulation



With simulation of pincushion distortion

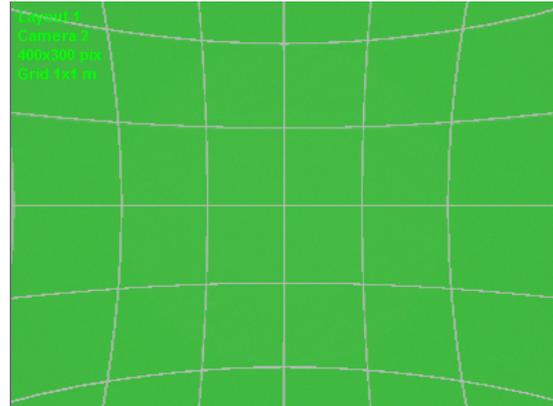


Fig. 11,12. View of a cross-hatch. With Pincushion distortion the cross-hatch resembles a **pillow**

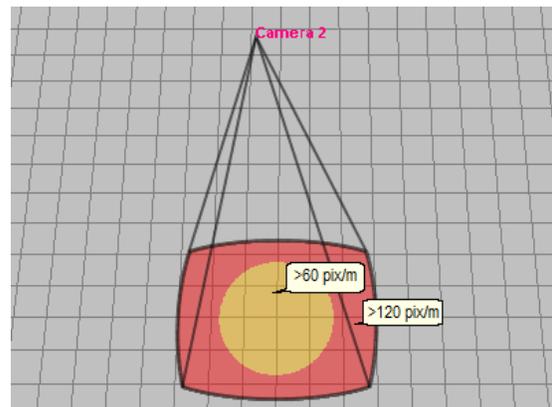
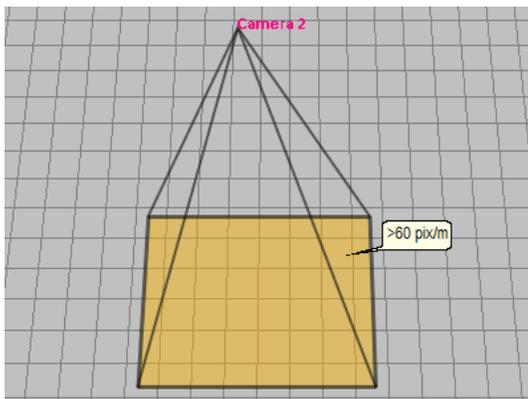


Fig. 13,14. Field of view. With Pincushion distortion the cross-hatch resembles a **barrel**. The **spatial resolution** increases from the center to the edges.

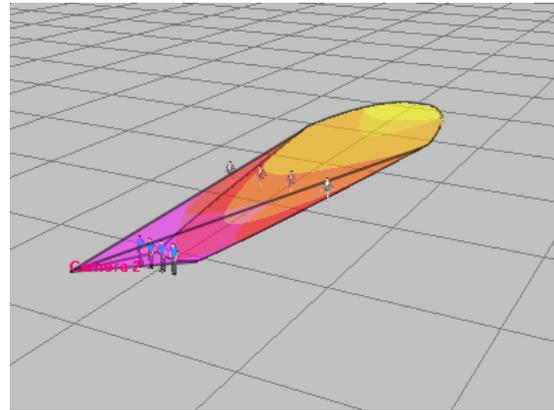
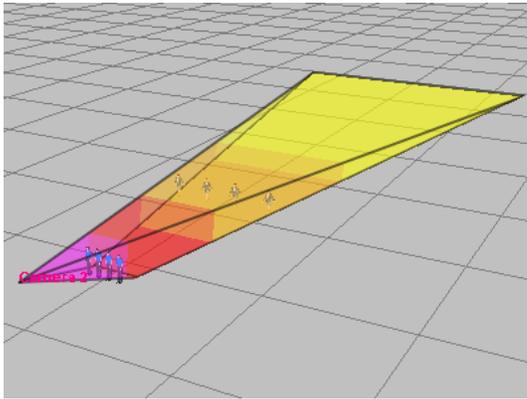


Fig. 15,16. View area and scene model.

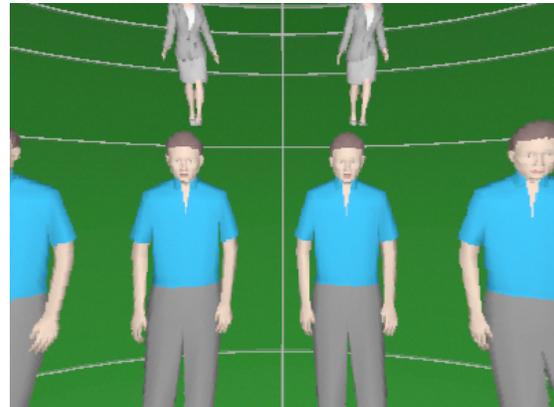
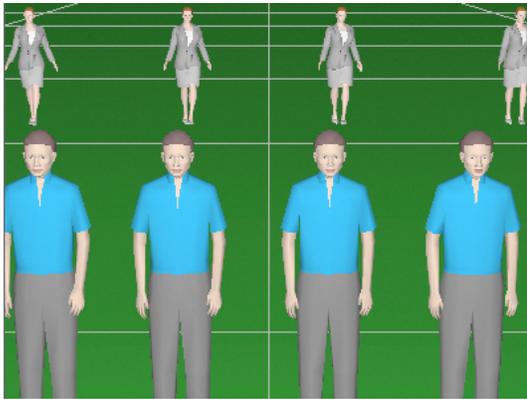


Fig. 17,18. Camera image model. As the lens is teleobjective (narrow angles), the perspective distortion is not unnoticeable (compare with [Fig. 7](#)^[43†]).

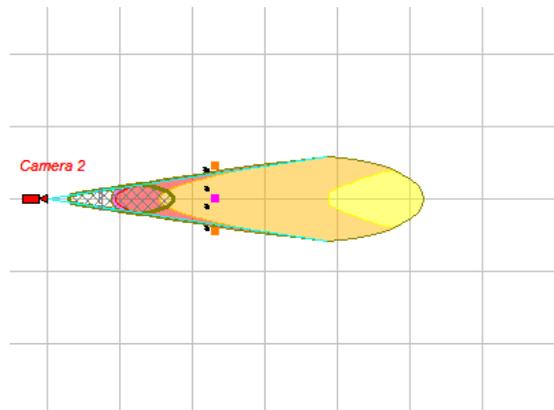
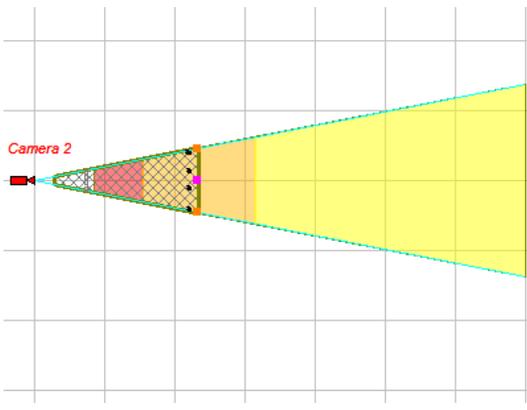


Fig. 19,20. View area projection. [View area projection bounds](#)^[168] in the **2 levels** mode.

Modeling lens distortion in VideoCAD

Lens distortion is modeled in VideoCAD Professional only.

Despite the complexity of internal calculations, simulation of lens distortion in VideoCAD is very easy. The lens distortion in VideoCAD is defined by a combination of **calculated view angle** and **real view angle**. The calculated view angles are calculated in the program from the [lens focal length](#)^[256] and [format](#)^[255] or the [actual size](#)^[267] of the image sensor.

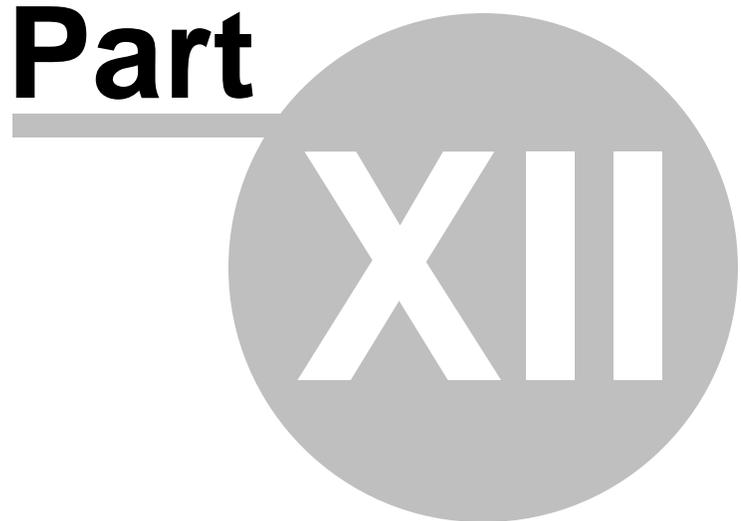
The real angles are usually given in the specifications of cameras and lenses. If the angles are unknown, it is possible to get them by [practical measuring](#)^[405].

To determine the lens distortion it is enough to set one of three real angles: horizontal, vertical or diagonal. It is preferable to set the horizontal angle. Missed real angles will be calculated by VideoCAD. For maximum accuracy, you can specify 2 or all 3 the real angles.

See more: [Lens distortion](#)^[267], [Modeling lens distortion](#)^[403], [Measuring real view angles](#)^[405]

See also: [Specifying active area size of the image sensor](#)^[415]

Part



**Ordering and
contacting**

12 Ordering and contacting

[Contacting CCTVCAD Software](#)^[438]

[Order and Registration](#)^[439]

12.1 Contacting CCTVCAD Software

For the latest versions of our programs, please check our web site at <http://www.cctvcad.com>

Any questions can be e-mailed to us at info@cctvcad.com
Technical questions can be e-mailed to us at support@cctvcad.com

We try to answer e-mail as quickly as possible.

You may also use our on-line form on our website <http://www.cctvcad.com/CCTVCAD-Support.html>.

Telephone support is available only by request. If you need telephone support, or just want to talk to a live person, please contact us at one of the above addresses for the current hours of availability, as they change often.

If you have ideas, suggestions, comments, criticisms, or questions, we would love to hear from you about our programs!

12.2 Order and registration

For the latest order options, visit the CCTVCAD Software web site at:

<http://www.cctvcad.com/CCTVCAD-Order.html>

For details of the registration please see [VideoCAD registration procedure](#)

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