

SPATIX

User Manual

V 020.012

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Introduction

[Spatix](#) is a simple CAD software to make your drafts in 3D space. It has a number of powerful tools to create and edit vector geometry. Using Spatix you can manage your spatial data easily and intuitively.

Spatix implements its own vector file format. It has SPX extension. More details about SPX format are presented in the section [Spatix vector file format](#) of this manual.

[Terrasolid](#) is the world leader in the development of software for LIDAR data processing. Before 2020 Terrasolid applications were running only on top of CAD software packages developed by Bentley Systems. Since 2020 Terrasolid has chosen Spatix as a new platform and ported their main applications to run on Spatix to increase productivity and functionality.

LIDAR professionals can now process their data without additional expenses. Latest Spatix distro along with Terrasolid's modules can be downloaded from the Terrasolid website: [Terrasolid](#)

System requirements

Spatix system requirements depend on the sizes of the datasets you work with.

Simplest minimal config:

CPU: 1.5 GHz Intel i5

RAM: 8GB

OS: MS Windows 7 x64

Video card: NVIDIA, ATI, Intel embedded video card with at least 1GB video-RAM supporting OpenGL v3.2

Resolution: 1280 x 1024

Recomended config:

CPU: 3.5 GHz Intel i7

RAM: 24GB

OS: MS Windows 10 x64

Video card: NVIDIA or ATI with at least 4GB video-RAM, OpenGL v3.2

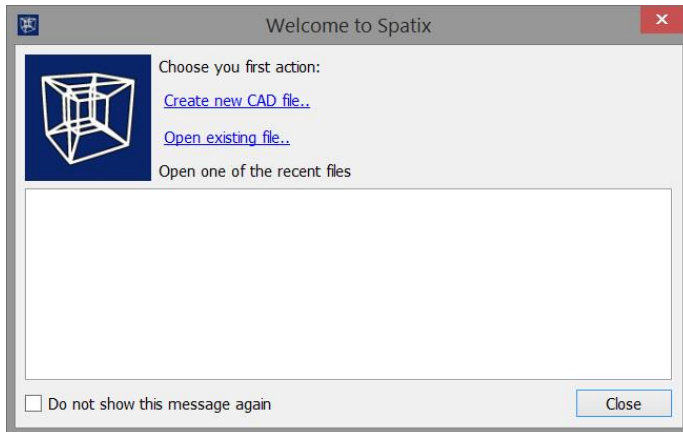
Resolution: FullHD (1980 x 1080)

ixApps

Spatix functionality can be extended by development of custom applications on top of it. Such applications are called “IxApps” (Spatix **A**pplications). IxApps can be [started](#) within Spatix and add up tools to it.

Getting started

To start working in Spatix run **spatix.exe**. “Welcome to Spatix” window will appear:



Select one of options:

“[Create new CAD file](#)” to create a new spx file from template

“[Open existing file](#)” to load already existing spx file

Create new CAD file

Firstly a dialog “Specify template” will appear. Indicate spx file you want to use as a template. Actually created new file will be a copy of the template.

To work with Terrasolid apps it is recommended to choose one of templates located in ‘seed’ folder installed together with Terrasolid apps.

Then a dialog “New CAD file” will appar. Define location and file name and click ‘Ok’.

Open existing file

A standard Windows ‘Open file’ dialog will appear. Indicate location and file name and click ‘Ok’.

Spatix will open in read-only mode. You will be able to view and navigate through the existing vector elements in the spx file.

To activate all Spatix functions [load one or more Terrasolid ixApps](#) with valid Terrasolid license.

Menu Commands

The menu bar contains commands, which allow basic spx-file manipulations, ixApps control and Spatix settings.

File Edit IxApps Application Window Help

File

Item	Function
New (default)...	Creates a new spx-file with the default settings
New (from template)...	Creates a new spx-file using the settings of the selected template file, defined by the user. Already existing spx-file should be used as a template
Open...	Opens an existing spx-file or dgn-file. If a dgn-file is selected it is automatically converted into spx format, the new spx file is created in the same folder
Save	Saves the opened spx-file
Save as...	Saves the opened spx-file as another one
Backup...	Saves a backup copy of the opened spx-file
Close	Closes the opened spx-file
List of spx-files	<i>Shows recently opened spx-files</i>
Exit	Closes the current Spatix session

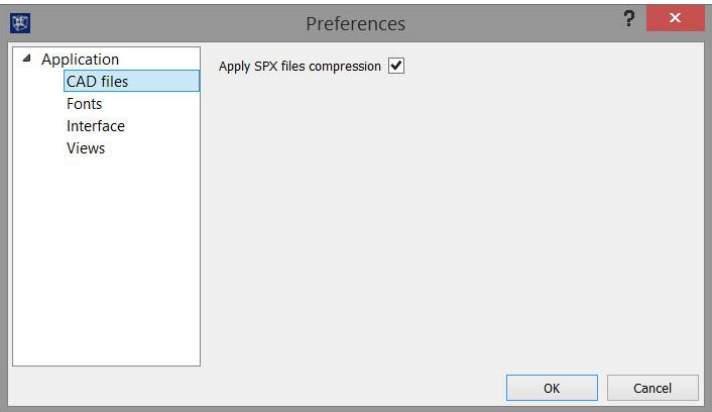
Edit

Item	Function
Undo	Cancels the last operation or the last datapoint
Redo	Repeats the last operation or the last datapoint, canceled by Undo
<u>Preferences...</u>	Defines Spatix global settings
CAD file settings...	Defines the spx-file settings
<u>Shortcuts...</u>	Defines commands' shortcuts
View Params Presets...	Defines persistent sets of the view parameters to be applied later instantly
Copy edited file name	Copies full path and name of opened spx-file into clipboard

Preferences...

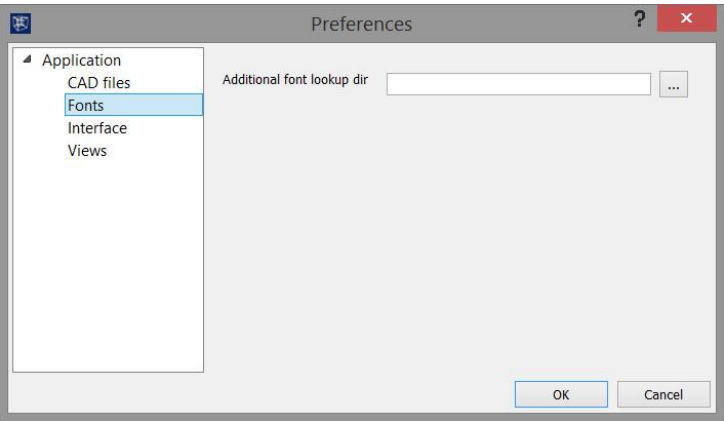
Opens the dialog window which lets a user define Spatix global settings:

CAD files



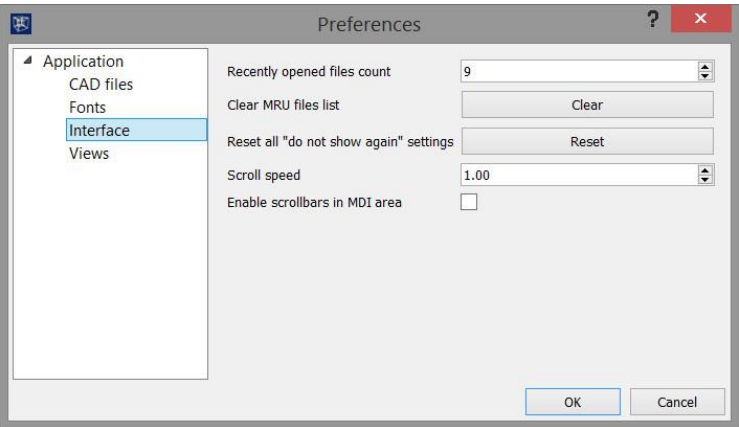
Setting	Function
Apply SPX files compression	If checked, compression is applied when saving the spx-file

Fonts



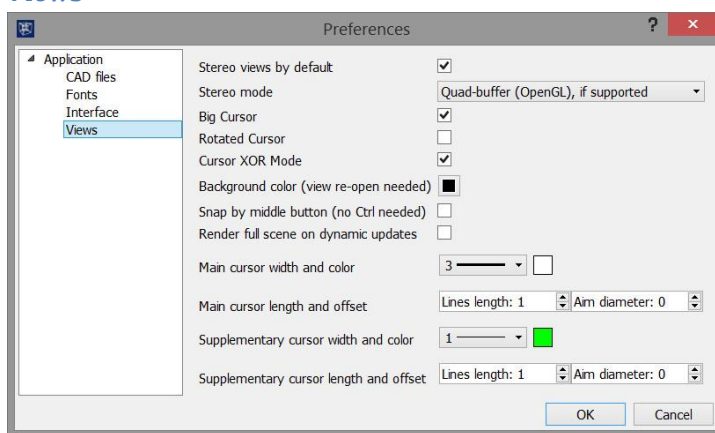
Setting	Function
Additional font lookup dir	Sets folder for external fonts. Spatix can use SHX fonts directly

Interface



Setting	Function
Recently opened files count	Defines count of recently opened spx-files in List of spx-files
Clear MRU files list	Removes all recently opened files from List of spx-files
Reset all “do not show again” settings	Returns all Spatix ‘do not show again’ settings to ‘unchecked’ state
Scroll speed	Not used
Enable scrollbars in MDI area	If checked, a scrollbars automatically appear when the view leaves Spatix’s work area

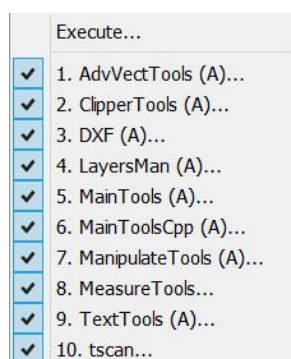
Views



Setting	Function
Stereo views by default	Not used
Stereo mode	Sets the default mode for stereo rendering in stereo-views <ul style="list-style-type: none"> Quad-buffered (OpenGL), if supported sets the appropriate mode for stereo rendering if hardware supports it. If hardware doesn’t meet requirements the anaglyph mode is set Always red/cyan anaglyph sets the anaglyph mode for stereo rendering regardless hardware
Big Cursor	If checked, the cursor is displayed as a full-view cross
Rotated Cursor	If checked, the cursor is displayed as a cross rotated 45 degrees. It can be useful for stereo mode
Cursor XOR Mode	If checked, the color of the cursor changes at the intersection with vector elements for better display if the cursor color is close to the element color
Background color	Background color for views (Spx-file needs to be reopened to apply change)
Snap by middle button	Sets the additional way to snap to an element by pressing middle mouse button
Render full scene on dynamic updates	If checked, all vector elements are dynamically rendered during view operation, for example Pan, Zoom or Rotate. It can affect performance for huge spx-files
Main cursor width and color	Sets width and color of the cursor in the working view

Setting	Function
Main cursor length and offset	Sets main cursor appearance <ul style="list-style-type: none"> Lines length defines length of lines that cursor consists of. It has no effect if 'Big Cursor' is checked Aim diameter defines distance between lines that cursor consists of
Supplementary cursor width and color	Sets width and color of the cursor in all opened non-working views
Supplementary cursor length and offset	Sets supplementary cursor appearance <ul style="list-style-type: none"> Lines length defines length of lines that cursor consists of. It has no effect if 'Big Cursor' is checked Aim diameter defines distance between lines that cursor consists of

IxApps



Item	Function
Execute...	Runs an ix application
List of loaded ixApps	Shows loaded ixApps and allows to define settings for each application

Execute...

To start ixApp click on the item ixApps in the [Menu](#) and choose 'Execute' from the drop-down list. 'Choose ixApp to execute' window will open (it's a standard Windows 'Open file' dialog). Specify the required application (*.ix file) and click Ok. Also you can specify multiply *.ix files to start at once using "Ctrl" and "Shift" keys.

Application

(it only appears if any external ixApp is loaded)

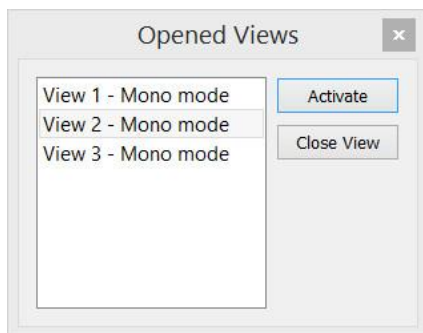
Item	Function
List of loaded external ixApps	Allows to load application tools if presented

Window

zItem	Function
New Window (Mono)	Opens a new view window in mono-mode
New Window (Stereo)	Opens a new view window in stereo-mode
Arrange 2x2	Organizes views like 2 x 2 tile
Tile	Organizes views like N x M tile
Cascade	Organizes views as a cascade
List of opened views	<i>Shows opened views</i>
Opened views...	Opens the view list in a separate window
Save views to CAD...	Saves the opened views set and their settings to the current spx-file
Show Log	Opens the separate Log window
Clear Log	Closes the Log window
Disable Tooltips	Turns off tooltips, which appear, when the cursor hangs over a toolbutton
Spaccels	Opens window to run commands using command line
Layer Manager	Opens window to manage visibility of layers in opened views

Opened Views

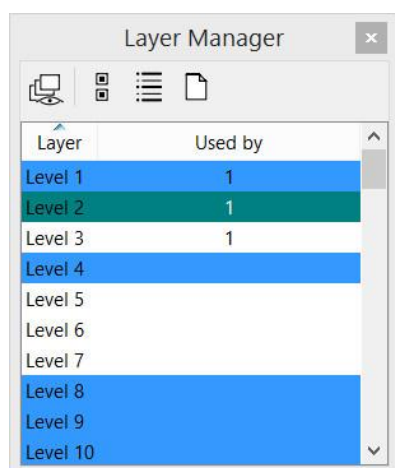
Opens the window which lets a user manage opened views



Button	Function
Activate	Makes the selected view active (only one view must be selected to apply function)
Close view	Closes all selected views

Layer Manager

Opens the window which lets a user set visibility of vector layers in opened views










Visible layers have a blue or green background. Green background indicates that currently this layer is active. Active layer is always visible. Invisible layers have a white background.

To change layer visibility click on layer's row by the left mouse button. Also you can drag the cursor through layers holding the left mouse button.

Double click on the layer's row sets it active.

Additional visibility settings can be defined by the buttons located at the top of the Layer Manager window:

Button	Function
 Apply to Opened Views	By default changes in layer visibility are applied only to the active view if ' Layer Visibility Global ' is active. This button applies changes to all opened views
 Select All  Select None	Makes all layers visible (Select All) or invisible (Select None). Select None has no effect on the active layer
 Show Unused  Hide Unused	Defines whether all layers are displayed in the list (Show Unused) or only those with vector elements (Hide Unused)
 Layer Visibility Global  Layer Visibility Per View	Defines whether changes in layer visibility are applied to all views (including newly opened) or only to the active view

Help

Item	Function
Manual	Opens this manual as a pdf file
FAQ...	Loads web-browser and opens Spatix FAQ web-page
Feedback...	Loads web-browser and opens Spatix Feedback web-page
About	Shows Spatix version and license information

Mouse usage

Definitions

LButton – left mouse button click

RButton – right mouse button click

MButton – middle/scroll mouse button click

Scroll – scroll mouse wheel





Action	Function
LButton	Enter a datapoint
RButton	End/restart the current tool, iterate over the located elements
LButton + RButton	Snap to an element
Ctrl + MButton	Snap to an element
Scroll	Zoom in/Zoom out
Ctrl + Scroll	Change the cursor depth
Shift + Scroll	Change the cursor depth adjustment speed
MButton+moving	Pan/Move the camera.

Tool Reference

File toolbar

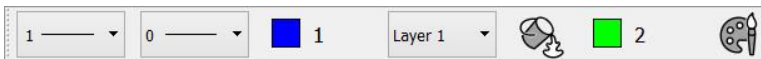
Lets a user open, save and close spx-files




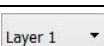





Tool	Function
	Opens an existing spx-file file. It leads to the same result as “ Open... ” item in the “ File ” menu
	Saves the opened spx-file file. It leads to the same result as “ Save ” item in the “ File ” menu
	Saves the opened spx-file as another one. It leads to the same result as “ Save as... ” item in the “ File ” menu
	Closes the opened spx-file. It leads to the same result as “ Close ” item in the “ File ” menu

Active element styles

Active element styles toolbar defines graphics settings for vector elements drawing in the spx-file.



Tool	Function
	Active Line Weight
	Active Line Style
	Active Color
	Active Layer
	Active Fill Type
	Active Fill Color
	Element style presets

Active Line Weight

The drop-down list lets a user define the line/edge weight for vectorized elements. If Active Line Weight is set to “By Layer”, it corresponds to the value which is specified for the active layer in the [Layers](#) drop-down window.

Active Line Style

The drop -down list lets a user define the line/edge style for vectorized elements. If Active Line Style is set to “By Layer”, it corresponds to the value which is specified for the active layer in the [Layers](#) drop-down window.

Active Color

The drop -down list lets a user define the line/edge color for vectorized elements. If Active Color is set to “By Layer”, it corresponds to the value which is specified for the active layer in the [Layers](#) drop-down window.

Active Layer

The drop -down list lets a user define the layer number for vectorized elements.

Active Fill Type

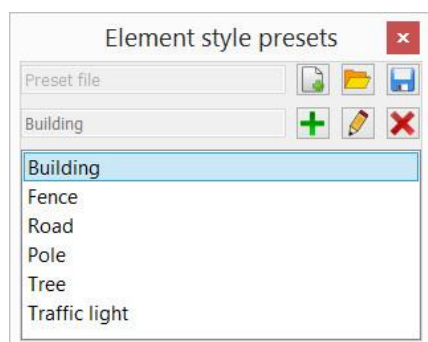
Sets, whether vectorized area elements (e.g. blocks, polygons, circles etc.) are filled or not. As long as it's checked, new area vector elements are filled.






Active Fill Color


Sets the fill color for filled elements.

Element style presets

This tool allows to define a vector classification. Each object class (feature) corresponds to the set of the graphic attributes (Layer, Weight, Style, Color etc.). After saving, these attributes can be applied in a moment by clicking the left mouse button on the required row. The presets can be saved into a special file and then re-used.

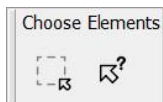




Sub-Tool	Function
 New style presets file	To create a new style presets file: <ul style="list-style-type: none">Click the “New style presets file” button. It opens the “New preset” dialogChoose a folder and a file name and click Save
 Open style presets file	To open an existing style presets file: <ul style="list-style-type: none">Click the “Open style presets file” button. It opens the “Open preset” dialogChoose a location and a file and click Open
 Save current style presets file	To save any changes in the current presets: <ul style="list-style-type: none">Click “Save current style presets file”. It opens the “Save preset” dialogChoose a folder and a file name and click Save
 Create new preset using active element style	To create new feature in the current preset: <ul style="list-style-type: none">Set the desirable Active element stylesClick “Create new preset using active element style”. It opens the “New preset” windowEnter a name for the new preset and click OK
 Update selected preset with active element style	To change attributes for an existing preset: <ul style="list-style-type: none">Select a preset for changing by the left mouse button clickSet the desirable newClick “Update selected preset with active element style” and then click Yes in the opened window

Sub-Tool	Function
 Delete selected preset	To delete an existing preset: <ul style="list-style-type: none"> Select a preset for deleting by the left mouse button click Click “Delete selected preset” and then click Yes in the opened window

Choose Elements

Choose Elements tool is intended to select and deselect vector elements. Besides, it allows user to get information about the vector element.

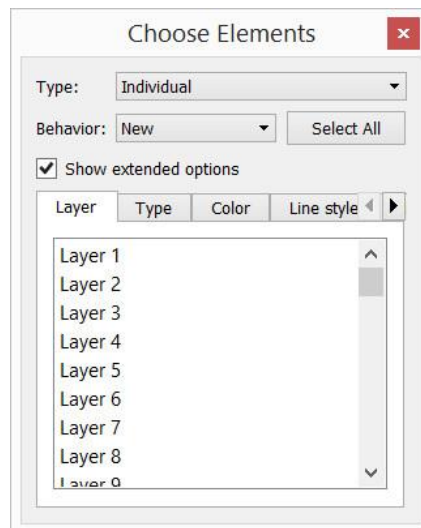
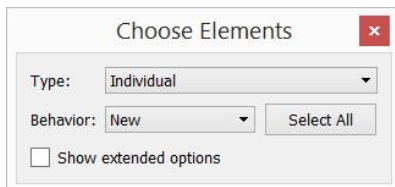


Tool	Function
	Choose Elements
	Element Information

Choose Elements

This tool lets a user choose vector elements in the spx-file interactively or using element attributes (layer, type, color etc.)

When Choose Elements is selected the dialog appears:



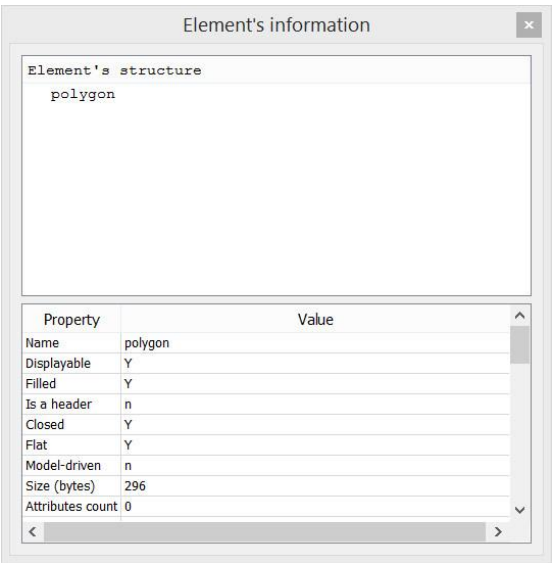
Define settings and choose elements according to your needs

Setting	Function
Type	<p>The drop-down menu defines the mode to apply a selection</p> <ul style="list-style-type: none"> • Individual selects one vector element by the left mouse click. Use ctrl + left mouse click to add an element to or subtract an element from the existing selection set. Also you can drag the cursor through the work window holding the left mouse button. In this case all elements inside the resulting orthogonal block are selected • Block selects all elements, which are fully inside the orthogonal block, defined by two left mouse clicks. Alternatively, you can drag the cursor through the work window holding left mouse button to define a block for a selection • Shape selects all elements, which are fully inside the polygon, defined by the left mouse clicks • Circle selects all elements, which are fully inside the circle, defined by two left mouse clicks – a circle center and edge points • Line selects all elements, which are crossed by the line, defined by two left mouse clicks
Behavior	<p>The drop -down menu defines the selection status of selected elements</p> <ul style="list-style-type: none"> • New creates a new selection set and deselects all previously selected elements <i>*Using this option with holding the Ctrl button will lead to the same result as the Add option</i> • Add adds elements to an existing selection set without the deselection of the previously selected elements • Subtract removes the elements from an existing selection set. • Invert changes the element selection status (adds to an existing selection set, if the element is not selected yet, and removes from an existing selection set, if the element is selected)
Select All / Clear	Selects or deselects all vector elements in the spx-file
Show extended options	<p>Opens the advanced options for selection by criteria. You can define a combination of elements attributes to get the desirable selection set</p> <ul style="list-style-type: none"> • Layer • Type • Color • Line style • Line weight

The number of selected elements is shown in the status bar at the bottom of Spatix window.

Element Information

Gives the information about single vector element in the spx-file. To get element information move the cursor to the desired element. When the cursor is close to the vector element the element is highlighted and brief info appears. It includes element type, element ID and layer. To get detailed information click on the element by left mouse button:



Main tools

Main toolbar contains tools for basic geometry creation.



It has several sub-toolbars divided by geometry type. Each sub-toolbar can be displayed keeping left mouse button pressed for some time on a tool icon. Also sub-toolbar can be opened separately by selecting 'As toolbar' option from the pop-up.

Place Linear sub-toolbar



Tool	Function
	Place Line
	Place Polyline
	Place Point

Place Line

Creates a two-vertex line segment. To place a line, enter first and second vertex datapoints by left mouse button clicks. Continue to enter datapoints to create a chain of lines connected with each other or finish drawing by clicking the right mouse button. Element's attributes are picked from the current [Active element styles](#).

Place Polyline





Creates a multi-vertex polyline as a single element. To place a polyline, enter vertex datapoints one by one by left mouse button clicks. To finish the polyline creation click the right mouse button. Element's attributes are picked from the current [Active element styles](#).

Place Point

Creates a point element. Element's attributes are picked from the current [Active element styles](#).

Place Polygons sub-toolbar



Tool	Function
	Place Polygon
	Place Block
	Place Regular Polygon
	Place Orthogonal Polygon

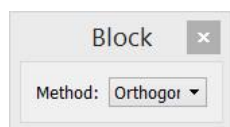
Place Polygon

Creates a closed multi-vertex element. To place a polygon, enter vertex datapoints one by one by left mouse button click. To finish the polygon creation click the right mouse button. Element's attributes are picked from the current [Active element styles](#).



In general, polygon's vertices may not be located in one plane.

Place Block

Creates a rectangle. Element's attributes are picked from the current [Active element styles](#). While Place Block is active, a dialog appears:



Choose the appropriate method and enter datapoints by left mouse button clicks to place a rectangle.

Setting	Function
Method	<p>Defines the rectangle creation method.</p> <ul style="list-style-type: none"> Orthogonal. The rectangle sides are placed parallel to the view window sides. In this case you need to enter two datapoints to place an element:  <ul style="list-style-type: none"> Rotated. The rectangle sides aren't restricted to the view windows sides. In this case you need to enter three datapoints to place an element: 

Place Regular Polygon

Creates a regular polygon. Element's attributes are picked from the current [Active element styles](#). While Place Regular Polygon is active, a dialog appears:

Regular polygon
✕

☐ Radius: 0.000000

Edges: 3

Method: Inscribed

Direction: Clockwise

Specify the settings and enter datapoints by left mouse button clicks to place a polygon.

Setting	Function
Radius	If checked, fixes the polygon radius as a distance between the center and a vertex or between the center and an edge (depending on the defined Method)
Edges	Defines the number of polygon vertices/edges
Method	<p>Defines the method to place a polygon</p> <ul style="list-style-type: none"> Inscribed. Enter the polygon's center by the first click and a vertex by the second click to place a polygon Circumscribed. Enter polygon's center by the first click and edge's center by the second click to place a polygon By Edge. Enter two neighboring vertices to place a polygon
Direction	<p>Defines the direction of drawing if the By Edge method is used</p> <ul style="list-style-type: none"> Clockwise. The entered vertices are ordered clockwise. Counterclockwise. The entered vertices are ordered counterclockwise

Place Orthogonal Polygon

Creates an orthogonal polygon, where every edge is perpendicular to its neighbors, probably excluding the last one. To place an orthogonal polygon, enter vertex datapoints one by one by left mouse button clicks. Starting from the fourth vertex, the tool "sticks" the cursor when it moves close to a point, suitable for an orthogonal element creation. To continue entering the vertices, move the cursor further from this point (you can use for that some view navigation means, e. g. zoom, if needed). To finish the polygon creation, click the left mouse button

keeping the cursor “sticked” or click the right mouse button to close the polygon at the last datapoint. Element’s attributes are picked from the current [Active element styles](#).

In general, polygon’s vertices may not be located in one plane.

Place Circles sub-toolbar



Tool	Function
	Place Circle
	Place Circle By Edge
	Place Ellipse
	Place Ellipse By Edge

Place Circle

Creates a circle by a center and a point on its boundary. Element’s attributes are picked from the current [Active element styles](#). While Place Circle is active, a dialog appears:



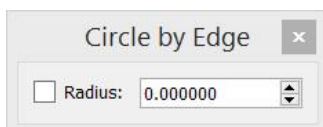
Setting	Function
Radius	If checked, fixes the circle radius

To place a circle, enter the circle’s center by the first left mouse button click and a point on the edge by the second click. If **Radius** is fixed in the dialog window, you need to enter only 1 datapoint to place circle.

This tool can only create a circle in a plane, which is parallel to the plane of the current view.

Place Circle By Edge

Creates a circle by three points on its boundary. Element’s attributes are picked from the current [Active element styles](#). While Place Circle By Edge is active, a dialog appears:



Setting	Function
Radius	If checked, fixes the circle radius

To place a circle, enter three datapoints on the circle's boundary by left mouse button clicks. If **Radius** is fixed in the dialog window, you need to enter only 2 datapoints to place a circle.

Place Ellipse

Creates an ellipse by a center and points on the boundary, which define the primary and the secondary semi-axes of the ellipse. Element's attributes are picked from the current [Active element styles](#). While Place Ellipse is active, a dialog appears:

Setting	Function
Primary	If checked, fixes the ellipse primary semi-axis
Secondary	If checked, fixes the ellipse secondary semi-axis
Rotation	If checked, fixes the ellipse angle of primary semi-axis direction

To place an ellipse, enter the ellipse center by the first left mouse button click and points on the boundary by the second and third clicks. If some parameters are fixed in the dialog window, you need to enter only 1 or 2 datapoints to place ellipse.

This tool can only create an ellipse in a plane, which is parallel to the plane of the current view.

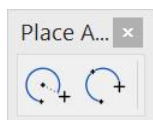
Place Ellipse By Edge

Creates an ellipse by three points on the boundary. Element's attributes are picked from the current [Active element styles](#). While Place Ellipse By Edge is active, a dialog appears:

Setting	Function
Primary	If checked, fixes the ellipse primary semi-axis
Secondary	If checked, fixes the ellipse secondary semi-axis
Rotation	If checked, fixes the ellipse angle of primary semi-axis direction

To place an ellipse, enter three datapoints on the ellipse boundary by left mouse button click. If some parameters are fixed in the dialog window, you need to enter only 1 or 2 datapoints to place an ellipse.

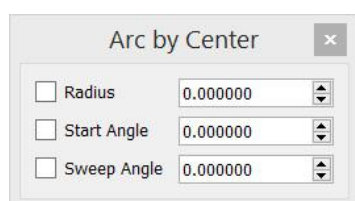
Place Arcs sub-toolbar



Tool	Function
	Place Arc
	Place Arc By Edge

Place Arc

Creates an arc by a center and two points on the arc's ends. Element's attributes are picked from the current [Active element styles](#). While Place Arc is active, a dialog appears:



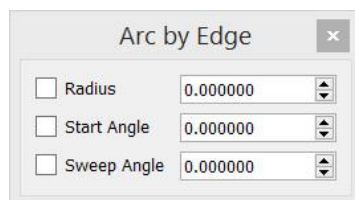
Setting	Function
Radius	If checked, fixes the arc radius
Start Angle	If checked, fixes the direction from the arc center to the first end
Sweep Angle	If checked, fixes the arc angle

To place an arc, enter the arc's first end by the first left mouse button click, the center by the second click and the second end by the third click. If some parameters are fixed in the dialog window you need to enter only 1 or 2 datapoints to place an arc.

This tool can only create an arc in a plane, which is parallel to the plane of the current view.

Place Arc By Edge


Creates an arc by three points on it. Element's attributes are picked from the current [Active element styles](#). While Place Arc By Edge is active, a dialog appears:



Setting	Function
Radius	If checked, fixes the arc radius
Start Angle	If checked, fixes the direction from the arc center to the first end
Sweep Angle	If checked, fixes the arc angle

To place an arc, enter the arc's first end by the first left mouse button click, the middle point on the edge by the second click and the second end by the third click. If some parameters are fixed in the dialog window, you need to enter only 1 or 2 datapoints to place an arc.

Place Curve sub-toolbar

Tool	Function
	Place Curve

Place Curve

Creates a curve passing through the control points. To place a curve, enter control points one by one by left mouse button clicks. To finish the curve creation, click the right mouse button. Element's attributes are picked from the current [Active element styles](#).

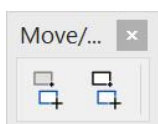
Manipulate tools



Manipulate tools let a user modify existing vector elements in spx-file.



It has several sub-toolbars divided by geometry type. Each sub-toolbar can be displayed keeping left mouse button pressed for some time on a tool icon. Also sub-toolbar can be opened separately by selecting 'As toolbar' option from the pop-up.

Move/Copy sub-toolbar



Tool	Function
	Move Element
	Copy Element


Move Element

Moves a single vector element or a set of elements to a new location. To move several elements at once, select them by [Choose Element](#) tool beforehand or use [Clipper](#).

Copy Element

Copies a single vector element or a set of elements to a new location. To copy several elements at once, select them by [Choose Element](#) tool beforehand or use [Clipper](#).

Delete Element





Tool	Function
	Delete Element

Delete Element

Deletes a single vector element or a set of elements from file. To delete single element indicate it by the left mouse button click. Removable element will be highlighted. Confirm deletion by left mouse click anywhere in work window. If there are many elements under the cursor use right mouse click until the desired element is highlighted. To delete several elements at once, select them by [Choose Element](#) tool beforehand.

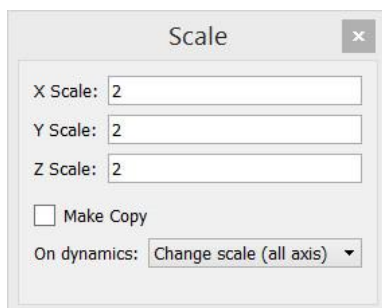
Element Transformation sub-toolbar



Tool	Function
	Scale Element
	Rotate Element
	Mirror Element
	Copy At Offset

Scale Element

Scales a single vector element or a set of elements. To scale several elements at once, select them by [Choose Element](#) tool beforehand. While Scale Element is active, a dialog appears:



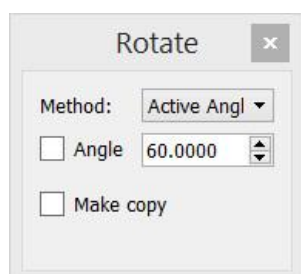
Set the desirable parameters and use the tool.

Setting	Function
X Scale	Defines the scale factor along X axis
Y Scale	Defines the scale factor along Y axis
Z Scale	Defines the scale factor along Z axis
Make Copy	If checked, the initial element remains in the file

Setting	Function
On dynamics	<p>Defines a rule for the scaling</p> <ul style="list-style-type: none"> • Change scale (all axis). Allows to define the scale factor along all axis dynamically by the cursor movement • Change X scale. Allows to define the scale factor along X axis dynamically by the cursor movement. Scale factors for Y and Z axes are fixed by the settings Y Scale and Z Scale • Change Y scale. Allows to define the scale factor along Y axis dynamically by the cursor movement. Scale factors for X and Z axes are fixed by the settings X Scale and Z Scale • Change Z scale. Allows to define the scale factor along Z axis dynamically by the cursor movement. Scale factors for X and Y axes are fixed by the settings X Scale and Y Scale • Move/Copy. The scale factors along X,Y,Z axes are fixed by the settings X Scale, Y Scale, Z Scale

Rotate Element

Rotates a single vector element or a set of elements. To rotate several elements at once, select them by [Choose Element](#) tool or [Clipper](#) beforehand. While Rotate Element is active, a dialog appears:



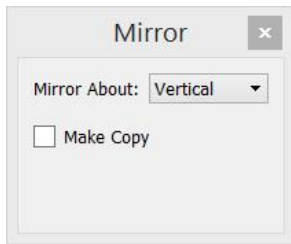
Set the desirable parameters and use the tool.

This tool can only rotate element(s) around the axis, which is the normal to the plane of the current view.

Setting	Function
Method	<p>Defines a rule for the rotation</p> <ul style="list-style-type: none"> • Active Angle. Rotates element(s) by an angle, which is defined in the Angle setting. It doesn't matter if the Angle setting is checked or not while the Active Angle method is used. To rotate element(s), indicate the rotation center by the left mouse button click • 2 points. Rotation center, angle and direction are defined by 2 points. To rotate element(s), indicate the rotation center by the first left mouse button click, rotation angle and direction by the second click. If the Angle setting is checked, you need to indicate the rotation center by the first left mouse button click and confirm rotation by the second click • 3 points. Rotation center, angle and direction are defined by 3 points. To rotate element(s), indicate the rotation center by the first left mouse button click, rotation angle and direction by the second and third clicks. If the Angle setting is checked, you need to indicate the rotation center by the first click, make any second click in the work view and confirm the rotation by the third click
Angle	If checked, defines the fixed rotation angle
Make copy	If checked, the initial element remains in the file

Mirror Element

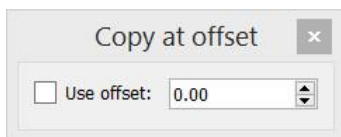
Mirrors a single vector element or a set of elements about a plane or a line. To mirror several elements at once, select them by [Choose Element](#) tool or [Clipper](#) beforehand. While Mirror Element is active, a dialog appears:



Setting	Function
Mirror About	<p>Defines a rule for mirroring</p> <ul style="list-style-type: none">• Vertical. Mirrors element(s) about a plane, which is parallel to the horizontal axis of the current view and perpendicular to the plane of the current view. To mirror a single element, first click on the element's edge by the left mouse button and then click to define the mirroring plane. To mirror a set of selected elements, first click anywhere in the work view by the left mouse button and then click to define the mirroring plane• Horizontal. Mirrors element(s) about a plane, which is parallel to the vertical axis of the current view and perpendicular to the plane of the current view. To mirror a single element, first click on the element's edge by the left mouse button and then click to define the mirroring plane. To mirror a set of selected elements, first click anywhere in the work view by the left mouse button and then click to define the mirroring plane• Line. Mirrors element(s) about the defined line. To mirror a single element, click on the element's edge by the left mouse button and then define the mirroring line by the second and third clicks. To mirror a set of selected elements, you need only to define the mirroring line by the first and the second left mouse button clicks
Make Copy	If checked, the initial element remains in the file

Copy At Offset

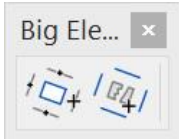
Creates a new element, with all edges having the same offset from the initial element. While Copy At Offset is active, a dialog appears:





Setting	Function
Use offset	If checked, edges of the new element have fixed offset which is defined by the user

To create a new element at offset, specify the element and then define the offset and the direction interactively by the left mouse button click. If **Use offset** is checked, the second click defines only direction for copy.

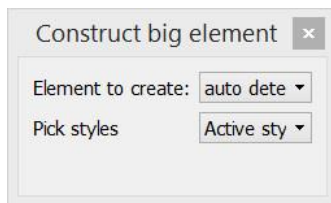
Big Elements sub-toolbar



Tool	Function
	Construct Big Element
	Break Big Element

Construct Big Element

Combines several elements into a single complex one. Hereupon this complex element is used as a single object. While the Construct Element command is active, a dialog appears:



Set the desirable parameters and use the tool. You can construct a big element in two ways:

- 1) Choose the Construct Big Element tool. Click on the first element's boundary by the left mouse button. Continue to define the components one by one interactively in a similar way. Confirm the result by clicking anywhere in the work view.
- 2) Select all elements to combine by the [Choose Element](#) tool. Choose the Construct Big Element tool. Confirm the result by clicking anywhere in the work view.

Three types of elements can be created by this tool: group, big line and big polygon.



Setting	Function
Element to create	Defines a rule for combining and a type of the complex object <ul style="list-style-type: none"> • Auto detect mode. The type of the complex element is defined automatically depending on its components • Group. The complex element is a free group of components • Big line. The complex element is a linear element • Big polygon. The complex element is an area element • Poly hole. The complex element is an area element with "islands". It only works with preselected elements
Pick styles <i>Applied only for Big line and Big polygon when components are defined interactively</i>	Defines styles of complex element <ul style="list-style-type: none"> • Active style. Created complex element has active element styles • First element. Created complex element has styles of first component • Last element. Created complex element has styles of last component

Break Big Element

Divides a complex element, which was created by the [Construct Big Element](#) tool, into its initial components.

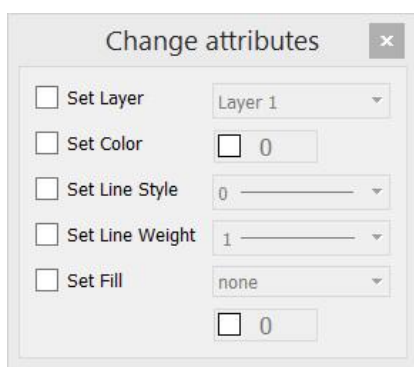
Attributes sub-toolbar



Tool	Function
	Change Element's Attributes
	Get Element's Attributes

Change Element's Attributes

Lets a user to change the attributes of the existing vector element(s). While Change Element's Attributes is active, a dialog appears:



You can use two ways to set element's attributes:

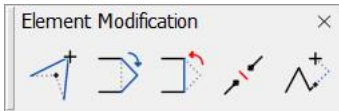
- 1) Choose the Change Element's Attributes tool. Set the desirable settings and click on the element's boundary by the left mouse button. Confirm the result by clicking anywhere in the work view.
- 2) Select all elements to change attributes by [Choose Element](#) tool. Choose the Change Element's Attributes tool. Set the desirable settings and click by the left mouse button anywhere in the work view.






Setting	Function
Set Layer	If checked, the element's layer can be changed. Select the required layer from the drop-down list.
Set Color	If checked, the element's color can be changed. Select the required color from the drop-down window.
Set Line Style	If checked, the element's line style can be changed. Select the required line style from the drop-down list.
Set Line Weight	If checked, the element's line weight can be changed. Select the required line weight from the drop-down list.
Set Fill	<p>If checked, the element's fill type and fill color can be changed. This setting affects only on area elements. The two options can be used:</p> <ul style="list-style-type: none"> • None. Sets "unfilled" type for an element. • Solid. Sets "filled" type for an element. <p>Select the desirable option from the drop-down list and select the required color if the fill type is set to <i>solid</i>.</p>

Get Element's Attributes

Sets the [Active element styles](#) to be the same as the attributes of the indicated existing element. To get the attributes, choose the Get Element's Attributes tool, left click on the element's of interest boundary and confirm the result by clicking anywhere in the work view.

Element Modification sub-toolbar



Tool	Function
	Modify Element
	Insert Vertex
	Delete Vertex
	Break Element
	Extend Segment

Modify Element

Lets a user modify an existing element by moving element's vertex or edge. To modify the element, pick an element's vertex or edge to be modified and then define the target point interactively to move the vertex/edge by the left mouse button click.

You can use the [Vertex snap](#) for accurate vertex catching.

Insert Vertex

Lets a user insert a single vertex to an existing element. To insert a vertex, indicate an element's edge and then define a location for the new vertex interactively by the left mouse button click.

Delete Vertex

Lets a user remove a single vertex from an existing element. To delete a vertex, indicate it by the left mouse button click. Removable element's part will be highlighted. Confirm deletion by left mouse click anywhere in work window. If there are many elements under the cursor use right mouse click until the desired element is highlighted.

You can use the [Vertex snap](#) for accurate vertex catching.

Break Element



Splits an existing element into two parts at the defined point. To break an element, choose Break Element tool and set a point for splitting by the left mouse button click.

Extend Segment

Lengthens or shortens linear element.

Element Trim sub-toolbar



Tool	Function
	Trim To Element
	Trim to Intersection

Trim To Element

Modifies an existing linear element to correspond to another one. As a result of this tool, the modified element is extended to XY intersection with the second element. To trim an element, choose Trim To Element tool, pick up the trimmed linear element's edge by the first left mouse click, define an edge of the second element by the second click and click anywhere in the work view to confirm.

Trim To Intersection

Modifies two existing linear elements to be intersected with each other in XY coordinates. As a result of this tool both of the modified elements are extended to their XY intersection. To trim elements to intersection, choose Trim To Intersection tool, indicate the first trimmed linear element's edge by the first left mouse click, the second trimmed linear element's edge by the second click and click anywhere in the work view to confirm.

Layers



Layers tool opens a drop-down window to manage layers in the spx-file.

Element style: ByLayer						
ID	Name	Visible	Used by	Line style	Line width	Color
▲ <root>	<ROOT LAYER>	<input checked="" type="checkbox"/>	0	<Undefined>	<Undefined>	<Undefined>
1	Level 1	<input checked="" type="checkbox"/>	0	<Undefined>	<Undefined>	<Undefined>
2	Level 2	<input checked="" type="checkbox"/>	0	<Undefined>	<Undefined>	<Undefined>
3	Level 3	<input checked="" type="checkbox"/>	0	<Undefined>	<Undefined>	<Undefined>
4	Level 4	<input checked="" type="checkbox"/>	0	<Undefined>	<Undefined>	<Undefined>
5	Level 5	<input checked="" type="checkbox"/>	0	<Undefined>	<Undefined>	<Undefined>
6	Level 6	<input checked="" type="checkbox"/>	0	<Undefined>	<Undefined>	<Undefined>
7	Level 7	<input checked="" type="checkbox"/>	0	<Undefined>	<Undefined>	<Undefined>
8	Level 8	<input checked="" type="checkbox"/>	0	<Undefined>	<Undefined>	<Undefined>
9	Level 9	<input checked="" type="checkbox"/>	0	<Undefined>	<Undefined>	<Undefined>
10	Level 10	<input checked="" type="checkbox"/>	0	<Undefined>	<Undefined>	<Undefined>
11	Level 11	<input checked="" type="checkbox"/>	0	<Undefined>	<Undefined>	<Undefined>
12	Level 12	<input checked="" type="checkbox"/>	0	<Undefined>	<Undefined>	<Undefined>
13	Level 13	<input checked="" type="checkbox"/>	0	<Undefined>	<Undefined>	<Undefined>
14	Level 14	<input checked="" type="checkbox"/>	0	<Undefined>	<Undefined>	<Undefined>
15	Level 15	<input checked="" type="checkbox"/>	0	<Undefined>	<Undefined>	<Undefined>

Using this window user can create, remove and rename layers in the spx-file. Also it is possible to set global visibility and attributes for each layer.

Spx-file can contain up to 4096 layers and layers can be nested.

- **To create a new layer** on the top level right-click on the <root> row and select 'New' in the context menu

- **To create a new child layer** right-click on the row of the parent layer and select 'New' in the context menu
- **To remove layer** right-click on the layer's row and select 'Delete' in the context menu. (Layer with child layers cannot be deleted)
- **To change layer name** right-click on the layer's row and select 'Rename' in the context menu. Type new layer name and press <Enter>
- **To set layer active** right-click on the layer's row and select 'Set active' in the context menu

The checkboxes in the 'Visible' column set global vector element's visibility for each layer. Changes in visibility of parent layer affect child layers accordingly. Changes in visibility of the <ROOT LAYER> affect all layers in the spx-file.

Column 'Used by' shows how many vector elements are in the layer.

Columns 'Line style', 'Line width', 'Color' let a user define two fixed sets of attributes for each layer. Set of attributes is defined as 'By layer' or 'Alternative' in the 'Element style' drop-down list in the upper part of Layer window.

'ByLayer' has effect both on [Active element styles](#) (if 'ByLayer' option is used) and on Layer Overrides in the [View Attributes](#) settings.

'Alternative' only affects Layer Overrides in the [View Attributes](#) settings.

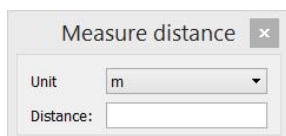
Measure tools



Tool	Function
	Measure Distance
	Measure Angle
	Measure Element

Measure Distance

Lets a user measure distance between two points. While Measure Distance is active, a dialog appears:



To measure distance enter the first point by the first left mouse button click, then enter the second point by the second left mouse click. A blue two-sided arrow shows the distance graphically. Distance value is displayed in the 'Distance' field of the tool dialog. Units can be chosen in the "Unit" drop-down list.

Measure Angle

Lets a user measure angle defined by 3 points or by existing vector elements.

Measure angle ×

Mode

Between 3 points

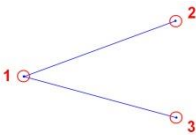
Unit

Degrees

Angle

0

Units can be chosen in the “Unit” drop-down list. Angle value is displayed in the ‘Angle’ field of tool dialog.

Setting	Function
Mode	<div>Defines mode to measure angle</div> <ul style="list-style-type: none">Between 3 points. To measure angle specify 3 points defining angle interactively in the view by left mouse button click:<div></div>Between elements. To measure angle specify the segments of vector elements which you want to measure

Measure Element

Lets a user get geometric information about vector element. To measure the element click on it by the left mouse button and then click again in the work view to confirm. Geometric information will be displayed in the tool window:

Measure Element ×

Element type

Polyline

Length

525196.711675

Area

0.000000

Primary axis

0.000000

Secondary axis

0.000000

Start angle

0.000000

Sweep angle

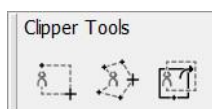
0.000000

End angle

0.000000

Clipper tools

Clipper is the entity which lets a user combine vector elements into group and manipulate them as a whole.



Clipper can be applied for the following [Manipulate tools](#):

[Move Element](#)

[Copy Element](#)




[Delete Element](#)

[Scale Element](#)

[Rotate Element](#)

[Mirror Element](#)

To define clipper choose the desired mode and set the area interactively.

Tool	Function
	Set clipper by block
	Set clipper by polygon
	Set clipper from element

Set clipper by block

Sets clipper contour as an orthogonal rectangle.

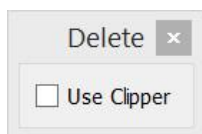
Set clipper by polygon

Sets clipper contour as a free polygon.

Set clipper from element

Sets clipper contour corresponding shape of existing area vector element.

When clipper is set you can use it with one of mentioned Manipulate tools. Each of these tools has 'Use Clipper' checkbox in the tool window:







If 'Use Clipper' is not checked the tool works as usual. If 'Use Clipper' is checked the new toolbox appears:



This toolbox allows user to define which vector data relative to the clipper contour ([Within](#) / [Outside](#) / [Intersect](#)) will be affected by the tool.

Within



Tool	Function
	Within
	Within + Clip
	Within + Clip and Close
	Within + Intersect

Within

The tool affects vector elements that are entirely inside of clipper contour and don't cross it.

Within + Clip

The tool affects vector elements that are entirely inside of clipper contour and internal parts of vector elements that cross contour. Elements that cross clipper contour are cut by contour. Area elements that cross clipper contour are cut into linear parts.

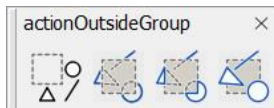
Within + Clip and Close





The tool affects vector elements that are entirely inside of clipper contour and internal parts of vector elements that cross contour. Elements that cross clipper contour are cut by contour. Area elements that cross clipper contour are cut and closed along the contour.

Within + Intersect

The tool affects vector elements that are entirely inside of clipper contour or cross it. Elements that cross clipper contour are not cut.

Outside



Tool	Function
	Outside
	Outside + Cut
	Outside + Cut and Close
	Outside + Intersect

Outside

The tool affects vector elements that are entirely outside of clipper contour and don't cross it.

Outside + Cut

The tool affects vector elements that are entirely outside of clipper contour and external parts of vector elements that cross contour. Elements that cross clipper contour are cut by contour. Area elements that cross clipper contour are cut into linear parts.

Outside + Cut and Close







The tool affects vector elements that are entirely outside of clipper contour and external parts of vector elements that cross contour. Elements that cross clipper contour are cut by contour. Area elements that cross clipper contour are cut and closed along the contour.

Outside + Intersect

The tool affects vector elements that are entirely outside of clipper contour or cross it. Elements that cross clipper contour are not cut.

Intersect



Tool	Function
	Intersect
	Not Intersect
	Intersect + Clip
	Intersect + Clip and Close
	Intersect + Cut
	Intersect + Cut and Close

Intersect

The tool affects vector elements that cross clipper contour. Elements that are entirely inside or entirely outside contour are not taken into account.

Not Intersect

The tool affects vector elements that don't cross clipper contour.

Intersect + Clip

The tool affects internal parts of vector elements that cross clipper contour. Elements are cut by contour and area elements that cross clipper contour are cut into linear parts. Elements that are entirely inside or entirely outside contour are not taken into account.

Intersect + Clip and Close

The tool affects internal parts of vector elements that cross clipper contour. Elements are cut by contour and area elements that cross clipper contour are cut and closed along the contour. Elements that are entirely inside or entirely outside contour are not taken into account.

Intersect + Cut

The tool affects external parts of vector elements that cross clipper contour. Elements are cut by contour and area elements that cross clipper contour are cut into linear parts. Elements that are entirely inside or entirely outside contour are not taken into account.

Intersect Cut and Close

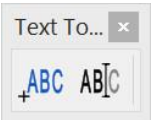
The tool affects external parts of vector elements that cross clipper contour. Elements are cut by contour and area elements that cross clipper contour are cut and closed along the contour. Elements that are entirely inside or entirely outside contour are not taken into account.

Text tools

Text tools allow placing and modifying text elements.



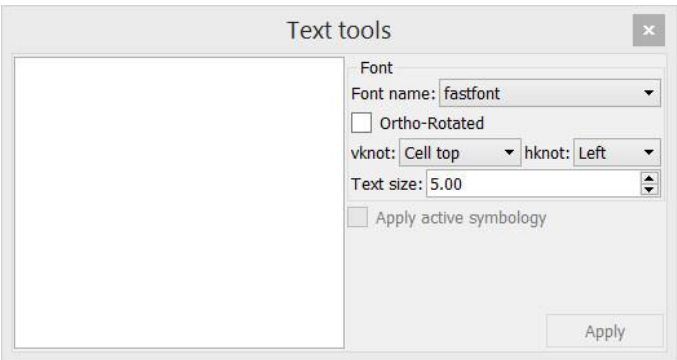
TextTools sub-toolbar



Tool	Function
	Place Text
	Modify Text

Place Text

Creates a text element. While Place Text is active, a dialog appears:

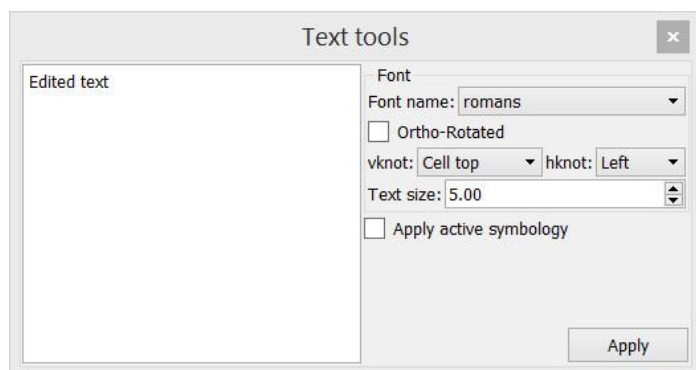


To place a text element type desirable text in the left dialog's field, set parameters in the right part of the dialog and enter text element's position in the work view by left mouse button click.

Setting	Function
Font name	Sets font for text element. Choose desirable font from the drop-down list.
Ortho-Rotated	If checked, the text element will be placed as lying in the XY plane.
vknot	Sets vertical text origin
hknot	Sets horizontal text origin
Text size	Sets text size (height of text's capital letter in working units)

Modify Text

Lets a user change both the already existed text itself and it's attributes. To edit text activate Edit text and click by left mouse button on the text element to be edited. A dialog appears:



Edit text and/or change desirable attributes and click 'Apply'.

Setting	Function
Font name	Sets font for text element. Choose desirable font from the drop-down list
Ortho-Rotated	If checked, the text element will be placed as lying in the XY plane
vknot	Sets vertical text origin
hknot	Sets horizontal text origin
Text size	Sets text size (height of text's capital letter in working units)
Apply active symbology	If checked, text element's attributes change to Active element styles

Snaps









The Snap toolbar defines the active snapping type for vector elements. To perform the snap, you can use left + right mouse buttons click or Ctrl + middle mouse button click.

The general snap rule:

- Choose a snap mode.
- Move the cursor next to the desired snap point on an element.
- Use left + right mouse buttons click or Ctrl + middle mouse button click to snap cursor position to an element.



Tool	Function
	Nearest Point Snap
	Vertex Snap

Tool	Function
	Edge Middle Snap
	Element Center Snap
	Middle Length Snap
	Intersection Snap
	Perpendicular Snap
	Perpendicular At Snap
	Parallel Snap
	2D Snap Mode

Nearest Point Snap

Defines a point on the element's edge, nearest to the cursor position.

Vertex Snap

Defines a vertex or an element's key point (like a circle quarter point etc.) on the element's edge, nearest to the cursor position.

Edge Middle Snap

Defines the middle point of an element's edge segment, nearest to the cursor position.

Element Center Snap

Defines the element's center of mass.

Middle Length Snap

Defines the point on the middle of the element's edge.

Intersection Snap

Defines the point on the intersection of two edge segments. The segments should be picked by the two consecutive clicks.

Perpendicular Snap

Defines the direction of the drawn element's segment to be perpendicular to the snapped segment.

Perpendicular At Snap

Defines a vertex on snapped element's edge, nearest to the cursor position and the direction of the drawn element's segment to be perpendicular to the snapped segment.

Parallel Snap

Defines the direction of the drawn element's segment to be parallel to the snapped segment.

2D Snap Mode

Keeps the cursor's current global Z value while any other snap is used. It is useful to get the clear XY topology for elements with different Z like multi-level roofs.

Locks

Locks set restrictions for the cursor position and movement. They are divided into 3 sections — point locks, linear locks and planar locks.



Tool	Lock section	Function
	Point	Grid Lock
	Linear	Lock To Element
		Lock Axis (only X/Y/Z cursor movement is allowed)
	Planar	Lock To Plane By 3 Points
		Lock To XoY Plane (only XY cursor movement is allowed)
		Lock to Element's Plane

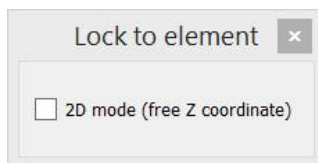
Only one lock can be active in each section. For example, it's impossible to activate 2 or 3 planar locks simultaneously. But you can use one point lock, one planar lock and one linear lock at the same time. Besides that, locks can be used along with other cursor's restriction methods like snaps. For more information see [Locks Interaction](#) sub-section in the end of this paragraph.

Grid Lock

Restricts cursor position to a coordinate grid. Grid settings and visibility are defined by [View Attributes](#) tool.

Lock To Element

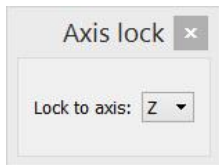
If activated, the cursor moves along the defined vector element.



Setting	Function
2D mode	If checked, Lock To Element freezes only XY coordinates and allows changing the cursor's global Z at the same time. For example, you can get the correct topology if you vectorize roof planes with different heights, docked one to another

Lock Axis

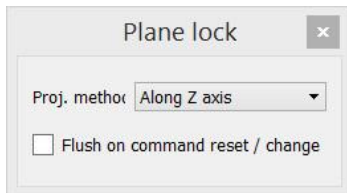
It restricts the cursor movement to the global X, Y, or Z directions. The desirable axis can be chosen from the drop-down list in the toolbox.



Actually, Z axis is the most useful option as it allows to vectorize strictly vertical segments of elements.

Lock To Plane By 3 Points

This lock defines a vectorization plane by 3 data points, entered after lock activation. All next data points will be located on the same plane as long as the lock is active. You can use an existing vector element to specify the desired plane using one of the snap tools. To define a plane by an existing element without entering data points for the current command use Alt+Left click snap accepting, instead of the regular left click. While Lock to Element's Plane is active, a dialog appears:



Set the parameters and enter 3 datapoints to choose the desirable plane.

Setting	Function
Proj. method	Defines the rule of using plane lock in combination with Element lock restriction <ul style="list-style-type: none">• Orthogonal. The cursor glides over an element's projection onto the locked plane, this projection is built using the rays, perpendicular to the locked plane• Along Z axis. The cursor glides over an element's projection onto the locked plane, this projection is built using the rays, perpendicular to the global XoY plane
Flush on command reset/change	Defines, if the current locked plane affects only the single operation or all operations, while this lock is active <ul style="list-style-type: none">• If the flag is on, the cursor keeps locked to the defined plane while the current operation is active. After the current operation is finished, the cursor position and movement is unlocked• If the flag is off, the cursor keeps locked to the defined plane as long as the Lock to Element's Plane tool button is pushed

Lock To XoY Plane

If activated, the cursor's absolute Z movement isn't allowed.



Setting	Function
<i>Flush on command reset/change</i>	<p>Defines, if the current locked plane affects only the single operation or all operations, while this lock is active</p> <ul style="list-style-type: none"> If the flag is on, the cursor keeps locked to the defined plane while the current operation is active. After the current operation is finished, the cursor position and movement is unlocked If the flag is off, the cursor keeps locked to the defined plane as long as the Lock to Element's Plane tool button is pushed

This lock allows to vectorize strictly horizontal segments of elements.

Lock To Element's Plane

It restricts the cursor movement to the plane, defined by an already existing element. Locked plane is defined as an average plane of the all element vertexes. The element must have 3 or more vertices. While Lock to Element's Plane is active, a dialog appears:















Set the parameters and choose the desirable vector element.

Setting	Function
<i>Proj. method</i>	<p>Defines the rule of using plane lock in combination with Element lock restriction</p> <ul style="list-style-type: none"> Orthogonal. The cursor glides over an element's projection onto the locked plane, this projection is built using the rays, perpendicular to the locked plane Along Z axis. The cursor glides over an element's projection onto the locked plane, this projection is built using the rays, perpendicular to the global XoY plane
<i>Flush on command reset/change</i>	<p>Defines, if the current locked plane affects only the single operation or all operations, while this lock is active</p> <ul style="list-style-type: none"> If the flag is on, the cursor keeps locked to the defined plane while the current operation is active. After the current operation is finished, the cursor position and movement is unlocked If the flag is off, the cursor keeps locked to the defined plane as long as the Lock to Element's Plane tool button is pushed

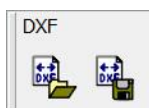
Locks interaction



The lower table shows results for linear and plane locks interaction.

Linear	Plane	Effect
 + 		The cursor glides over the projection of the element, picked by " Lock to Element ", onto the plane, defined by the 3 points This projection is built using rays, either perpendicular to the destination plane (if Proj. method is Orthogonal), or perpendicular to the global XoY plane (if Proj. method is Along Z axis) <i>Plane by 3 points should be defined at first when Lock to element is inactive</i>
 + 		The cursor glides over the projection of the element, picked by "Lock to Element", onto the global XoY plane Global Z of this XY plane is defined by a click on the locked element when this one is indicated
 + 		The cursor glides over the projection of the element (2-nd), picked by " Lock to Element ", onto the plane, defined by the 1-st existing element This projection is built using rays, either perpendicular to the destination plane (if Proj. method is Orthogonal), or perpendicular to the global XoY plane (if Proj. method is Along Z axis) <i>Plane from the existing element should be defined at first, when Lock to element is inactive</i>
 + 		It locks the cursor to the intersection of the plane, defined by 3 points, with the line, which is parallel to the selected axis in Lock Axis dialog, and passes through the current cursor position
 + 		It locks the cursor in its current XYZ location
 + 		It locks the cursor to the intersection of the plane, defined by "Lock to Element", with the line, which is parallel to the selected axis in Lock Axis dialog, and passes through the current cursor position

DXF tools

DXF toolbar contains tools to import/export geometry from/to dxf format. Currently only text dxf is supported.



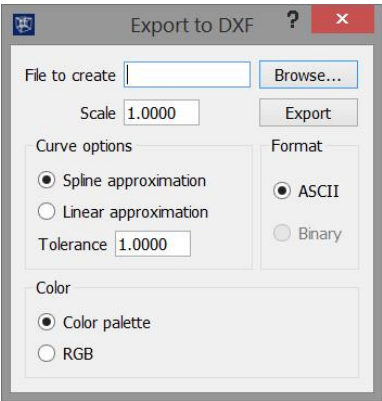
Tool	Function
	Import from DXFfile
	Export to DXF file

Import from DXF file

Imports geometry from dxf file into opened spx file. To import geometry choose the 'Import from DXF file' tool. Standard Windows 'Open file' dialog' will open. Select dxf file to be imported and click 'Ok'.

Export to DXF file

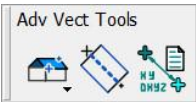
Exports geometry from opened spx file to dxf file. To export geometry choose the 'Export to DXF file' tool. Tool window will appear:






Specify location and file name to export to, define export parameters and click 'Export'.

Advanced tools

Advanced toolbar provides you with some additional vectorization tools.



Tool	Function
	Place Standard Building
	Place Set Of Parallel Lines
	Measure Coordinates Delta

View Commands

View Commands are located on the bottom line of any view. They make it possible to navigate through the work area. Also some settings for data visualization can be defined here.


















View Commands are different for Mono and Stereo views (Stereo views have a few additional view tools)

View Commands for Mono views:



View Commands for Stereo views:



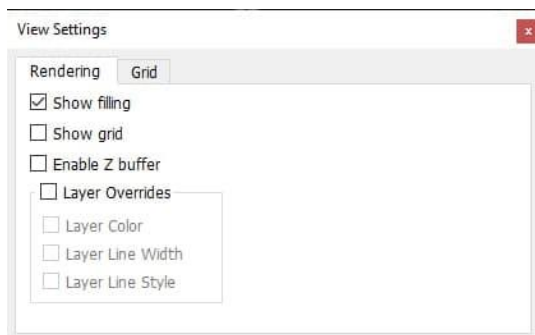
Tool	Function
	View Attributes
	Refresh View
	Clone View
	Escape Window
	Pan
	Fit View
	Zoom Area
	Zoom In
	Zoom Out
	Rotate
	Standard Views
	Perspective
	Stereo Parameters Control (It appears only for stereo views)
	View Presets
Actv.Z spd. 0.100  m	Change Active Z Speed (It appears only for stereo views)
	Camera Movement On/Off (It appears only for stereo views)
	Camera Zoom On/Off (It appears only for stereo views)
	Undo
	Redo

View Attributes

Defines the view settings. Settings window has the 2 tabs: [Rendering](#) and [Grid](#).

Rendering

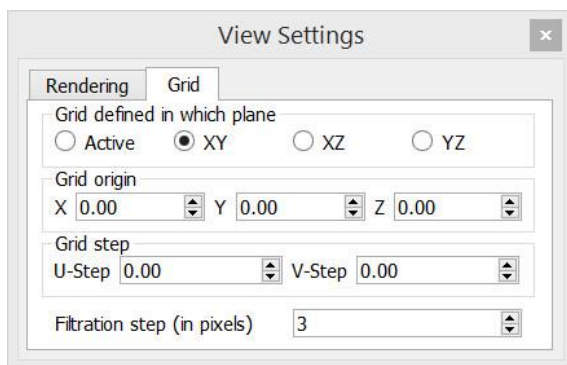
Sets rules to render vector objects



Setting	Function
Show filling	If set to on , the elements filling is visible.
Show grid	If set to on , coordinate grid is shown according to parameters set in ' Grid ' tab
Enable Z buffer	If set to on , laser points, vector elements and the cursor are shown as valid 3d objects, the nearer overlaps the farther. The rendering takes more time.
Layer Overrides	If set to on , the visible symbology of vector elements is changed according to the Layer settings (ByLevel or Alternative). See the Layers tool description.

Grid

Sets parameters of coordinate grid. Set [Grid Lock](#) active to use coordinate grid for creation and editing of vector elements.



Setting	Function
Grid defined in which plane	Sets the grid plane: <ul style="list-style-type: none"> • Active. Sets the grid plane parallel to view plane. The grid plane intersects with 3D cursor position • XY. Sets the grid plane parallel to XY plane. The grid plane intersects with point defined as a Grid origin • XZ. Sets the grid plane parallel to XZ plane. The grid plane intersects with point defined as a Grid origin • YZ. Sets the grid plane parallel to YZ plane. The grid plane intersects with point defined as a Grid origin
Grid origin	Sets grid origin
Grid step	Sets grid steps
Filtration step	Defines grid rendering depending on view scale

Refresh View

Updates the view contents.

Clone View

Copies view parameters from one view to another. To make copy select the tool in the source view and click inside the target view.

Escape Window

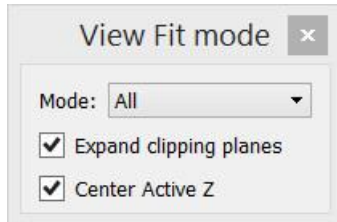
Detaches a view from the Spatix workspace. After the detaching, a full screen mode can be turned on/off by pressing F11.

Pan

Allows to navigate through the work area. Keep the middle mouse button pushed and drag the mouse through the view to navigate.

Fit View

Set the view to show all vector elements.



Setting	Function
Mode	Defines elements for fitting. <ul style="list-style-type: none">• All fits view to all vector elements.• CAD file graphic fits view to all vector elements (the same as All mode in the current version).• Selection fits view to the selected vector elements.
Expand clipping planes	Establishes view's front and back clipping planes to view all desirable elements.
Center Active Z	Sets the view active depth as a center between view's front and back clipping planes.

Zoom Area

Zooms the view in by specifying the rectangular area to be displayed in the view. Keep the left mouse button pushed and drag the mouse through the view to define rectangular area.

Zoom In

Zooms the view in by click in the view.



Setting	Function
Scale	Combobox to define zoom scale

Zoom Out

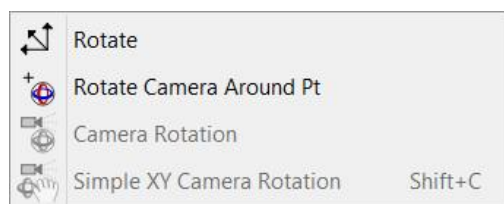
Zooms the view out by click in the view.



Setting	Function
Scale	Combobox to define zoom scale

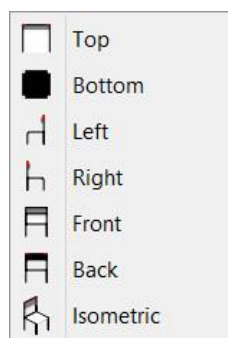
Rotate

Allows to rotate the view interactively. The drop-down list defines a rotation mode.



Sub-Tool	Function
Rotate	Rotates the view around the defined 3D point. Indicate 3D point as a rotation center by left mouse click and then drag holding left mouse button. Combination Rotate + Ctrl + Shift fixes rotation to only around global Z axis. Also you can lock the rotation to the horizon, to keep the natural orientation of sky/ground.
Rotate Camera Around Pt	Rotates the view around the defined 3D point. After picking 3D point as a rotation center by left mouse click, a yellow circle will appear. (Also you can use Snap to define rotation center.) Then click inside circle by left mouse button and drag holding left mouse button or use small rectangles to rotate only around pitch or roll axes. You can lock the rotation to the horizon, to keep the natural orientation of sky/ground.
Camera Rotation (it is only active if Perspective is set to option other than 'No camera')	Rotates the view around the camera position. After choosing this rotation mode a yellow circle will appear. Click inside circle by left mouse button and drag holding left mouse button or use small rectangles to rotate only around pitch or roll axes. You can lock the rotation to the horizon, to keep the natural orientation of sky/ground.
Simple XY Camera Rotation (it is only active if Perspective is set to option other than 'No camera')	Rotates the view around the camera position. Click inside work area by left mouse button and drag holding left mouse button. This rotation mode is useful for navigation in perspective view when mobile dataset is used. You can lock the rotation to the horizon, to keep the natural orientation of sky/ground.

Standard views

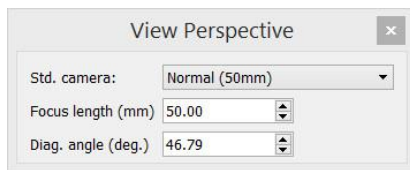


Sets the view orientation in one of the predefined states. To set view orientation select the option and click inside the view.

Perspective

Allows to define camera lens parameters.

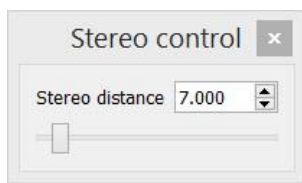
This can be done either dynamically by 2 mouse left clicks (use a cube helper as a reference), or with the tool dialog:



Setting	Function
Std. camera	Lets a user select one of the standard camera lenses (the recommended option).
Focus length (mm)	Lets a user define camera focus length manually*
Diag. angle (deg.)	Lets a user define diagonal angle of view manually*

**Focus length and Diag. angle are linked to each other*

Stereo Parameters Control



Defines the distance between the left and right cameras (eyes) in stereo views.

View Presets

Makes it possible to instantly apply the view parameters defined and saved previously. (See View [Params Presets...](#) in the [Edit](#) menu)

Change Active Z Speed

Defines the scroll sensitivity for changing the cursor depth. (See [Mouse usage](#) section)

Cursor Depth Speed can also be defined interactively using Shift + Scroll.

Camera Speed Control

Changes the camera movement speed during the navigation.

Camera Movement On/Off

If it's activated, the cursor depth remains permanent when zooming using the camera.

Camera Zoom On/Off

Switches the zoom mode to either simple zoom (scale) or camera forward/backward moving.

Undo

Cancels the last view modification.

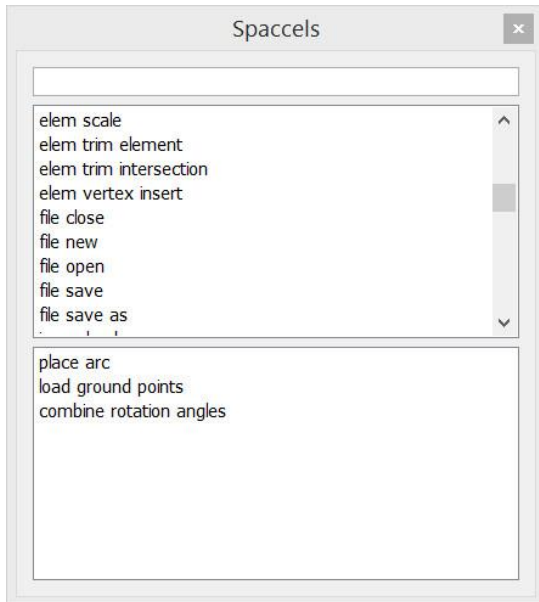
Redo

Restores the view state canceled by [Undo](#).

Spaccels

'Spaccels' (abbreviated name of 'Spatix accelerators') are the commands that can be run using command line. Also spaccels or their sequences can be tied to [Shortcuts](#) to speed up your work. Almost all Spatix tools have corresponding spaccels. If external application (*.ix) running on top of Spatix has own special commands for its tools they will also be available for execution as a spaccels.

To run spaccels window select 'Spaccels' from the item [Window](#) in the [Menu](#).



Type the spaccel command in the command line or select it from list and press 'Enter' to execute.

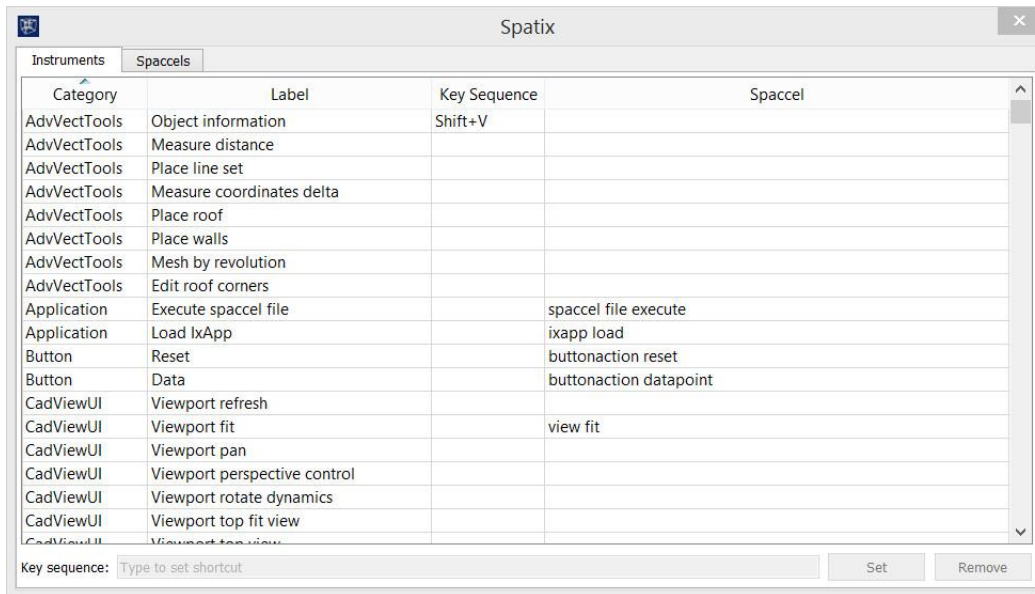
Also you can execute several spaccel commands at once. To do it type them in the command line separated by semicolons and press 'Enter'.

Example: command '**place block; xy=0:0; dx=500:500**' creates a rectangle with vertex coordinates:

```
0, 0
0, 500
500, 500
500, 0
```


Shortcuts

Keyboard shortcuts can be defined for the most of Spatix tools and Spaccels. It allows to speed up processing when using Spatix.



To set new shortcut:

- Select desired tool row
- Place cursor into “Key sequence” field
- Type desired key sequence
- Click **Set**

To remove existing shortcut:

- Select desired tool row
- Click **Remove**

Additional

Spatix vector file format

SPX files:

- store element coordinates as 64-bit decimals (double precision)
- store elements on disk in the same format as they are represented in memory. This minimizes in-memory conversion operations
- elements can be attached with the custom user-data. This is utilized by IxApps
- all element coordinates are always in 3D (no 2D elements)
- SPX file stores R,G,B components of colors besides the color index into the color table, though the Spatix core logic still relays on color index while dealing with elements
- each element has a 64-bit unique ID
- each element has last modification time field
- SPX file implements layers usage counting
- the open file is kept completely in memory and user needs to save it (if user has done changes)
- elements are organized in blocks both in memory and on disk. This is for possible performance optimizations in future
- when blocks are saved to disk they are compressed, when read - decompressed (SPX files compression can be disabled in Spatix preferences for faster write operations)
- SPX file implementation keeps track of which elements were modified and which element's geometry was altered

SPX file format limitations:

- SPX file may have up to 2^{40} blocks. Each block is up to 65530 elements or up to 128MB in size in memory (whichever limit is reached first)
- one block of non-elements data max size = 2^{32} -16 bytes
- one element is up to 128K in size. For polylines it allows for about 5000 3D points with decimal coordinates
- up to 4095 layers could be defined in file