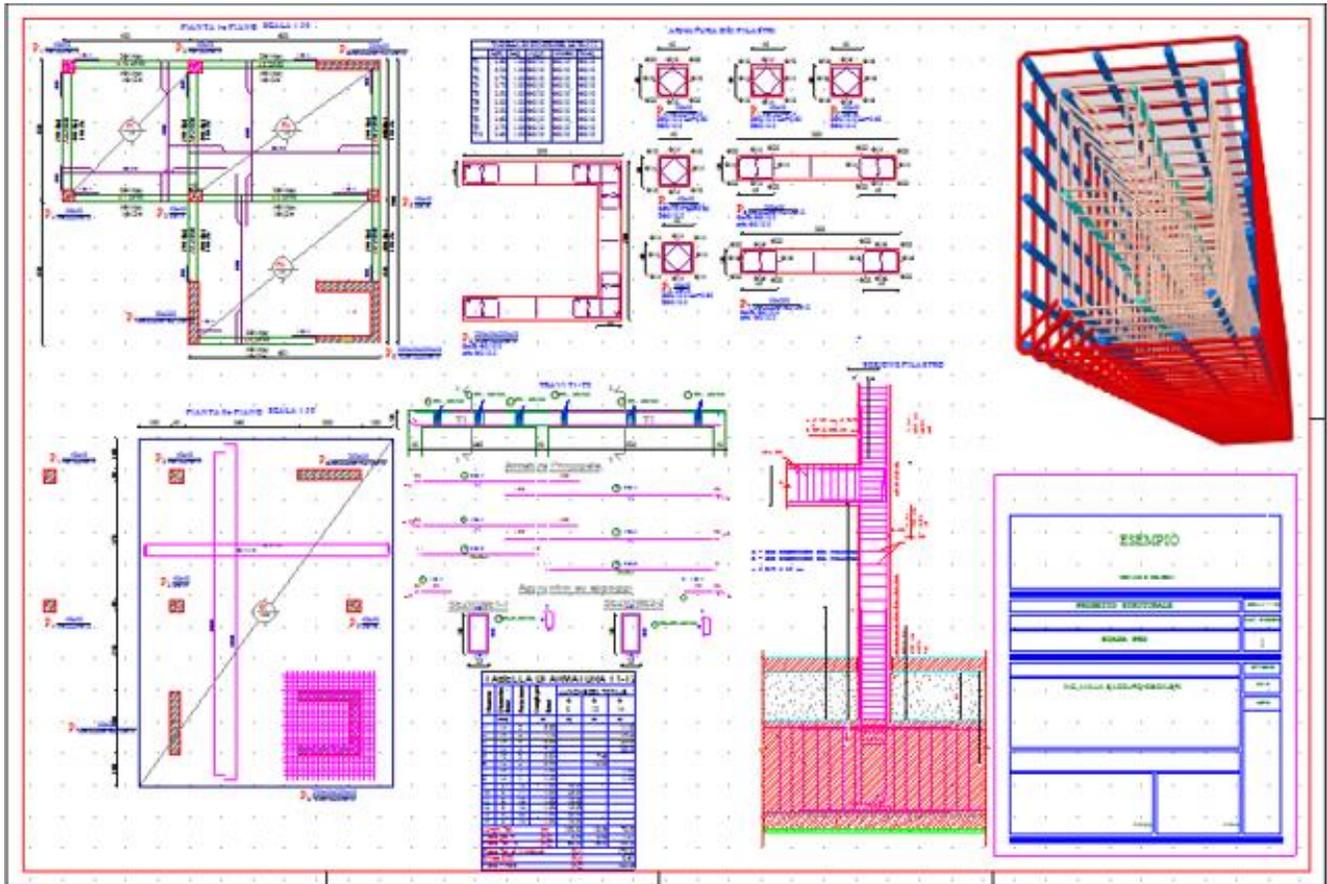




SCADA Pro[™]
Structural Analysis & Design

User's Manual

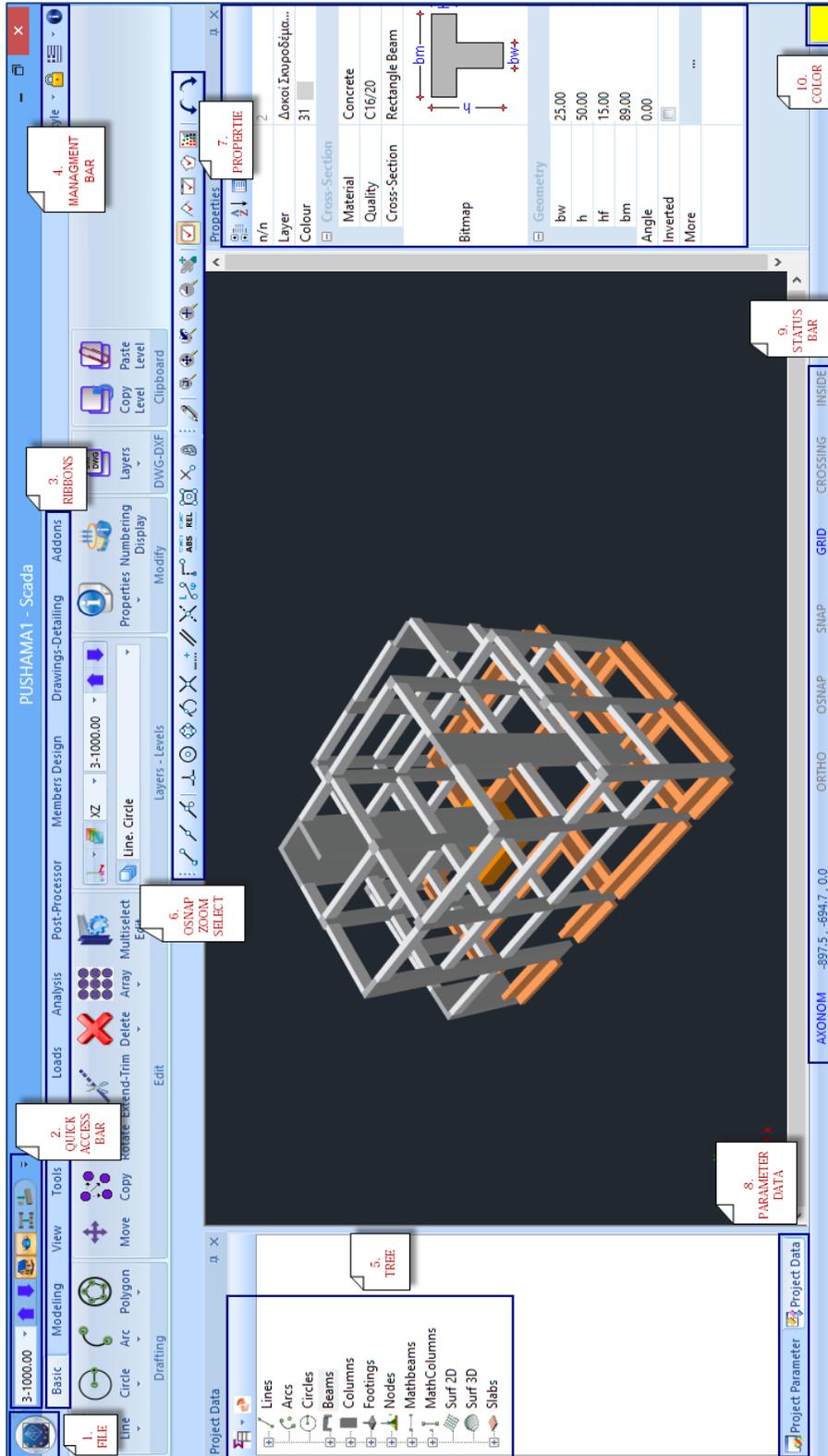
10.DRAWING



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I. THE NEW UPGRADED INTERFACE of SCADA Pro

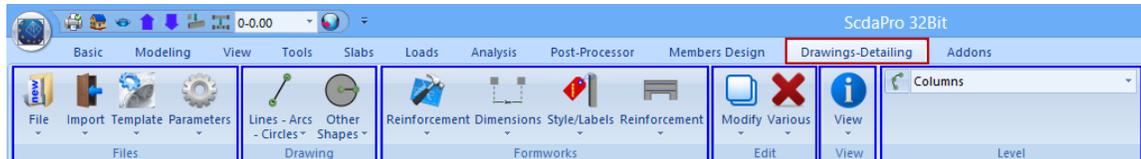


II. DETAILED DESCRIPTION OF THE NEW INTERFACE

In the new upgraded SCADA Pro, all program commands are grouped in 11 units.



Drawings-Detailing

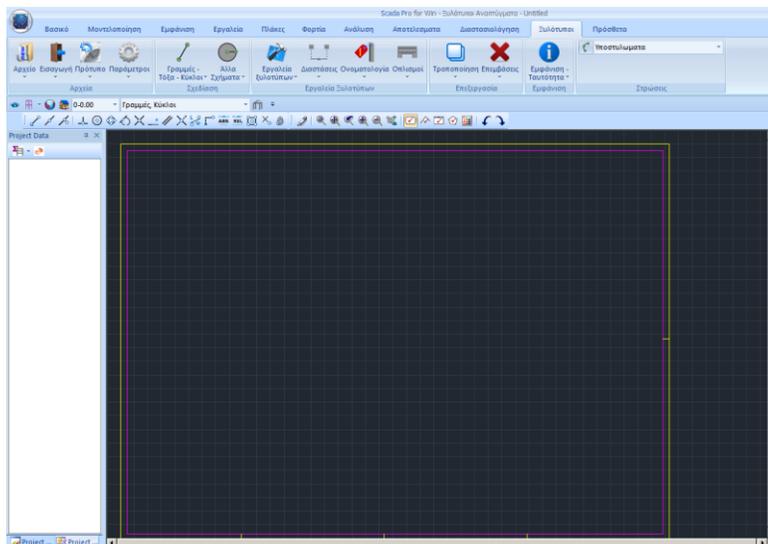


The 10th Unit called "Drawing-Detailings" includes the following six groups of commands:

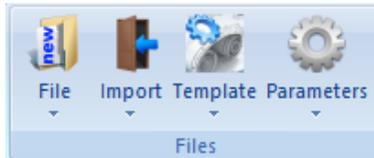
1. **Files**
2. **Drawing**
3. **Formworks**
4. **Edit**
5. **View**
6. **Level**

Since the design and reinforcement of the structural elements of the concrete structures or the design of steel connections of the steel structures have been completed, you can open, modify and finally produce all the drawings in the "Drawing-Detailings" Ribbon.

The "Drawing-Detailings" Ribbon incorporates a drawing application in the interface.



1. Files

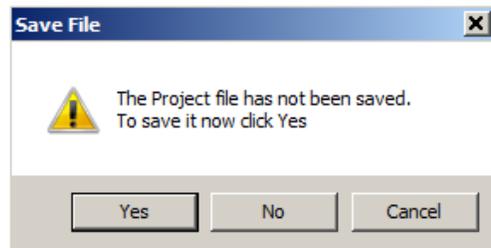


The “Files” command group allows you to open, save and print the drawings that the program produces since the structural members’ design has been completed.

1.1 File

It is a group of commands related to the file management.

New: This command clears the screen from any drawing, so you can insert a new project’s design or start introducing entities from the beginning. In the dialog box, you decide whether to save or not the existing project.

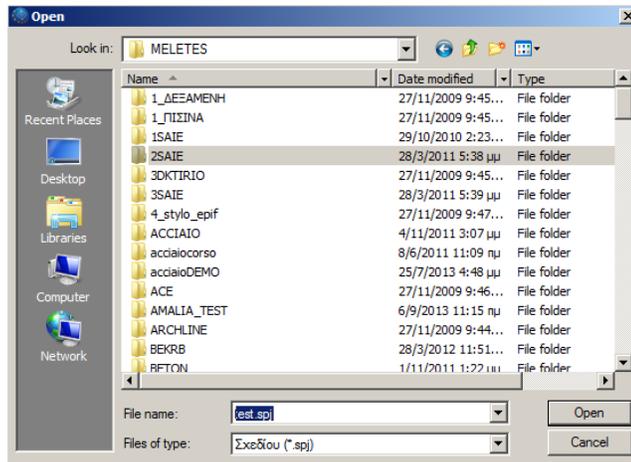


: This button is used to save the project under a name that the user will define.

: This button is used to remove the existing drawing without saving. All previous work will be lost.

: This button is used to cancel the "New" command and continue editing the existing project.

Open: This command is used to open an existing drawing file (i.e. a design that you have already edited and saved as a project file). These files in SCADA Pro are SPJ extension files.



Save: Select this command to open a similar to the presented previously dialog box, where you can save the project’s design.

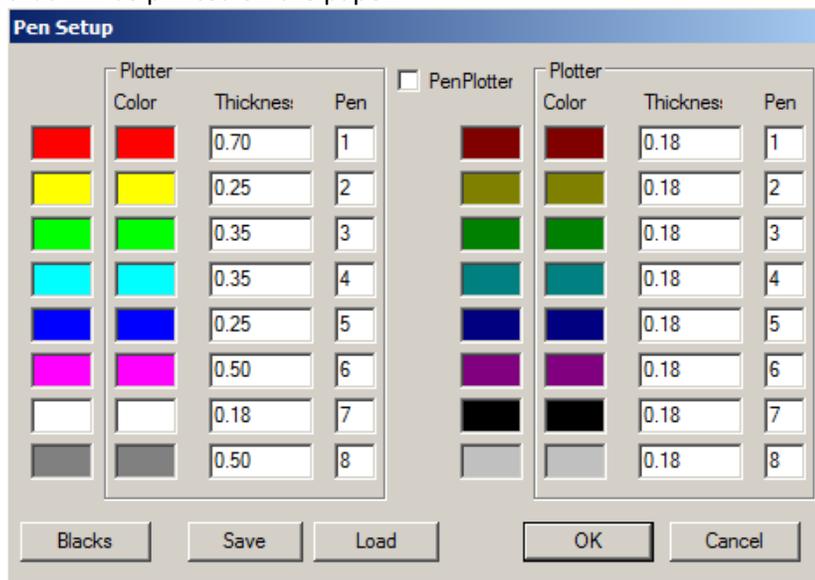
⚠ The first time you save a project’s drawing when you select the "Save" command, it is like you had selected the command “Save as” (see next paragraph).

Save as: This command is used to save a project’s drawing with a new name. It is useful when you have made some changes and you want to save the modified drawing under a different name.

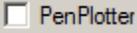
Print SetUp: Select this command to open in Control Panel the Setup of the default printer and confirm or change the parameters.

Print: This command is used to print the drawings. In the dialog box, you can define the parameters, line thickness, and pen of the lines, which will be printed colored like they appear on your screen.

The list of colors on the left, outside the box titled "plotter", is related to the colors you see on the screen. In the corresponding columns in the "plotter" box, match the colors and thickness that will be printed on the paper.



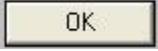
a. Set printing parameters for inkjet plotter.

1. Deactivate the check box “PenPlotter”, . Then, the program is adjusted for the use of an inkjet plotter.

2. Choose for any color of your project’s drawing (colors on the screen):

i. The corresponding color to be printed on the paper. Initially, the program assumes that the line colors appear on the screen will be printed also on the paper. To change the color printed on the paper, double click inside the box of the corresponding color in the "plotter" column. Immediately, a new dialog box titled "RGB" opens with the color analysis in the three primary colors (red-RED, Green-GREEN, blue-BLUE).

To change the color analysis use the arrows  or type the value.

Choose the color and press the following button, , to open the previous dialog box and continue with the definition of the other parameters.

ii. The thickness of each colored line. This definition is made for each color, in the “thickness” column, where you can type in each tab the corresponding value.

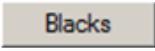
 For inkjet plotters, the “Pen Plotter” check box is deactivated.

b. Set the printing parameters for pen plotter.

1. Activate the check box “Pen Plotter”, .

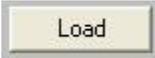
2. For each color of the screen (left column of colors), choose the number that corresponds to the position of the pen. The setting is made in the corresponding boxes in the column entitled "pen".

 For pen plotters “Color” and “Thickness” are deactivated.

: Click on this button, if you want all colors to be printed black on paper. In this way, you can print colored drawings in gray scale (black and white).

 The program allows you to save in the "palette" files, all the printing settings. In this way, when you want to use the same drawing settings for different projects, you can load the saved "palette" file and avoid in this way to set every time the printing properties.

: Since you have defined all parameters related to color and thickness, press “Save”. The "Create Color Palette" dialog box opens where you enter the name of the "palette" file only without the appropriate extension. The files created are PAL extension files.

: This button is used to load existing PAL files.



1.2 Import:

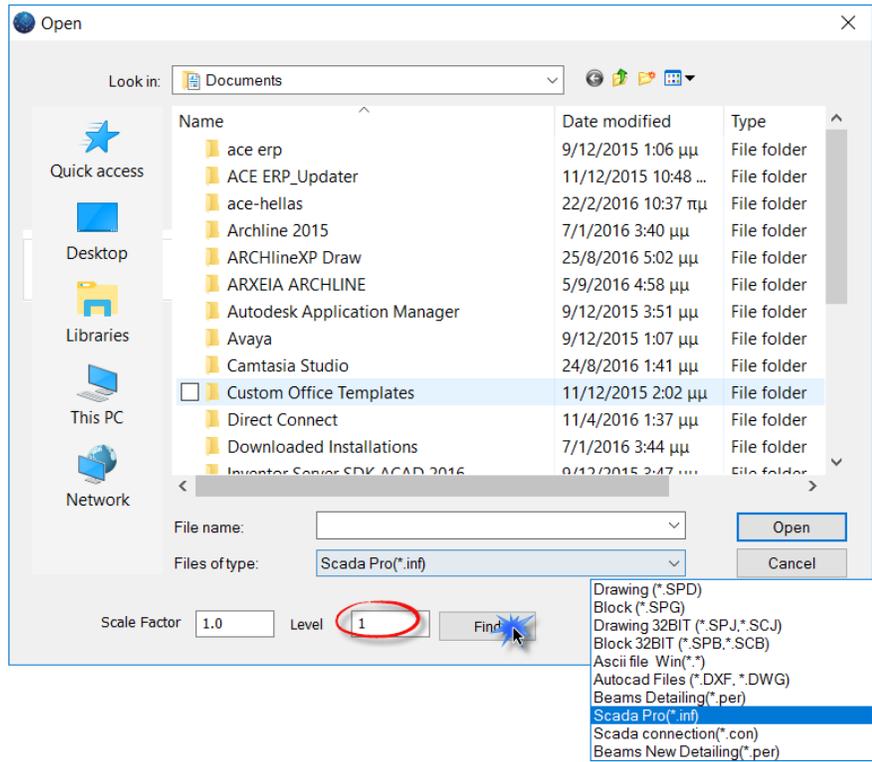
The program reads the geometry data from the Modeling and Dimensioning results from the relevant section.

Selecting “Import” command opens the following dialog box for choosing the project’s folder.

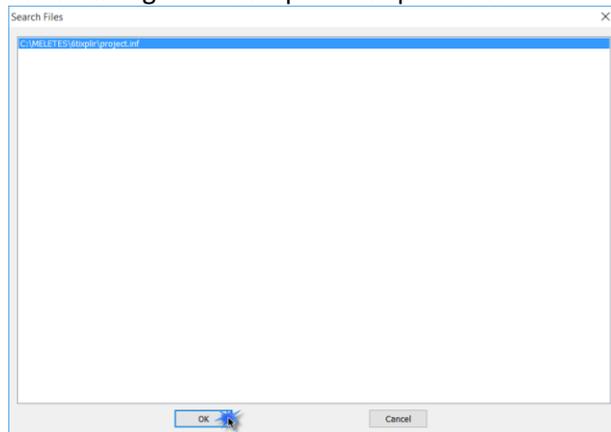
Then select:

- the type of project from **Files of Type**
- the number of the floor
- the Scale factor

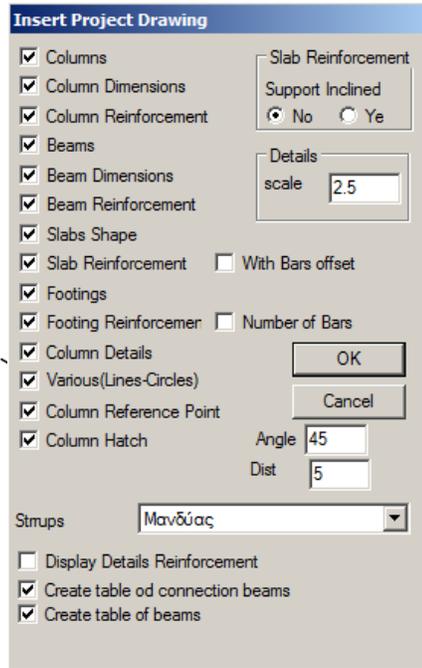
and press **Find**.



In the dialog select the path and press OK



In the dialog box:



- Select the elements that will be imported into the design by activating the corresponding checkboxes.
- In “**Slab Reinforcement**” select “Yes” if you want the inclined reinforcing bars to be designed as well as the additional reinforcement in slab’s supports. Otherwise, check “No”.
- In “**Scale**” type the zoom factor for the columns’ detailing.

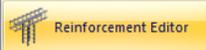
Example: If the design scale is 1:50 and you want the columns’ detailing to be scaled in 1:20, then the zoom factor should be $50/20 = 2.5$.

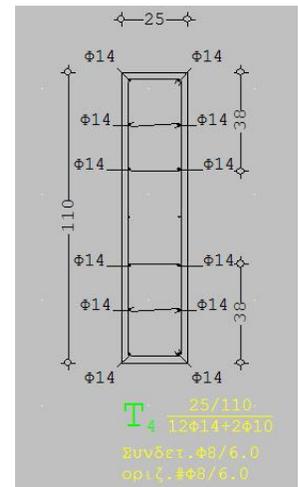
By activating the:

- “**With bars offset**” the additional reinforcing bars in the slab’s supports will be separated in inclined and not inclined.
- “**Number of Bars**”, the footing steel reinforcement will be inserted with the number of the given bars.
- “**Column Hatch**”, the columns will be imported with the hatch, and next to the “Angle” and “Distance” you can define the angle and distance between the lines of the hatch.

On “**Stirrups**” select the type of stirrups.

By activating the:

- “**Display Details Reinforcement**”, all information related to the detailing of the columns’ reinforcement will be included. For further elaboration on the detailing, use the “Reinforcement Editor” command . (Command path: Drawings-Detailing>Edit>Modify>Reinforcement Editor)
- “**Create Table of Connections Beam**” and “**Create Table of Beams**” to display the respective tables.



Indicate the insertion point and insert the design of the selected level. Repeat for all levels.

For Drawing file (*.scj, *.spj):

Import an existing SCJ or SPJ project file, created by the program, after the structural members' design procedure is completed. You can also display more than one levels in the same design.

For Block file (*.scb, *.spb) :

Import in the design an existing block, by selecting “File >> Import>> Block”. (SPB files belong to SCADAPro, while SCB belong to the older version named SCADA for Windows).

For Ascii Win (*.*)/Dos(*.*)file:

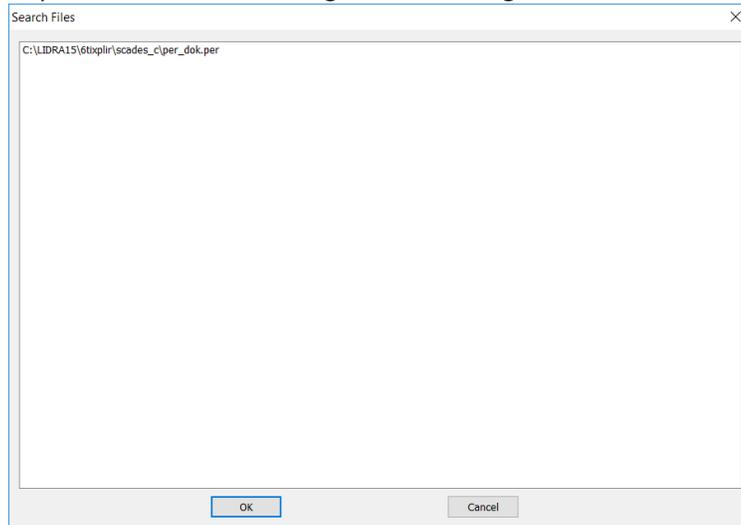
Import an Ascii file (text file) created by Windows or Dos word processor.

For Autocad Dxf Win file(*.dxf)/Dos(*.dxf) :

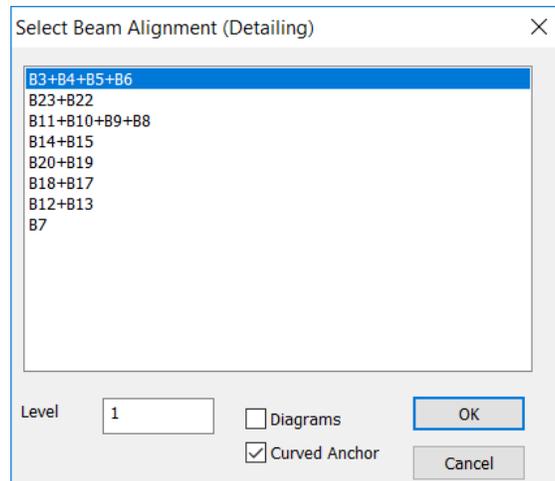
Import a DXF file created by a Windows or Dos cad.

Beams Detailing (*.per) :

Import the beams' detailing in the drawing.



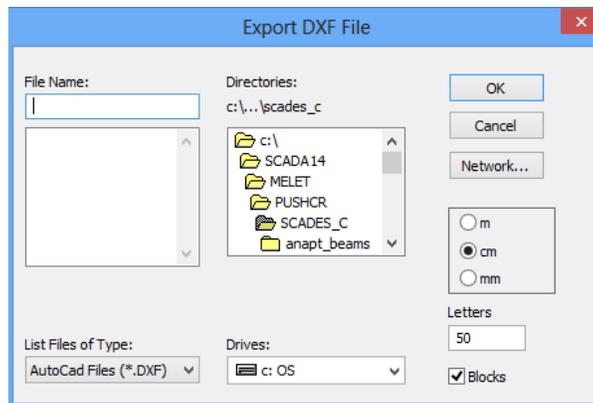
1. On “List of files format” select “Beams Detailing (*.per)”.
2. A new dialog box opens:



Select the “Level” by typing the level's number.

Active:

- “Diagrams”: Beams' Detailing drawing will be accompanied by the corresponding moment diagrams.
- “Curved Anchorage”: The anchorages will be curved at the end.



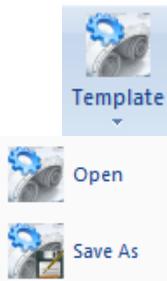
- File name: type the file's name.
- Directories: select the directory's path where the DXF file will be saved.
- List of file formats: define the format of the file (DXF ή DWG).



- : Specify the length units for the exported file. The specified unit depends on the units used in the cad program, where the exported DXF file will open.

- Letters: Type the font size of the texts.
- Blocks : By selecting this option, all the blocks or the current drawing will be exported as blocks. Otherwise, blocks will be exported in the DXF or DWG files.

Export-DWG, DXF: It is used to create a DXF or DXG file. It is the same command as the “Export – DXF”. The only difference is that the format is more modern and advanced than the previous one. The previous format is maintained for compatibility reasons. Use this command like the previous one.



1.3 Template:

Open: It is used to open a file with default rs, so that the new drawing will be adapted to these parameters. Prerequisite is having an existing default parameter format (*.dsc).

- ⚠ If there is already a loaded project on the screen, select this command and the program displays a dialog box which informs you that the drawing will be adjusted to the newly defined parameters.

Save as: It is used to create a file with default parameters (*.dsc).

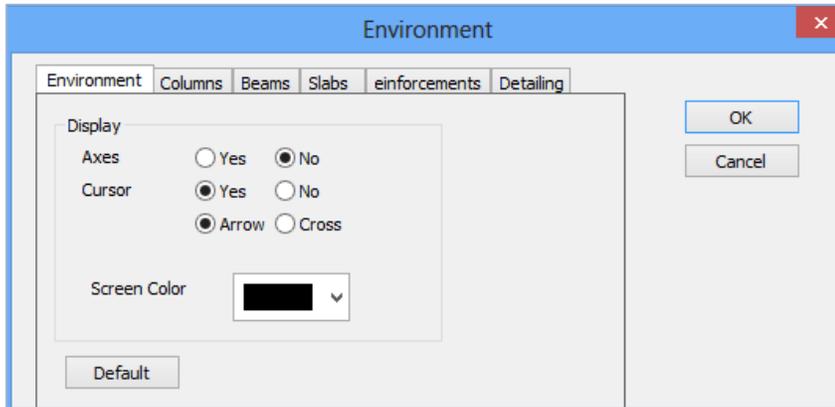
- ⚠ The default file can contain all these parameters considered in the “User Interface”, “Text”, etc.



- User Interface
- Various
- Axes
- Heights
- Grid
- Dimensions
- Lines
- Text
- Constraints
- Drawing Limits
- Layers
- Drawing Paper

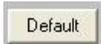
1.4 Parameters:

When this command is selected, a dialog box, in which all parameters of “User Interface” and design entities can be defined, opens.



Environment:

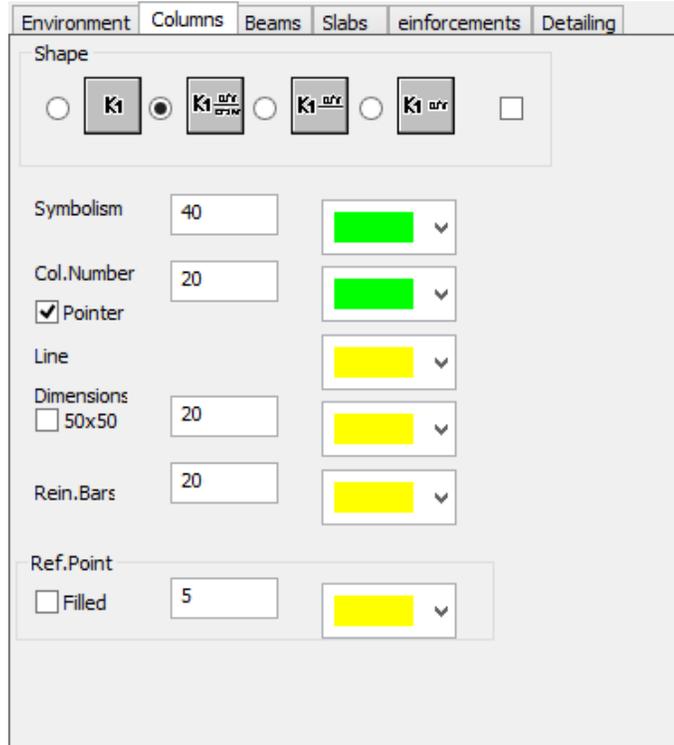
Select this command to display or not the axes and the cursor. Choose the cursor’s form and the color of the screen from the drop=down list (background).



: This button resets all default parameters and cancels any previous modification.

Columns:

To define the parameters of “Column’s text”:



Shape:

By selecting one of the following symbols, the corresponding information about the columns will be contained in the text:



: Symbol and numbering.



: Symbol, numbering, dimensions and steel reinforcement.



: Symbol, numbering, dimensions, steel reinforcement and the line separation.



: Symbol and dimensions.



: Activate the checkbox next to the “Shape” modes, to adapt the columns’ text to the selected “Shape” mode.

On the same dialog box, define the dimension (in the scale of cm) and the color of the Symbolism, the Numbering, the Separation Line, the dimension the text of the Reinforcement Bars and the Reference Points. The size is changed by typing a new value in the corresponding field, and the color by pressing the down arrow  located next to the color of the parameter you wish to change.

The active “Pointer” means that the label of the columns will appear as “K₆”. Otherwise, it will appear as “K6”.



The format of the presentation of the columns’ dimensions should be selected before you insert the drawing on paper.

Reference Point:

: By activating the checkbox, the columns’ reference point will be filled in with the same color.



If you want "full" columns referent point to be designed, you have to select the "Parameters" before you insert the design on the paper.

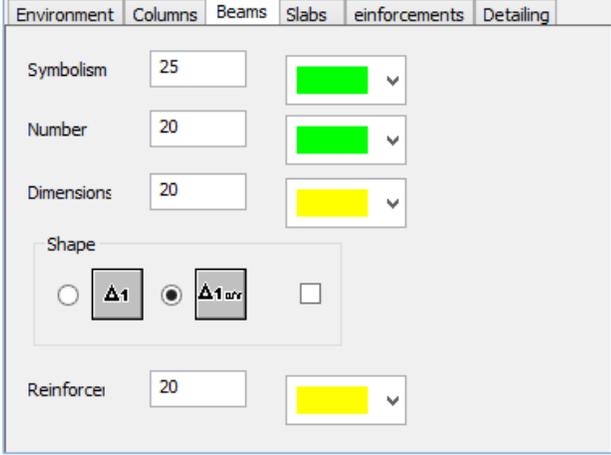
The columns reference point displayed in the design can be “closed” by setting their Layer to “Not Visible”.

The entities of the beams continuity are on separate layers between 50 and 59 positions on the list of Layers.

Click the button “OK”  to accept changes or the following button  to cancel them.

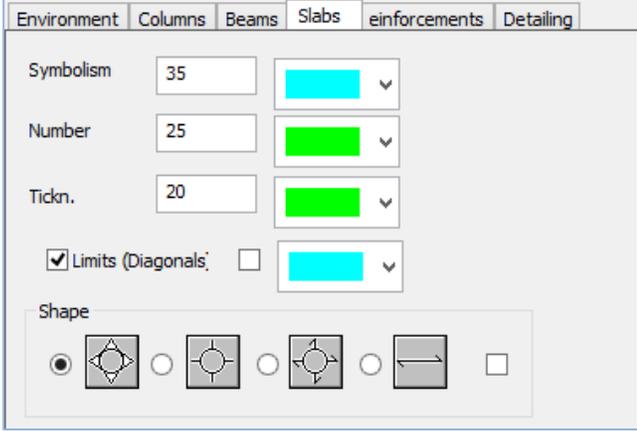
Beams:

Concerning the parameters of the columns text, set the parameters of the beams' text.



Slabs:

Specify the size and the color of the symbol, the numbering and the thickness of the slabs.

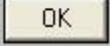


Boundaries: The activation of the checkbox/means that the imported slabs will be defined and designed with their boundaries.

- Limits (Diagonals) This check's combination removes the boundaries of the existing slabs.
- Limits (Diagonals) This check's combination restores the boundaries of the slabs designed in the first place and then removed.

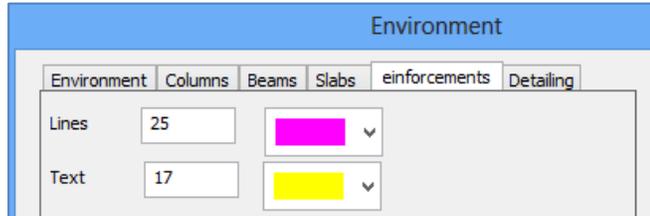
Shape: It is used for the definition of the slabs' symbolism (, , or ).

Activate the right checkbox to update all existing slabs.

Click the button  to accept changes or the button  to cancel them.

Reinforcement:

In this tab, the dimension, as well as the color of the text, are defined, where the additional steel reinforcement of slabs, footings, and beams is described.



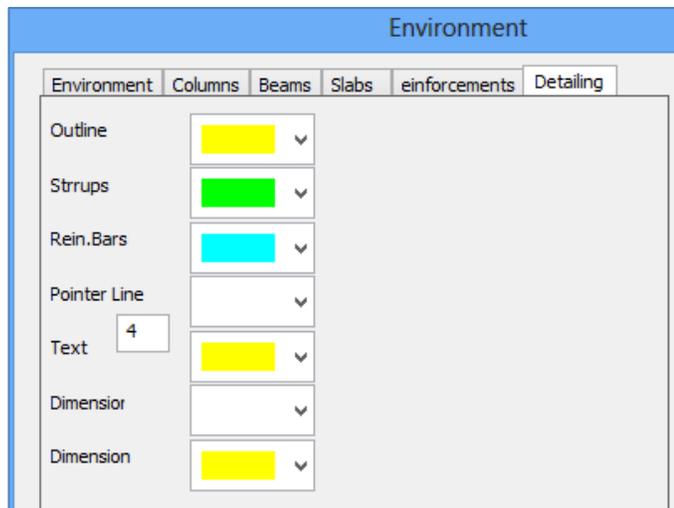
Environment		
Environment	Columns	Beams
Lines	25	 ▾
Text	17	 ▾

“Lines”: In the adjacent field, the distance among the reinforcing bars of the slab is defined.

“Text”: In the adjacent field, the relative distance in the slab’s text is defined.

⚠ This tab is about new steel reinforcement and the updates of existing ones.

Detailing:

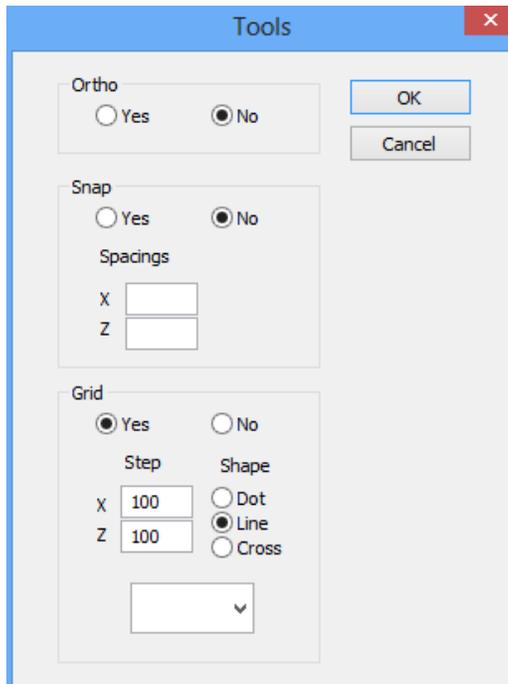


Environment		
Environment	Columns	Beams
Outline	 ▾	
Strups	 ▾	
Rein.Bars	 ▾	
Pointer Line	 ▾	
Text	4 ▾	
Dimension	 ▾	
Dimension	 ▾	

Define the color of the Border, the Stirrups and the primary steel Reinforcement of the columns’ detailing.

⚠ This tab is about new steel reinforcement and the updates of existing ones.

Tools:



a. Ortho: By selecting “Yes”/, you can move the mouse only horizontally or vertically.

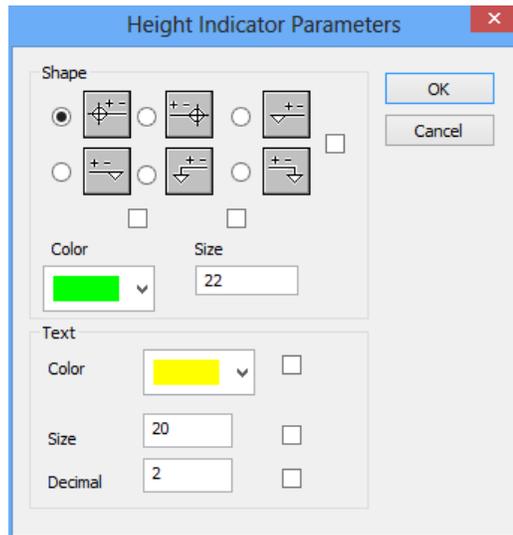
b. Snap: By activating or not the “Snap” function on the grid points, the mouse pointer can be attracted or not in a specific distance from the grid points. On “Spacing” in x or z, give the maximum distance in centimeters between the mouse pointer and the grid points, that the attraction is activated.

c. Grid: By selecting “Yes” Yes or “No” No the grid points are displayed or not on the screen. If you choose “Yes”, define the “Step”, the “Shape” and the “Color” of the grid.

Click the button to accept changes or the button to cancel them.

Height:

In this dialog box, the format and the color of the symbols of the elevation are defined. Also, the size of the symbols are defined in cm and they are displayed in scale in the drawing. (The size refers to the vertical length, starting from the horizontal line of the symbol and below).



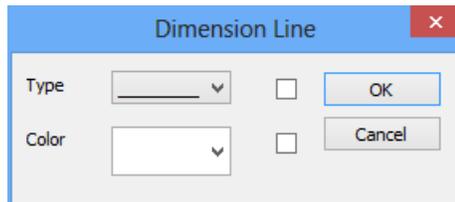
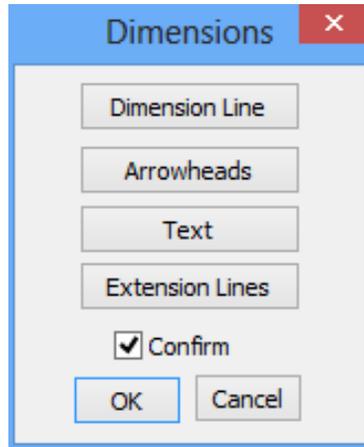
In “Text” you set parameters for the text of elevation indicator (color, size, and a number of decimals).

ATTENTION!

If you activate the checkbox , next to the parameters, the corresponding symbol will be updated in the existing design according to the defined parameters.

Click the button  to accept changes or  to cancel them.

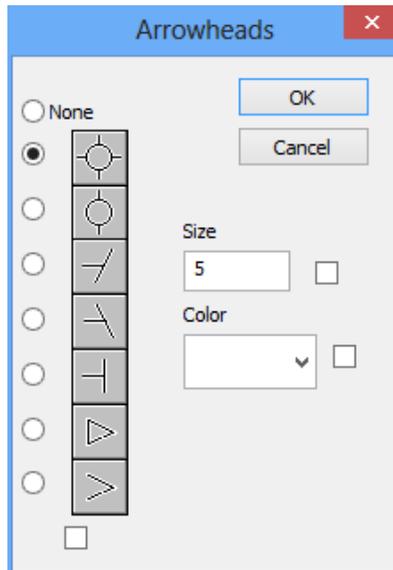
Dimensions:



a. Dimension Line: In the dialog box, select the “Type” and the “Color” of the dimensions’ lines.

ATTENTION!

 By activating the checkbox , on the right of the parameters, the parameter of the corresponding dimension line will be updated on the existing design.

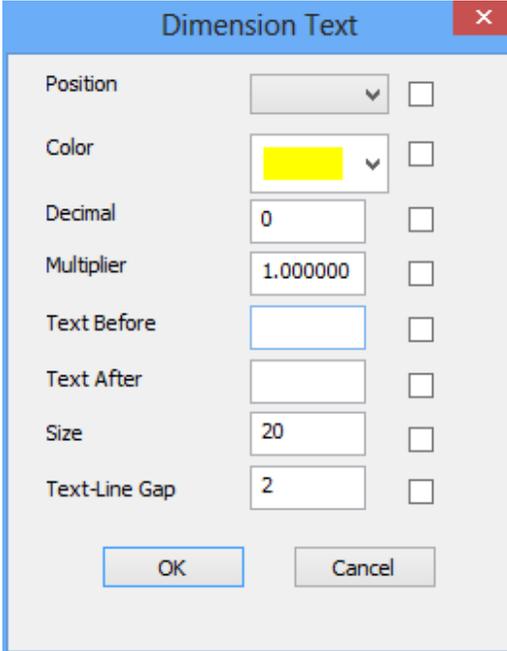


b. Arrowheads: In the dialog box, select the type of the “Arrowheads” of the dimension lines, as well as, their “Size” and “Color”.

The activation of “None”  means that the new dimensions, that you will insert in the design, will have no arrowheads.

ATTENTION!

 By activating the checkbox , on the right of the parameters, the parameters of the corresponding arrowhead will be updated on the existing design.

Text:


Position: In the drop-down list, you define the position of the text. More specifically:

- i. Middle Center: the text is located in the middle of the dimension line and the center. The text intercepts the line.
- ii. Center Up or Down: the text is located in the center of the line, up or down, without intercepting it.
- iii. Left or Right: the text is located on the left or the right of the dimension line. It is useful when the dimension is smaller than the size of the text.

Color: In the drop-down list, choose the color of the dimensions' text, as well as the thickness.

Decimal: In the field set the number of decimals.

Multiplier: In the field type a value to change the

measurement unit of the dimensions.

EXAMPLE

- 💡 In case of centimeters as measurement unit: Type 0.01 in the “Multiplier” field and, the corresponding dimensions will be converted in meters automatically (example: dimension 580 will be indicated as 5.80).

Text before/after: In these fields type a text that will be displayed before or after the dimension's text.

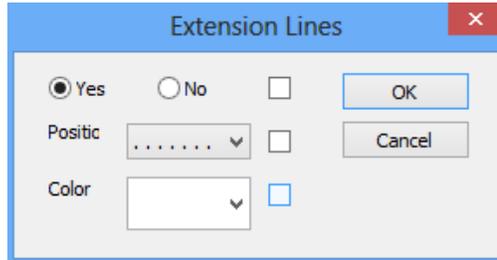
Size: In this field specify the text's size in centimeters considering the scale of the drawing.

Text-Line Gap: Specify the distance between the text and the dimension line.

NOTE!

- ⚠ By activating the checkbox , on the right of the parameters, the corresponding text parameter will be updated in the existing design.

Extension Lines:



In this dialog box, you can define the color and style of the extension lines. Decide either to design them (Yes) or not (No).

NOTE!

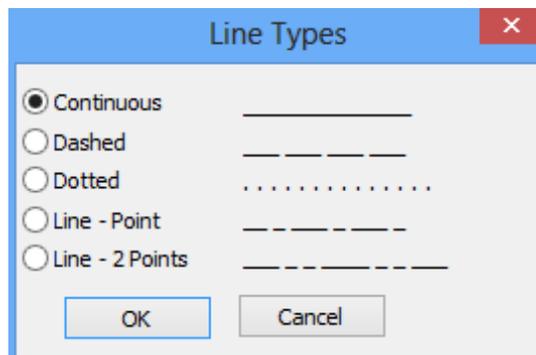
⚠ By activating the checkbox , on the right of the parameters, the corresponding parameter of the extension line will be updated in the existing design.

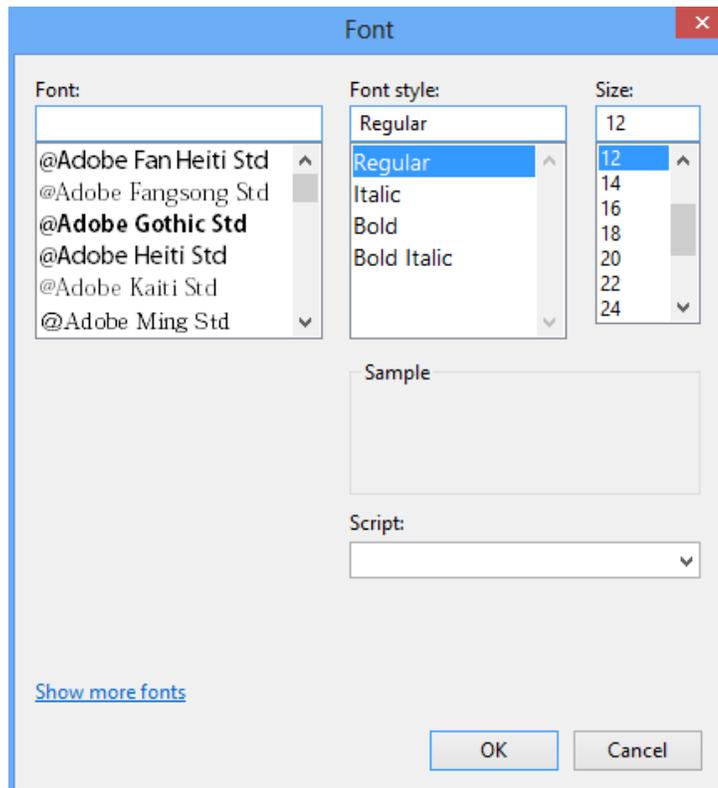
Confirm : If “Confirm” is activated, before you insert a dimension, a dialog box opens that contains the value of the calculated dimension that you might also change.



Lines:

Select the type of the line:



Font:

In this dialog box, select the font style and also use “Other

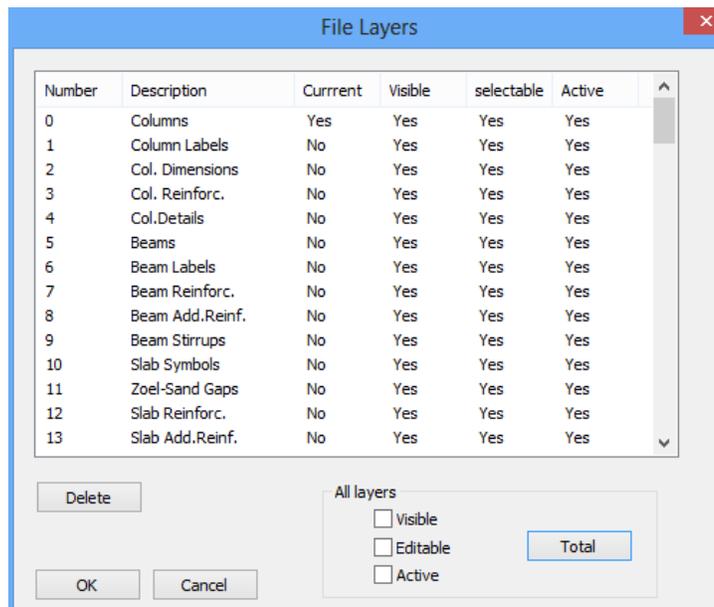


Shapes>>Text” to define the text’s parameters.

Layers:

In this dialog box, define the parameters of the default layers or those created from you.

1. State



a. **Current:** Any new design entity inserted in the “Current” layer. The column entitled “Current” contains the labels “Yes” and “No”, meaning that the corresponding entities can be edited or not, respectively. To change a label from “No” to “Yes”, use double click on “No” next to the layer’s name. “Yes” becomes “No” automatically when another layer becomes “Current”.

NOTE!

⚠ When a layer becomes “Current” it automatically becomes “Visible”, “Editable” and “Active”. The “Current” layer displays on “Layer”.

b. Visible

Label “Yes”: Layer’s contents display on the screen.

Label “No”: Layer’s contents don’t display on the screen, but they still exist and can be visible by turning “No” into “Yes” (double click to turn “No” into “Yes” and the opposite)

c. Editable

Label “Yes”: Layer’s contents can be edited.

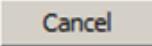
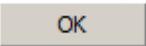
Label “No”: Layer’s contents can’t be edited.

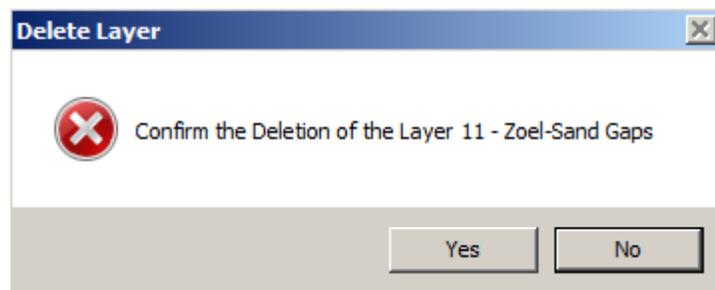
(double click to turn “No” into “Yes” and the opposite)

NOTE!

⚠ An “Editable” layer becomes “Visible” automatically. A “Visible” layer is not necessary “Editable”.

d. **Active:** An “Active” layer becomes “Editable” and “Visible” automatically. It’s a quick way to make a layer both "Editable" and "Visible". For individual changes in the state of a layer, use double click. To change the state of all layers, select the state from “All Layers” and click the following button/.

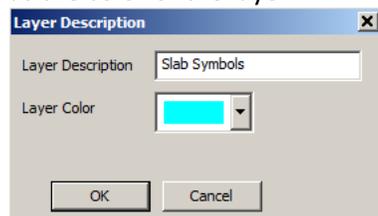
: Press this button to delete a layer’s contents without deleting the layer. Select the layer (click to become blue) and press the button . In the dialog box select  to confirm the deletion or  to cancel it.

**NOTE!**

⚠ The “Current” layer CAN’T be deleted. First, make as “Current” a different layer and then delete the previous one.

2. Modify the description/color of the layer

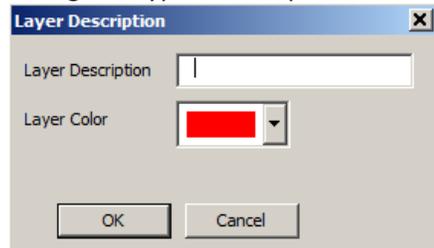
Double click on layer’s name, to open a dialog box, where you can modify the description as well as the color of the layer.



Every new entity entered in the drawing becomes an element of the current layer and takes its characteristics.

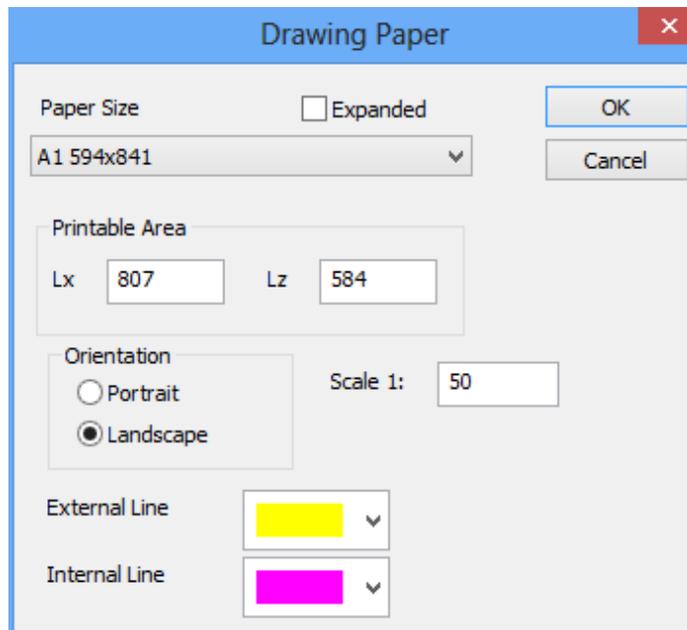
3. Create a new layer

To create a new layer, double click to the first empty position under the default layers. In the dialog box type a description, select a color and then press OK.

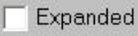


Drawing Paper:

In this dialog box, the parameters of the Drawing Paper are defined.



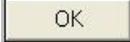
a. Paper Size: Click the down arrow  to select a standard paper size, or “User” and type your dimensions in Lx and Lz fields in the “Printable Area”.

b. Expanded: Activate the check box  to expand the printable area limits. (You must select the same state on plotter as well).

c. Scale 1:50: Type the scale number (for example type 100 for scale 1:100). Default scale: 1:50.

d. Orientation: Activate the selection  for vertical orientation or  for horizontal orientation.

e. External / Internal Line: Select the color and the thickness of the lines of the drawing’s borders.

Press  to accept the parameters. On your screen display the border of the paper, left click to enter the drawing in the specified position.

2. Drawing

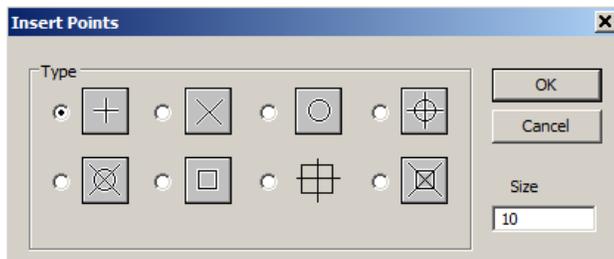


“Drawing” command group contains commands about the design of geometric elements.



2.1 Lines - Arcs - Circles:

Point: This selection is used to insert auxiliary points in the drawing. The exact location of the point can be defined by using the following tools.



In the dialog box, select the type and size of the point (in cm).

⚠ The definition of the point’s size works only for supervisory purposes and determines how visible is the point in your drawing.



Line - Segment: This command is used to draw individual linear segments by specifying the two edges.

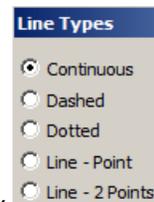
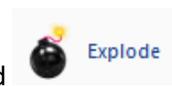


Line – Continuous Segment: This command is used to draw continuous linear segments that compose a crooked line. These segments can be edited (moved, deleted, etc.) individually.



Line – Polyline: This command is like the previous one. The difference is that the polygonal line is a single entity (pline).

⚠ If you want to cut the polyline in segments, use the “Explode” command from the “Varius” command list.



1. Select the line type, in the “Parameter - Line” dialog box
2. By using “Line >> Segment” and “Line >> Continuous Segment”, you can modify the type of the line and create lines composed by segments with a different type.

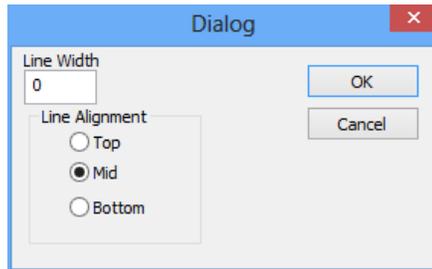
⚠ It is NOT possible by using the “Line-Polyline” command.



Double Line – Segment/Continuous Segment/ Polyline: This command is used to draw the double line by following the same procedures as previously described.

⚠ You can use “Double Line” to draw beams.

Select the command and in the dialog box define the line width and the line alignment.



Line Width: In this field, type the distance between the two lines in cm.

Line Alignment: In this field, define the line for the alignment.



The type of the line is defined in the “Parameters - Line” command .

⚠ During the drawing of the double line and before the right click, (to complete the command) a single line is displayed on the screen, which becomes double with a right click.



Arc: This command is used to draw arcs. The command tools are the following:

a. Center, Radius

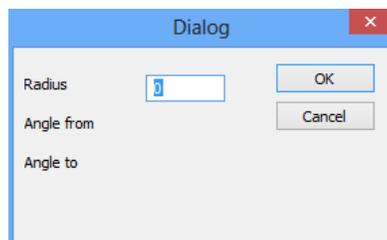
1. Select the command and then right click to define the center of the arc.
3. Indicate a second point (left click or by using the draw tools), to define arc radius. Then, a circle is displayed. Left click to select two points on the circle, which correspond to the two edges of the arc.

⚠ The positive direction for the definition of the arc’s edges is counterclockwise. It means that, if you select according to the clockwise direction, then the part of the cycle that starts from the first point and ends to the second, remains.



b. Center, Radius(Value)

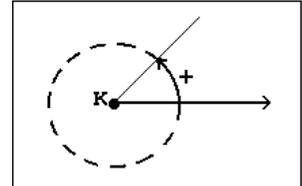
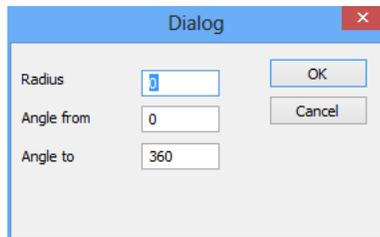
This tool’s function is similar to the one described above. The difference is that you specify the radius of the arc, by typing the value in centimeters in the dialog box that opens as soon as the command is activated.





c. Center, Data

Define the center point of the arc and the dialog box, in which you type the radius of the arc, the angle of the starting point and the angle of the end point of the arc, open.



⚠ The direction of the positive angle is depicted in the following figure

⚠ You can also type angles less than zero.

Press  to close the dialog box and then the arc is displayed.



d. Three Points

This command is used to draw the arc by defining the 3 points with left click.



Circle - Center, Radius/ Radius Value/ Three Points:



This command is used to draw circles. Define the center point and the radius (by left click or by typing the value) or define 3 points, like in the previous command.



2.2 Other Shapes:



Donuts:

This command is used to draw Donuts filled iv with the active color.

The procedure is similar to that of circles.

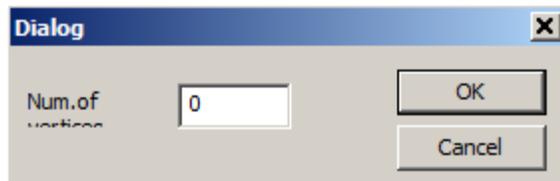


Polygon:

This command is used to draw polygons inscribed or circumscribed in an existing circle or arc. The procedure for both cases is the same:



1. Select the command and then left click on the circle.
2. Display a line that starts from the center of the circle. Move the mouse to give the direction of the polygon's first vertex and left click. In the dialog box, type the number of vertices:



- i. For inscribed polygons, the first vertex will be the intersection between the circle and the line (or the extension of the line).
- ii. For circumscribed the first vertex will be located on the line, outside of the circle.

Press  to close the dialog box and design the polygon.

Rectangle:



Horizontal: This command is used to draw a rectangle with sides parallel to the two main axes. Left click on the vertices of one of the two diagonals.



Inclined: This command is used to draw a rectangle inclined versus the main axes. Before the definition of the two vertices of the diagonals, the program asks you to indicate the inclination of the rectangle by selecting an existing line with the same orientation.



Hatch:

Object: This command is used to draw hatch inside plines, circles ect.



How to use:

1. Select the command.
2. Left click to select the objects that will be hatched.
3. Right click to complete the selection.
4. In the dialog box, type distance and angle to define hatching.
5. Press “O.K.”

The hatch is entered in the active layer as drawing entity, obeying the editing commands (transfer, delete, etc.).



4. In case of a boundary with the open continuous line the program hatch the area bounded by the open line and the imaginary linear part that connects the start and the end point of the open line.

Area: The program allows you to hatch a non-designed area by indicating only the vertices with the mouse.



How to use:

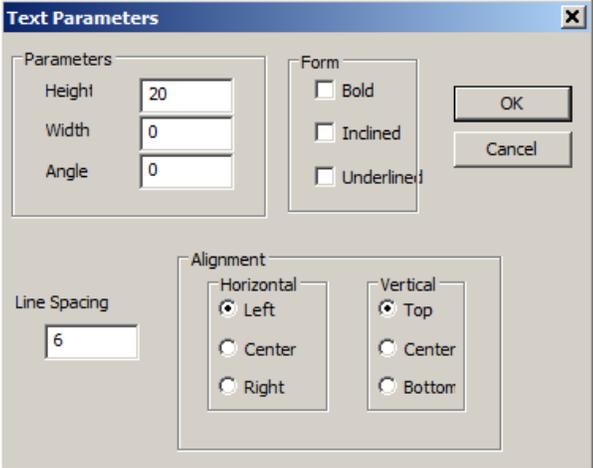
1. Select the command.
2. Left click to define the vertices
3. Right click to complete the selection and open the dialog box.



Text:

This command is used to import a text into the active layer with the active color. Select the command and in the dialog box define the parameters:

1. Height/ Width : type the values in cm.
 5. Value (0) means that the program will consider the characteristics of the respective font.
2. Angle: type the value in degrees for an inclined text.



The dialog box titled "Text Parameters" contains the following controls:

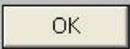
- Parameters:**
 - Height: input field with value 20
 - Width: input field with value 0
 - Angle: input field with value 0
- Form:**
 - Bold
 - Inclined
 - Underlined
- Line Spacing:** input field with value 6
- Alignment:**
 - Horizontal:**
 - Left
 - Center
 - Right
 - Vertical:**
 - Top
 - Center
 - Bottom

Buttons: OK, Cancel

Form: Select the text's form; bold, italics, with underline with the selection of the corresponding checkbox.

Line Spacing: type the distance between the text's lines.

Alignment: Select alignment in the two directions.

Press the following button , and left click to indicate the text's insertion point. Type the text and press "Enter" to change line. Each line obeys to the characteristics defined previously and acts as an independent entity.

Press the right mouse button to end the command.

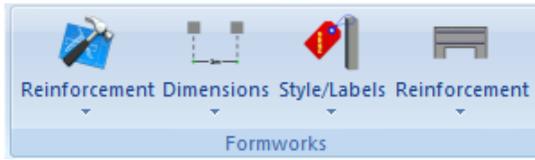
 To modify the content and / or characteristics of the text use "MODIFY >> Edit" command.



For color modification use "MODIFY >> Color"



3. Formworks



The command group “Formworks” contains useful commands for the presentation and the drawing of the formworks.

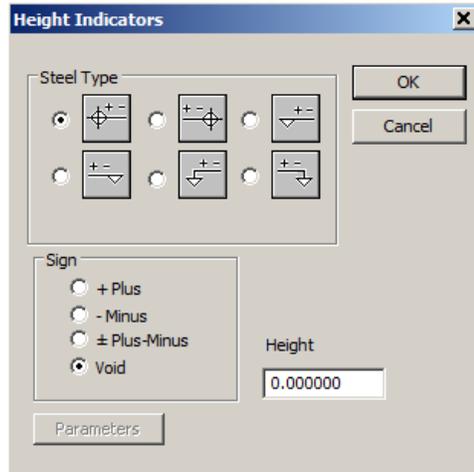


3.1 Reinforcement:

Height: This command is used to select the height symbols.



Select the command and the position point. In the dialog box select:



Symbol type: activate the relative checkbox

Sign: activate the sign of the height value.

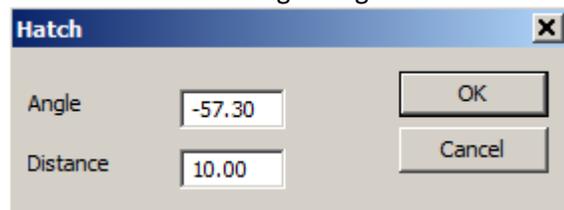
Height: Type the value without a sign (defined previously)

Press  to close the window and then the height symbol is designed in the defined position point.

! The field “Parameters”  is activated only during the editing process in “Modify”>”Edit” command where you can modify the height parameters (color, size, etc.) through the corresponding dialog box.



Slab Opening: This command is used to insert a “symbol” indicating that in a specific zone there is NO slab (opening). The slab opening is denoted as two “hatched triangles”, with parameters defined in the following dialog box:





How to use:

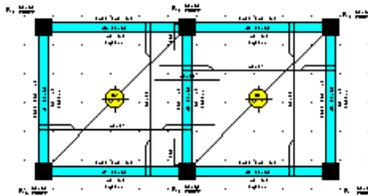
1. Activate “Reinforcement>Slab Opening”.
2. Left click to define three internal vertices of the opening shape.
3. In the dialog box type the characteristics of the hatch.

Press to close the window and the opening is designed in the specified location.

⚠ To remove slab openings’ symbol select “VARIUS >> Delete”  and click on the hatched area.



Slab Diagonals: This command is used to insert auxiliary diagonal lines indicating the borders of the existing slabs.



How to use:

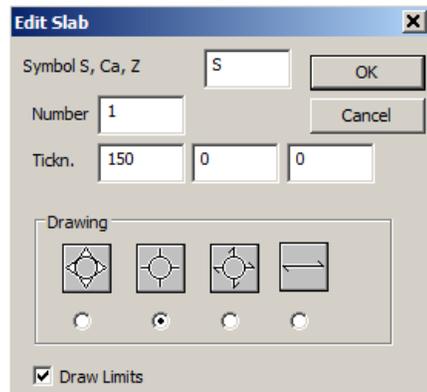
- Activate the command and then select the slab’s symbol.
- Left click to indicate the start point and the end point of the border line. The slab’s symbol is added in the middle of the line.

To remove the slab diagonals, follow the steps below:

a. Selective or total removal.

1. Use the command “Modify”>> “Edit” and select one or more slab diagonals.

2. In the dialog box, deactivate the field and click the button .



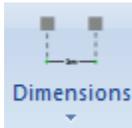
⚠ Repeat the command and activate the field Draw Limits, if you want to be displayed again. This happens only in cases where the border lines were already drawn and deleted following

the previously described procedure and IT IS NOT AN ALTERNATIVE METHOD FOR INSERTING LIMITS.



Columns Ref. Point: This command is used to insert the symbol of the columns’ reference point in the drawing, in an oval shape, color filled or not, according to the activated option in the "Parameters>> Interface>> Columns".

- ⚠ Columns’ reference points imported in this way design entities. For example, if a column has a reference point, this will not be deleted in case you design a new one. To delete reference points, use “Modify”>>“Delete”.



3.2 Dimensions

This command is used to insert dimensions as a distance between points, in any direction, also dimensions of arcs, circles, and angles.



a. Typical:

i. **Horizontal:** This symbol corresponds to the dimensions, parallel to x-x’ axis. The corresponding values refer to horizontal projections regardless of the points’ position in the drawing.

ii. **Vertical:** This symbol corresponds to the dimensions parallel to z-z’ axis. The corresponding values refer to vertical projections regardless of the points’ position in your drawing.

iii. **Aligned:** This symbol corresponds to the dimensions parallel to a line defined by two selected points. The corresponding values refer to the real distance between the two selected points.



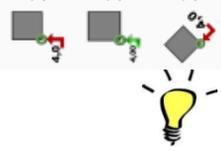
How to use:

1. Select “Dimensions >> Typical” (Horizontal, Vertical or Aligned).
2. Left click on a point to mark the position of the dimension text.
3. Select two points to calculate the distance between them. The value is displayed in the defined position.

NOTES :

- ⚠ By indicating more than two points you can receive serial dimensions. In that case, the end point of a dimension is the start point of the next.
- ⚠ **Confirm** : This is the “Confirm” field on “Parameters”>>“Dimensions” and when it is active, before the import of the dimension, a dialog box opens that contains the value of the calculated dimension. This value can be changed manually.



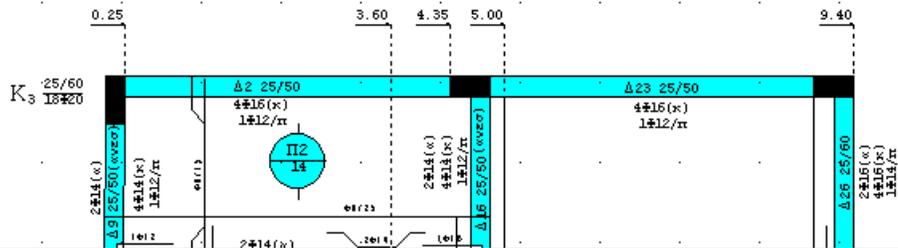


b. Etching – Horizontal/Vertical/Aligned: This command is used to insert consecutive and continuous dimensions starting by indicating the point in a horizontal, vertical or aligned direction.

How to use:

1. Select “Dimensions >> Etching”.
2. Left click on a point to give the position of the dimension text.
3. Indicate the starting point.
4. Indicate the successive points to calculate the distance from the starting point.

Dimensions will have the following format:



c. Intersection Vector: This command is used to import multiple consecutive dimensions in any direction.

How to use:

1. From “Line - Arcs - Circles”, draw a line that intersects the drawing and calculate the dimensions between the intersection points.
2. Select “Dimensions >> Intersection Vector-Projection x-x’, z-z’” or “Intersection Line” if you want the dimensions to be written as a horizontal or vertical projection or projected in the intersection line respectively.
3. Left click on a point to give the position of the dimension text.
4. Select the intersection line and the dimensions are added automatically.
5. Delete the auxiliary intersection line.

NOTES :

⚠ The intersection line can be one segment, more than one segments or a continuous line (pline).

In case of Segment-Segments, you must indicate the position of the dimension text before the segment’s selection, every time.

⚠ Zero dimensions are not indicated.

⚠ The dimensions’ format, obey the "Dimension Parameters" settings when this is possible.

⚠ Dimensions with "Intersection Vector" do not obey the parameter "Confirm".



d. Angular (Degrees): This command is used for the calculation and the definition of the size of an angle in degrees. The dimension is shown as an arc between the sides of the angle.

How to use:

1. Select “Dimensions >> Angular (Degrees)”.
2. Left click on a point to give the position of the dimension text.
3. Select the sides of the angle.

NOTES:

⚠ Angles are positive in a counterclockwise direction.





⚠ If “Confirm” on “Parameters”>>“Dimensions”, is activated, before a dimension is inserted, a dialog box opens that contains the value of the calculated dimension, which you may as well change.

e. Arc:

Length: This command is used for the calculation and definition of the length of the arc. The dimension line is a concentric arc attached to the indicated point.

Radius: This command is used for the selection of the intersection point between the dimension line and the arc.

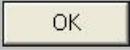
l=: This command works similarly as the “Length” command. The calculated dimension is introduced in the form $l = \alpha$, where α is the arc length, and an arrow is drawn for the dimensioned arc.

R=: This command is like the previous one except that the radius length is displayed.

How to use:



1. Select “Dimensions >> Arc” (Length, Radius, l or r).
2. Left click on a point to give the position of the dimension text. This point can be inside or outside the arc.
3. Select the arc and immediately the dialog box, where you confirm the size, opens as long as

the corresponding choice of parameters is enabled. Press the button  for the value to be displayed.



f. Circle – Horizontal/Vertical/Aligned:

Horizontal, Vertical, Aligned: These commands refer to the dimensions of the diameter of the circle that is designed parallel to the horizontal or vertical axis or on an arbitrary position, respectively.

Perimeter l =: This command is used for the definition of the length of the perimeter of the circle in the form of $l = a$, and an arrow is designed indicating the perimeter of the circle.

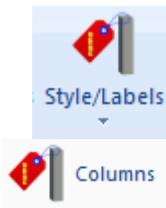
Radius r: This command is the same as the previous one, with the difference that the radius of the circle is imported.

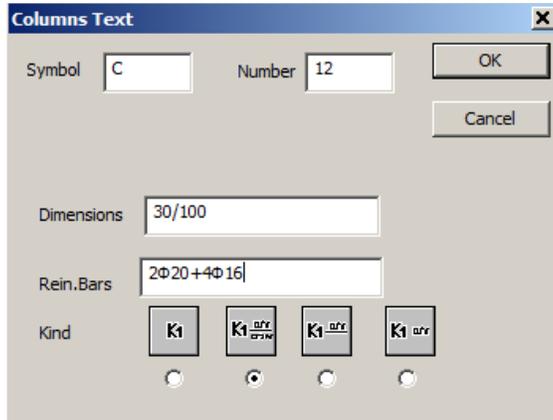
3.3 Style/Labels

This command is used to enter labels on columns, beams, and slabs.

Columns:

Select the command and define the insertion point of the text related to columns. In the dialog box type:





Symbol C, W, P: Type a letter as column’s symbol.

The program suggests:

C for Column.

W for Shear Walls.

P for Planted columns.

However, you can give any character you wish.

Number: Give a number to the column, written as a subscript of the symbol.

Dimensions: In this field, you type column’s dimensions. For example, 100/30/30/80 for L columns with sides 100 and 80 cm and thickness 30 cm.

Rein. Bars: Type the main reinforcement bars (number and size), for example, 8Φ20+4Φ16.

Kind: Select the type of the symbol.

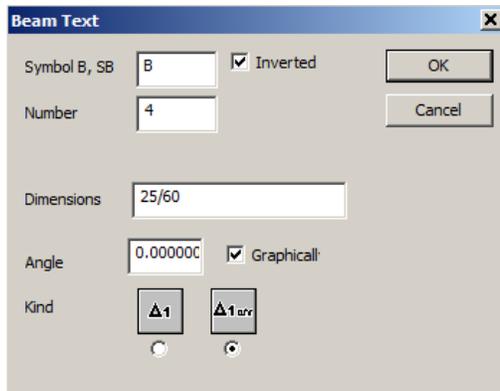
NOTE:

⚠ In case you type the “Dimensions” and you choose “Kind”/, even though the dimensions will not be displayed, they are saved. By selecting “Modify” >>”Edit” and by changing “Type” the dimensions are displayed.

Press the button  to accept, otherwise press the button/.



Beams:



Symbol B, SB: In this field, type a letter as beam’s symbol.

The program suggests:

B for Beams.

SB for Strengthened Zone.

However, you can give any character you wish.

Number: In this field to give a number to the beam, written as a subscript of the symbol.

Dimensions: In this field type beam’s dimensions (25/60, bw = 25 and h = 60 etc.)

Inverted : Activate the checkbox if the beam is inverted (25/60 (inverted)).

Angle: In this field type the inclination of the beam’s text. The angles are measured counterclockwise starting with the horizontal direction along the positive axis x-x '.

The direction of the beam’s text can be determined graphically if the corresponding checkbox Graphical is NOT selected.



Press the button and the program asks you to indicate a line for the text to be drawn in parallel. (a message appears at the bottom of the screen).

Type: Select the type of the symbol representation.

NOTE:

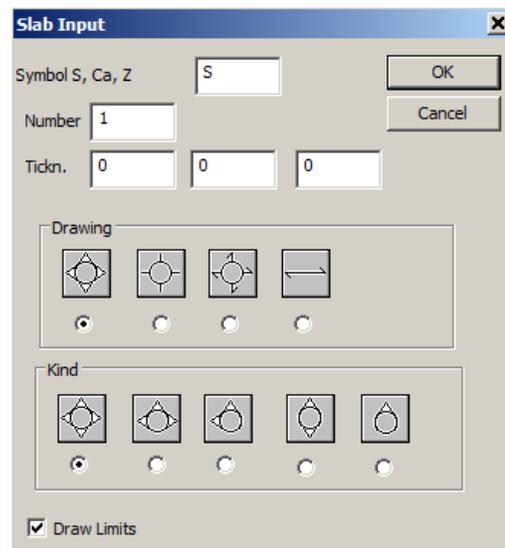
In case you type the “Dimensions” but you choose “Type” , the dimensions will not be displayed but they will be saved. By selecting “Modify” >>”Edit” and changing “Type” the dimensions are displayed.



Press the button to accept the new options, otherwise press the button/.



Slabs:

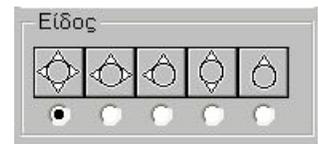


Symbol S, Ca, Z: Type a letter as slab’s symbol
 The program suggests:
 S for solid slabs
 Ca for cantilever
 Z for Zoellner
 However, you can give any character you wish.

Number: In this field type slab’s number.
Thickness: In this field type slab’s thickness in mm.
 For example, for slab 15 cm, type 150. On the design it is displayed in cm.

Drawing: Select the type of symbol (, , or)

Kind: Select the type of the symbol that represents slab’s support conditions (four-way, three-way, two-way, cantilever).



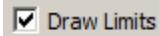
Draw Limits : Activate the checkbox to display the diagonal segments, indicating slab’s limits, as well.

a. When the following checkbox is inactive **Draw Limits** .

**How to use:**

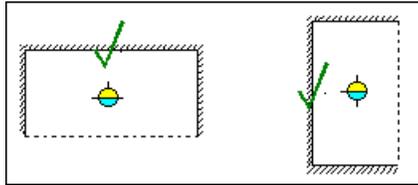
1. Select “Reinforcement >> Style-Labels >> Slab” and the “Slab Input” dialog box opens.
2. Type the characteristics and press the following button/.
3. Left click to define the insertion point.
4. Select slab’s reference side for the input of the slab’s symbol.

b. When the following checkbox is active

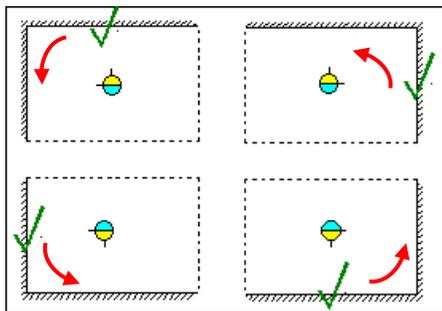


2. The same as previously
3. The same as previously
4. Indicate the two limits of the slab
5. Select a slab’s side as the reference side for the input of the slab’s symbol.

⚠ To insert the symbol in a three-way slab, always select the second side (✓).



⚠ To insert the symbol in a two-way slab, always select one of the two sides with support conditions (✓). The selected side is located on the left of the selected side (counterclockwise direction is considered).

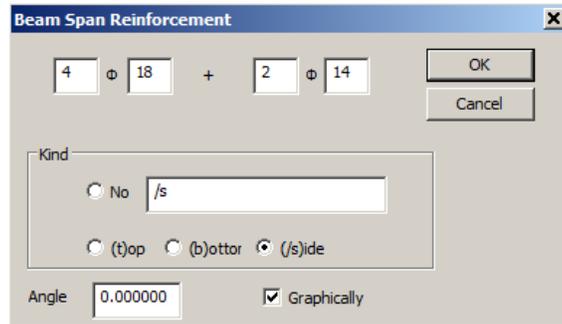




3.4 Reinforcement:

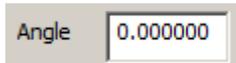
Beam Span:

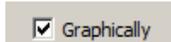
This command allows you to place the tension or compression steel reinforcement in the beams' span. Indicate the insertion point and define the parameters in the dialog box:


 A dialog box titled "Beam Span Reinforcement" with a close button (X). It contains two input fields for bar configuration: "4 Φ 18" and "2 Φ 14", separated by a plus sign. Below these are "OK" and "Cancel" buttons. A "Kind" section has three radio buttons: "No" (with a text input field containing "/s"), "(t)op", and "(b)ottom". The "(/s)ide" radio button is selected. An "Angle" input field contains "0.000000" and a "Graphically" checkbox is checked.

: In these fields, the quantity, as well as the diameter of the bars, are defined. Combining bars with two different diameters is possible.

Type: Select the bars' type, which means that the bar belongs to the compression or tension steel reinforcement (top/bottom side, respectively). The corresponding comment will be written right to the steel reinforcement. If label “No” is selected , there will be no comments. You can type a comment with ten characters maximum.

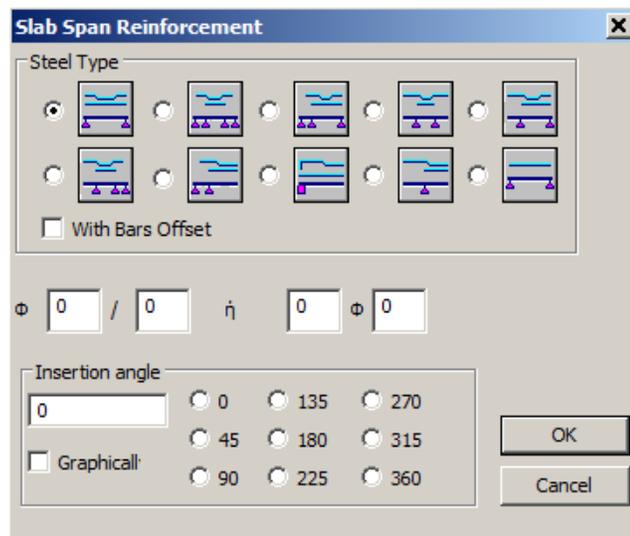
: In this field type the text's inclination angle versus the horizontal direction of the drawing.

: When this checkbox is activated, the field “Angle” is inactive. In this case, the text will be placed along a graphically defined (on the drawing) direction. The corresponding direction will be indicated after the closing of the dialog box.



lab Span:

In the dialog box, specify the data of the slab’s steel reinforcement in the span:



Steel reinforcement configuration: Select the bar type depending on the type of the slab. In particular:



Two-way slab reinforcement without continuity on both sides. For placing, indicate the outer sides of the two supporting beams (2 lines).



Two-way slab reinforcement with continuity on both sides. Indicate:

- the opposite limit of the first adjacent slab
 - the outer side of the first supporting beam of the slab where the bar will be placed
 - the outer side of the second supporting beam of the slab where the bar will be placed
 - the opposite limit of the second adjacent slab
- (4 lines)



Two-way slab reinforcement with continuity on one side. Indicate:

- the opposite limit of the first adjacent slab
 - the outer side of the mutual beam
 - the outer side of the second border beam for the placement of the bar
- (3 lines)



Two-way slab reinforcement with continuity on both sides with cantilevers. Indicate:

- the free edge of the first cantilever
- the outer side of the first supporting beam
- the outer side of the second supporting beam
- the free edge of the second cantilever



Two-way slab reinforcement with continuity on one side with a cantilever. Indicate:

- the free edge of the cantilever
- the outer side of the first supporting beam
- the outer side of the second supporting beam

(3 lines)



Two-way slab reinforcement with continuity on one side with a cantilever and to the other side with a two-way slab. Indicate:

- the free edge of the cantilever
- the outer side of the first supporting beam
- the outer side of the second supporting beam
- the beam or the two-way adjacent slab

(4 lines)



Three-way slab reinforcement with continuity to the side with a two-way slab. Indicate:

- the limit of the adjacent slab opposite to the mutual support
- the outer side of the beam support of the three-way slab
- the free edge of the three way slab

(3 lines)



Three-way slab reinforcement without continuity. Indicate:

- the outer side of the supporting beam
- the free edge of the three-way slab

(2 lines)



Three-way slab reinforcement with continuity with the cantilever. Indicate:

- the free edge of the cantilever
- the outer side of the supporting beam
- the free edge of the three-way slab

(3 lines)



Secondary Steel Reinforcement. Indicate the two limits of each slab reinforcement.

Activate the checkbox near the label “With bars offset”, to place the straight and inclined bars separately.



: In these fields, you can add the steel reinforcement with two different ways. Type in the first field the diameter and the second one the distance between the bars. For Zoellner slab, type the quantity and the diameter of the bars located inside the slab’s beam, in the third and fourth field, respectively.

- ⚠ Fill in the first pair of fields or the second pair, because if you type values in both, then only the values of the second pair are taken into consideration.

Insertion angle: This command is used to define in which inclination angle, the reinforcing bar will be located. Choose one of the default insertion angles or type a value.

The direction of the reinforcing bars can be determined graphically by selecting the corresponding checkbox Graphically, so the program will ask you to indicate an existing line to define the direction.



How to use:

1. Select the command and set the parameters related to steel reinforcement as indicated above.

2. Click the button to close the dialog box and then the program suggests you define the guidelines for the placement of the reinforcing bars, according to their configuration.

3. After setting the last line, the steel reinforcement is displayed on the screen and the program asks you to indicate the insertion point.

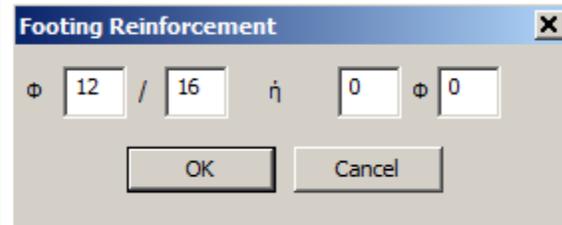
⚠ The direction of the reinforcing bars can be defined graphically, too. By activating the corresponding checkbox Graphically and before you define the lines, indicative for the bars' position, you must define the line for the direction of the bar.

In the drawing, the reinforcing bars are designed as blocks.



Footings:

In the following dialog box, the steel reinforcement of the footing is defined:



/ : In these fields, type the diameter of the reinforcing bars and the distance between them,

Or

Φ : The number and the diameter of the reinforcing bars.

Press the button to accept the defined settings, otherwise press the button to cancel them.



How to use:

1. Select “Reinforcement >> Footing” and the “Footing Reinforcement” dialog box opens.

2. Type the characteristic values and then the button/.

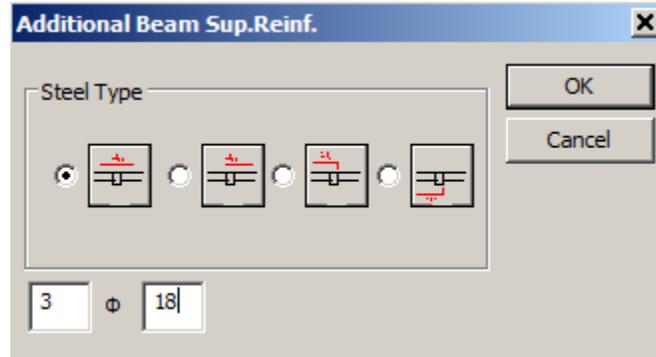
3. Left click to indicate the side of the footing for the parallel input of the reinforcing bars. The bars will have the same length as the selected side of the footing. Move the mouse to select the insertion point.

In the design, the bars are designed as blocks.



Beam Support Additional:

To place additional steel reinforcement in supporting beams.
 In the dialog box select the following parameters:



Steel Configuration:



Mutual additional tensile or compressive steel reinforcement. For placement purposes, indicate the two beams involved and the final position.



Linear additional tensile or compressive steel reinforcement for one beam. For placement purposes, indicate first the corresponding beam and then the start point and the end point of the reinforcing bars.



Additional top reinforcement with Γ configuration, at the intermediate or the end support of a beam. For placement purposes, indicate first the corresponding beam and then the start point and the end point of the reinforcing bars



Additional bottom reinforcement with Γ configuration, at the intermediate or the end support of a beam. For placement purposes, indicate first the corresponding beam and then the start point and the end point of the reinforcing bars.

How to Use:



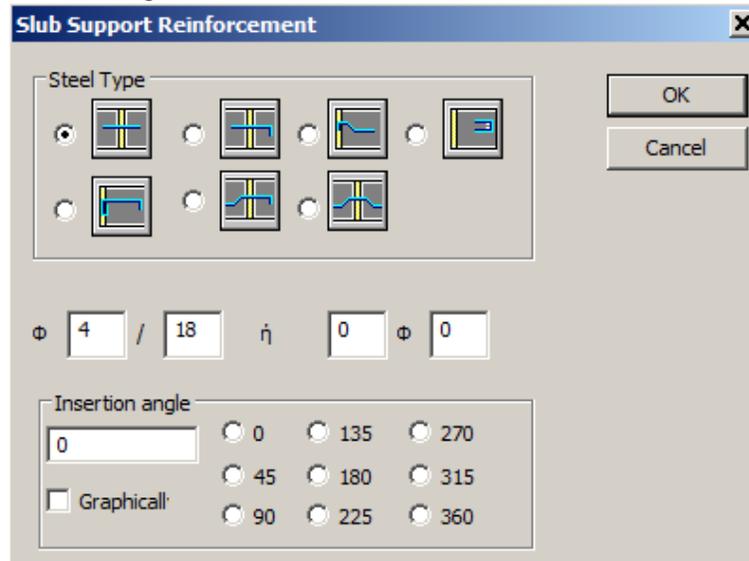
1. Select “Reinforcement >> Beam Supports Additional”.
2. In the dialog box, select the configuration.
3. Type the number and the diameter of the bars.
4. Depending on the configuration of the reinforcement at support, indicate the beams and/or the characteristic points appropriate for the placement of the reinforcing bars.

In the drawing, the bars are designed as blocks.



Slab Support Additional:

This command is used to place additional reinforcement in supporting beams. In the dialog box select:



Steel Configuration: In this field, the selection of the steel configuration is based on the slabs' typology.



Linear reinforcement at intermediate supports of continuous slabs (4-way, 2-way or a combination of them). For placing, indicate the two sides of the mutual supporting beam.



Linear reinforcement at the support of a cantilever which is adjacent with a slab on the support's side. For the placement, first indicate the free end of the cantilever and then one of the two sides of the mutual supporting beams.



Additional reinforcement at the end support or a secondary reinforcement for two-way slabs.

For the placement indicate the two sides of the supporting beam, starting from the end support.



Linear reinforcement at the free edge of the cantilever or the supports of 3-way slabs. For the placement first indicate the free end of the slab, the side, and the end point.



The reinforcement at the support of a cantilever without being adjacent with a slab on the support side. For the drawing of the reinforcement, indicate the outer side of the beam, the internal and the free edge of the cantilever, in sequence.



The bending reinforcement at the support of the cantilever is adjacent with a slab on the support side. For the placement, first, indicate the beam's side and then the free end of the cantilever.



Bending reinforcement at an intermediate support (4-way, 2-way or a combination of them). For the placement indicate the two sides of the mutual supporting beam of the slabs.



: In these fields type the reinforcing bars' diameter and the distance between them

or



: In these fields type the number and the diameter of the reinforcing bars.

Insertion Angle: Select one from the default angles or type a value.

The reinforcing bars' direction can be determined graphically, by activating the corresponding

checkbox **Graphically**, so the program will ask you to indicate an existing line that points out the direction.



How to use:

1. Select the command and define the parameters.

2. Click the button to close the dialog box and then the program suggests you define the lines for the parallel placement of the reinforcement, according to its configuration.

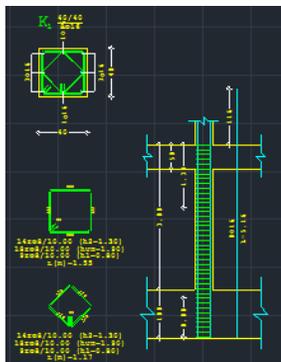
3. Indicate the position point.

⚠ Activate the corresponding checkbox **Graphically** and before defining the guidelines for the placement of the reinforcement, indicate a line that corresponds to the direction.

In the drawing, the reinforcing bars are designed as blocks.



Column Detailing Along Height:



⚠ **Critical Condition:** The columns can be edited by using the command "Detailing" ("Members Design>>Columns>>Results>>Detailing").

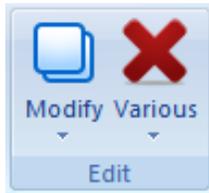
So, in the drawing, both the detailing of the column cross section, as well as the detailing of the column along the height, will be displayed.



To display the total detailing along height follow the steps below:

1. Select **Column Detailing Along Height**,
2. Indicate the corresponding column and
3. The insertion point (a rectangle appears that indicates the insertion point).

4. Edit



"Edit" commands group contains useful commands for the drawings' editing.

4.1 Modify:



Copy:

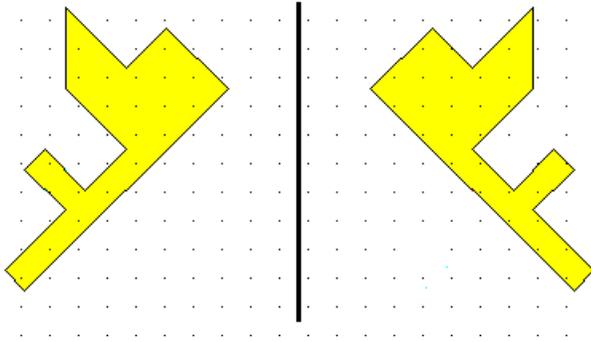
This command is used to make one or more copies.

How to use:

1. Select the command and indicate one or more objects.
2. Right click to end the selection.
3. Left click again to indicate the reference point and the position point.

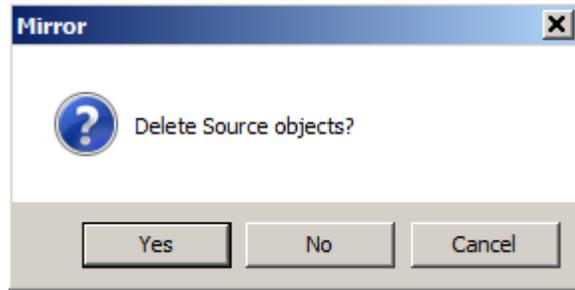
Mirror:

This command is used to create a "mirror copy" of one or more entities in respect to a line or two points. Furthermore, it is possible to keep or delete the original objects.



How to use:

1. Select the command and indicate one or more objects.
2. Right click to end the selection.
3. Select an existing line or two points.
4. In the dialog box select to delete or to keep the original objects.



⚠ The text that is copied by using the "mirror" command, is copied in respect to its position, but its original orientation is kept so that it can be read.



Offset:

This command is used to create copies of contour lines at a specific distance from the original object.



How to use:

1. Select the command.
2. In the dialog box type the distance value. Activate the checkbox “Multiply” to make more copies of the same line on multiple distances.



3. Select line or pline and indicate the side of the offset.

⚠ Use "Offset" command on circles and arcs to create circle or arc copies using the same center with larger or smaller radius.

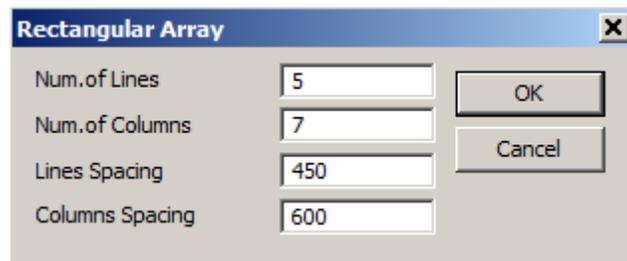


Array:

This command is used to reproduce entities in specific distances.

a. Rectangular Array

In the dialog box define the following parameters:



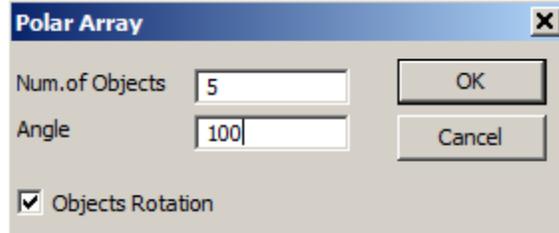
1. Num. of Lines: Specify the number of lines that the entity will be repeated on.
2. Num. of Columns: Specify the number of columns that the entity will be repeated on.

3. Lines Spacing: Set in cm the distance between lines.
4. Columns Spacing: Set in cm the distance between columns.



b. Polar Array - Circular Array

In the dialog box define the following parameters:



1. Num. of Object: type the final number of the object generated.
2. Angle: Define the angle (the length of the arc) for the objects development region.

⚠ By activating the corresponding checkbox **Objects Rotation**, all the produced objects will rotate around the center of the “Circular Array” array.



Move:

This command is used to move one or more objects.



How to use:

1. Select the command and one or more objects.
2. Right click to end the selection.
3. Left click again to indicate the reference point and the new position point.

To clear the screen, in case of residual objects, select “Redraw” or the symbol/.

⚠ The reinforcement of slabs and footing behave as single entities (blocks). You can also move the steel reinforcement’s text in total and not just a part of it, by picking the point indicated in the square/. Steel reinforcements remain as blocks.



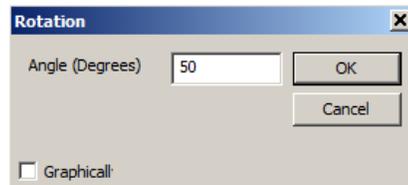
Alignment:

⚠ Use the methods and the examples explained in the chapter about Ribbon 4: “TOOLS>Varius>Alignment”.



Rotation:

This command is used to rotate an object.

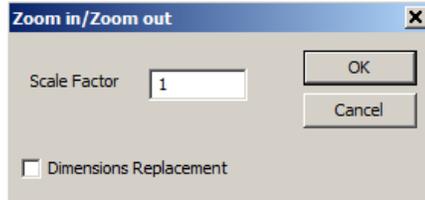


⚠ Use the methods and the examples explained in the chapter about Ribbon 1: “BASIC>Edit>Rotation”.



Scale:

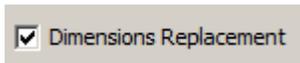
This command is used to enlarge or reduce one or more entities according to the scale factor, that you type in the corresponding dialog box.



How to use:

1. Select the command and the objects.
2. Right click to end the selection.
3. Left click to indicate a referencet point.
4. The dialog box opens. Type the scale factor's value as > 1 to zoom in or < 1 to zoom out.



By activating the corresponding checkbox , the dimensions obey on scaling.



Text Style:

This command is used to modify the font type of texts already imported in the drawing, or the type of designed lines, plines, circles etc.

Suppose you have a text font type “Arial” and you want to change the font style of the text in “Verdana”.



How to use:

1. From “PARAMETERS”, select text and font “Verdana”(it becomes current).
2. Select “Style” command and indicate the text to be modified.

Generally, to change the font style of a text, first select the new font (it becomes current). Then choose the text that will be modified according to the current font style.

A similar process is followed to modify the type of the designed lines, continuous lines, arcs, circles.

From “PARAMETERS >> Line”, select type. Then select “Style” command and indicate the object to be modified.



Color:

The command “Modify >> Color” is used for the change of the color of the design entities. Each selected element takes the current color, that is displayed in the following icon/.

Left click on the color palette to select another current color, then select “Modify >> Color” and left click to select the entities. 



You may as well change the current color, by selecting the “Modify >> Color” command.

Layer:



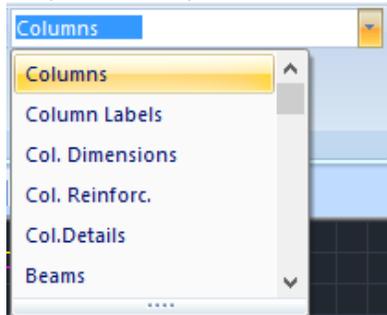
This command is used for the modification of a Layer, and it works similarly to the previous one.

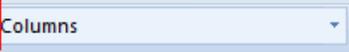
How to use:

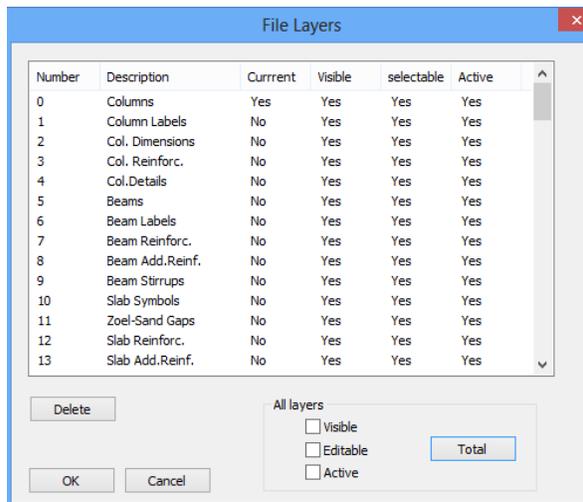
1. Select a layer to become “current”.
2. Select “Modify >> Layer” and left click the object on which the current layer will be applied.

There are two ways to select the Layer to be modified:

- a. Open the “Layers” list and select the one that will be the current layer:



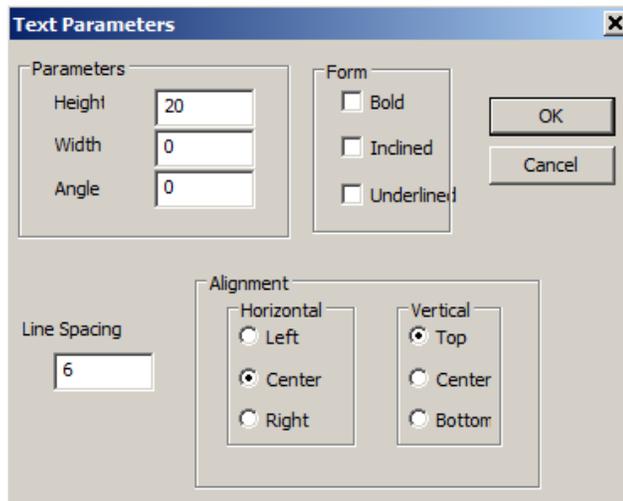
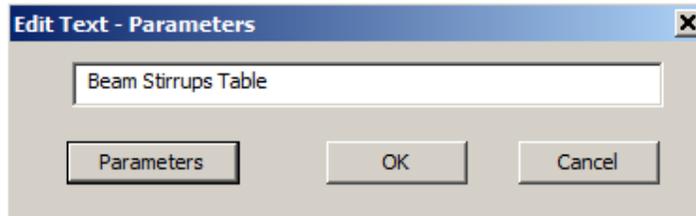
- b. Press the following icon  . By double clicking next to the layer under the “Current” column the label “No” will turn into “Yes”.



**Edit:**

“Edit” is a versatile command.

Select “Edit” and click an object. The corresponding dialog box, in which you can change the corresponding parameters, opens.

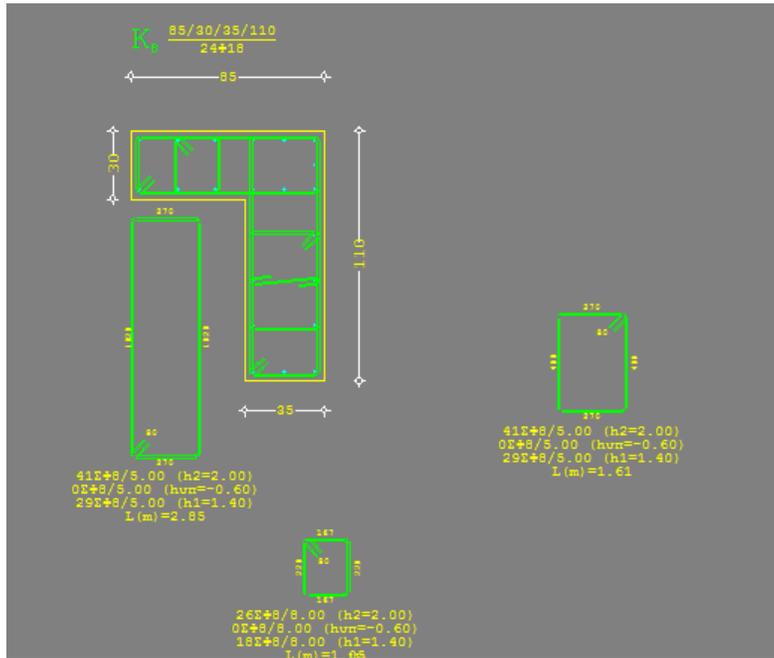
**NOTES:**

- ⚠ Use “Edit” to change :
 - Columns detailing, beams / columns / slabs’ text (symbol, number, type of symbol, thickness, limits)
 - Beams, columns, slabs and footings reinforcement
 - Additional reinforcement of beam and slab supports
 - Dimensions (text, characteristics)
 - Properties and content of a text
 - Altitudes (type, value, characteristics)

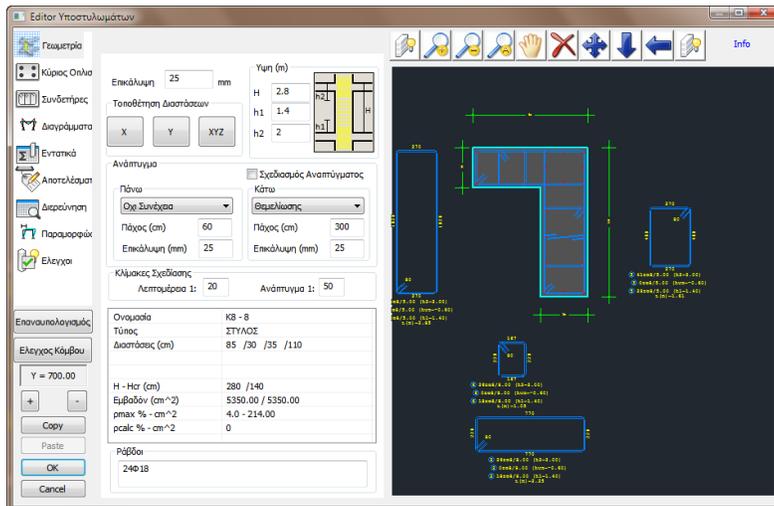
- ⚠ You CAN’T change :
 - Text-Line Style
 - Color
 - Layer

For these modifications, use the relative commands (Style, Color, Layer).

Use “Edit” on a column’s detailing (select “Edit” and then left click on the column cross section) :



The “Detailing” dialog box, where you can edit the column (main and secondary steel reinforcement).opens. Press OK and the design is updated.



Reinforcement Editor:

With this command, you can create or modify a design detail of a section reinforcement. For further information view the “COLUMN'S DETAILING” manual.



4.2 Various



Undo: This command is used to go back one step and cancel the last command. The "Delete" and "Move" commands obey to the "UNDO" command.



Redo: This command is used to go back to pre-Undo status.



Delete: This command is used to delete objects.
 To delete an object, the layer, which contains it, must be EDITABLE.

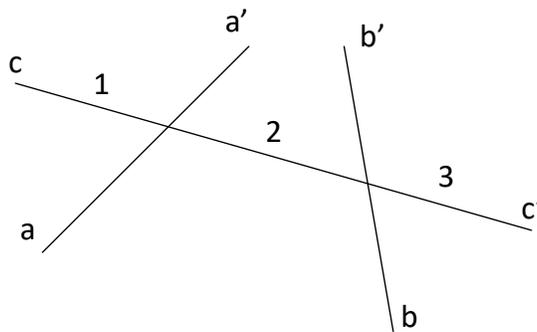
⚠ Use methods and examples explained in chapter 1 about Ribbon "Basic>>Edit>>Delete"



Trim: This command is used to remove parts of entities enclosed by limits.

EXAMPLE:

Suppose that you want to delete the part of the line c-c' located between the lines a-a' and b-b' (part 2).



How to use:

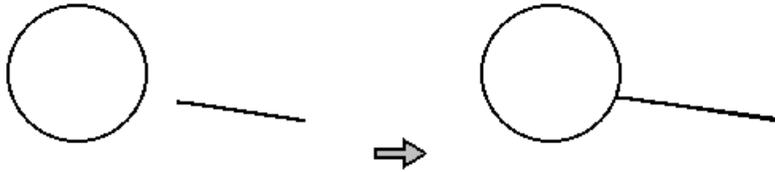
1. Select the "trim" command.
2. Indicate the first limit for trim (line a-a') and then the second (line b-b').
3. Right click to end selection.
4. Left click on part 2 of c-c' line to delete it.

NOTES:

- ⚠ If you click on part 1 of c-c' line (or on part 3) since you have indicated a-a' and b-b' it will be deleted.
- ⚠ The "Trim" command can operate on multiple deletions of the objects that are between the same limits. In this case, indicate all the parts to be deleted.



Extend: This command is used for the extension of lines or plines to a limit that can be another line, a pline, an arc, a circle or a ring.



How to use:

1. Select the command and then left click to define the limit considered for the extension.
2. Select the lines to be extended.

NOTES:

- ⚠ If the selected lines do not intersect with the defined limit, the extension will not happen.
- ⚠ To extend internal segments of plines to a limit, first “Explode” the pline.



Segmentation: This command is used to cut an object in parts (line, pline, circle, arc etc.) by removing that part of the object that is located between two points (a, b).

a) Line Segmentation

- Select the command and indicate the line to be cut.



- Select successively the first and second point to remove the part of the line between them.

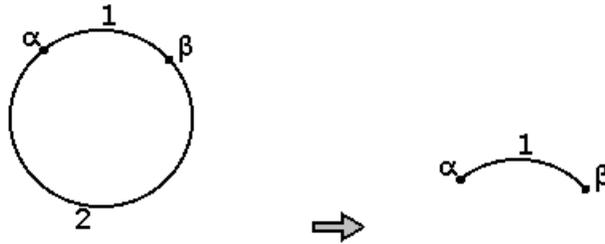
- ⚠ The points can be points of the line or random points on the drawing. In the second case, the projections of the random points should belong to the line so that the part of the line between them to be removed.

b) Circle Segmentation

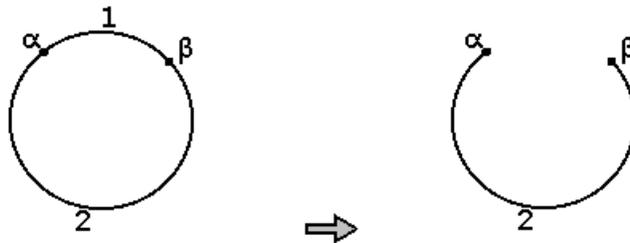
Select the circle and indicate two points to remove the part of the circle between them.

- ⚠ In case of a circle, the order according to which you indicate the points is important for the removing part.
- ⚠ The positive direction is counterclockwise.

To remove the part with the label “1”, indicate first the point “b” and then the point “a”.



To remove the part 2, indicate first the point “a” and then the point “b”.



c) Arc Segmentation

The procedure followed is the same as the circle segmentation except for the selection order which does not affect the result.

Observation:

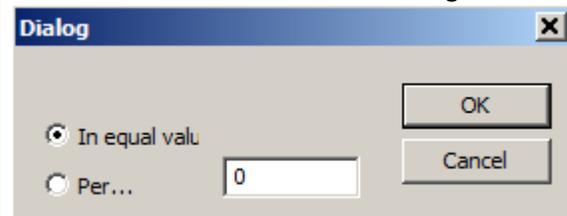
During the segmentation, the the two points can be selected by using the “Tools” (intersection lines, projection point to a line, etc.).

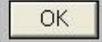
Break: This command is used to cut a line or pline, circle or arc in more parts.



A break can be applied in equal parts or a specific length of segments.

Select the command and in the dialog box define the segmentation parameters:



a) In equal value: In this filed type the number of the segments and click the button . Then, left click on the line, circle or arc.

b) Per: In this field type the following:

- i. The length of each part in centimeters (cm). The division starts from the nearest edge of the line to the indicated point.
- ii. The size of each part of the arc or circle is given in degrees.

How to use:

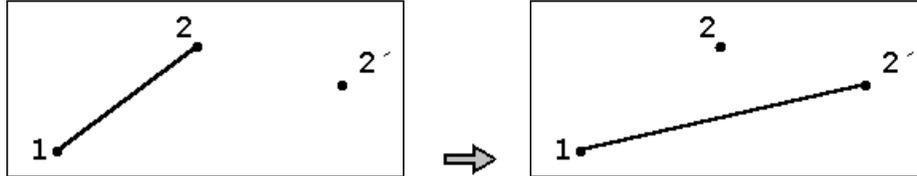




Stretch: This command is used to modify the dimension as well as the position of an object while there are some fixed points.

1. Stretch a line segment or segments

Select the command and a point on the line near to the edge that you wish to move (line becomes dashed). Then, indicate the new position. The other end will remain fixed.



EXAMPLE:

Draw the line 1-2. Then, move the end 2 of the line in 2' position with end point 1 being fixed.

1. Select the command.
2. Indicate point 2 or a point on the line 1-2 near the end 2.
3. Indicate point 2'.

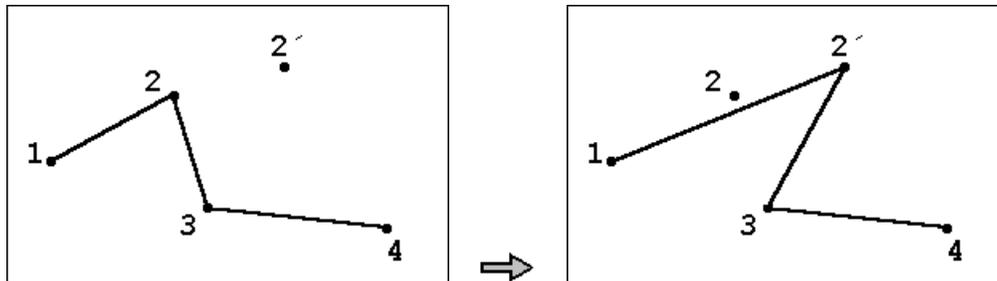
The new position of the line is 1-2'.

2. Stretch Pline



EXAMPLE:

Suppose you draw 1, 2, 3, 4 pline and you want to move point 2 in 2' position.



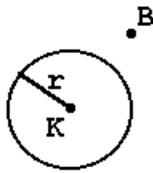
1. Select point 2 or a point on the line 1-2 near the end 2, or a point on the line 3-2 near the end 2.
2. While you move the mouse, you see that the positions of the two lines changes (1-2 and 3-2) while 1, 3 and 4 points remain fixed.
3. Indicate 2' position and the new pline becomes 1, 2', 3, 4.

3. Stretch Arc, Circle, Ring

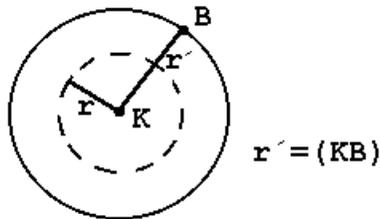
This command is used for changing the radius of those entities considering the center point fixed.

**EXAMPLE:**

Make the circle, with center K and radius r , larger by considering point B a point of the perimeter of the new circle.



1. Select the command and the circle.
2. Select point B and the new circle has center K and radius $r'=(KB)$.



The same procedure is followed for the arch and the ring.

4. Stretch Polygon - Rectangular

The procedure is the same with the line stretching.

5. Stretch Dimensions

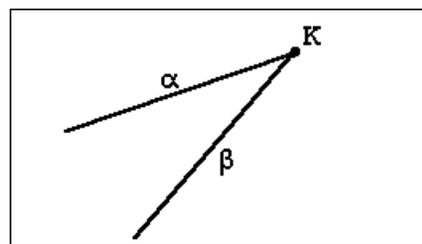
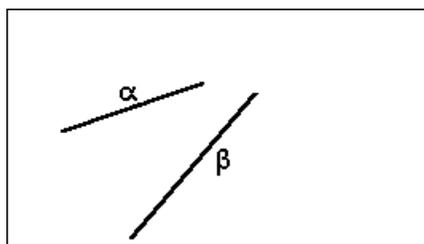
This command is used for the parallel transfer of a dimension versus its initial position. The end lines of the dimension are lengthened while their two endpoints are fixed.



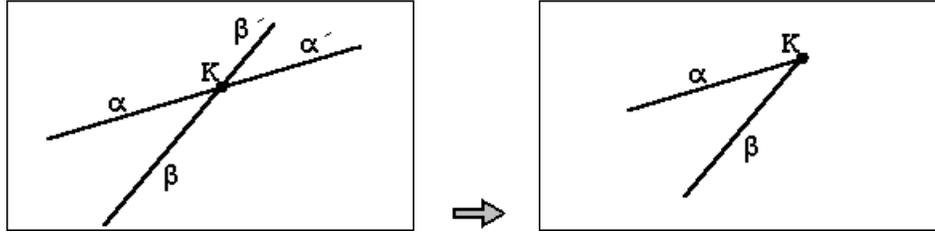
Extend Strip: This command is used for the expansion of two lines, which do not intersect, to the conceivable intersection point, or the cut of the parts of two Intersecting lines over their intersection.

**EXAMPLE:**

- To extend (a) and (b) lines to K point, select “Segmentation” and left click to the two lines.

**EXAMPLE:**

- To cut a' and b' segments of $a-a'$ and $b-b'$ lines, over the intersection point K , indicate the segments of the two lines that you wish to keep.



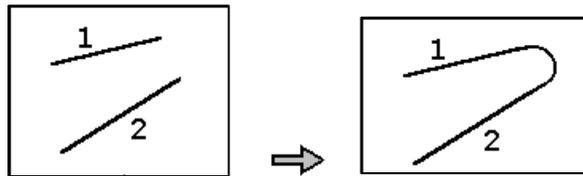
Fillet: This command is used to connect two lines, which intersect or not, with a predefined size of the arch.

It's like "Intersection" command, but first, in the dialog box type arch's radius in degrees.



EXAMPLE:

Connect line 1 and 2 with an arch of 45 degrees long:



Explode: This command is used to split an entity to the composed individual units.

To split an entity to its units, do the following:

1. **Explode blocks**

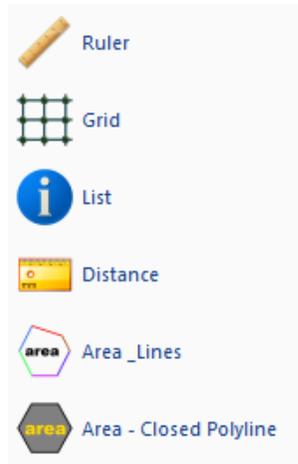
A block can be managed as an object (copy, move, rotate, etc.). To manage the individual units that compose entities, first, you must "Explode" them. Select the command and indicate the group.

2. **Explode plines**

The split of plines gives individual linear segments.

5. View

“View” list contains:



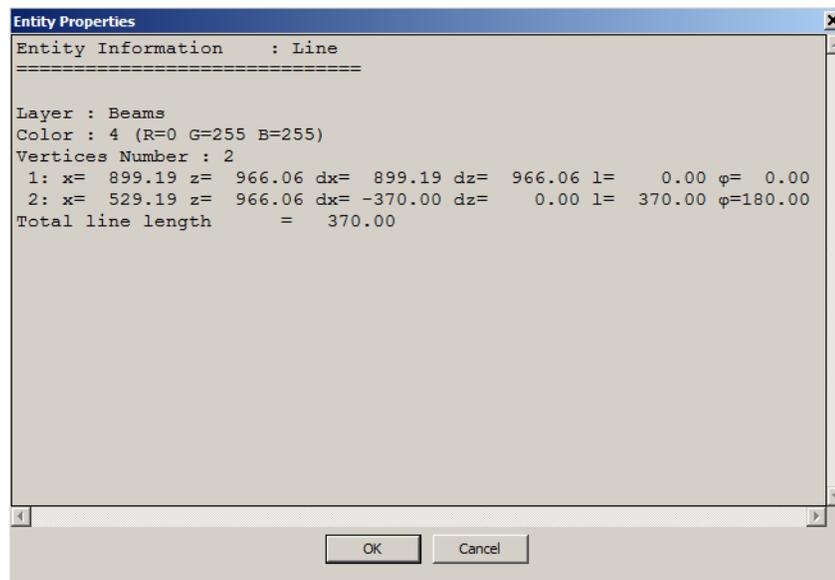
View:



Ruler & Grid: This command is used for the display of the ruler and the grid. Select the same command to activate or deactivate the display of the ruler and the grid. Do the same to restore it.



List: This command is used to display the properties of an entity. Select the command and click on a design entity. A dialog box opens that contains the entity’s properties:





Distance: This command is used to find the distance between two points.

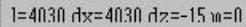


How to use:

1. Select “View >>Distance”.
2. Click on the first point.
3. Click on the second point.

Right click to close the command, or left click again to another (third) point, to find a new distance between the first and the third point, etc.

Distance and projections on x and z axes are displayed on the status bar.



l=4030 dx=4030 dz=-15 m=0



Area-Lines:

This command is used to calculate an area with boundaries defined by a continuous closed line, pline, circles, rings, polygons, and arcs (circular sections). The value is displayed on the status line in m². Select the command and then left click on the closed line.

- ⚠ For the calculation of an area with boundaries defined by an open pline, the program calculates the area, where as the boundary is considered the line segment that connects the beginning and the end of the pline.



Area-Closed Polyline:

This command is used to calculate an area by indicating the vertices. After indicating the last vertex, the value of the area is displayed in the status line.

6. Layers



Click  to open the layers' list:

Double clicking next to the layer in the column “Current” will turn “NO” into “Yes”.

