Metal Studio 2

Program for drawing metal structures
[updated for Build 2004]

In this manual, only the new capabilities of the program, i.e. the commands that were not in the program ‘Metal Studio 1’, are explained, so it is primarily intended for users who have worked in the program ‘Metal Studio 1’.

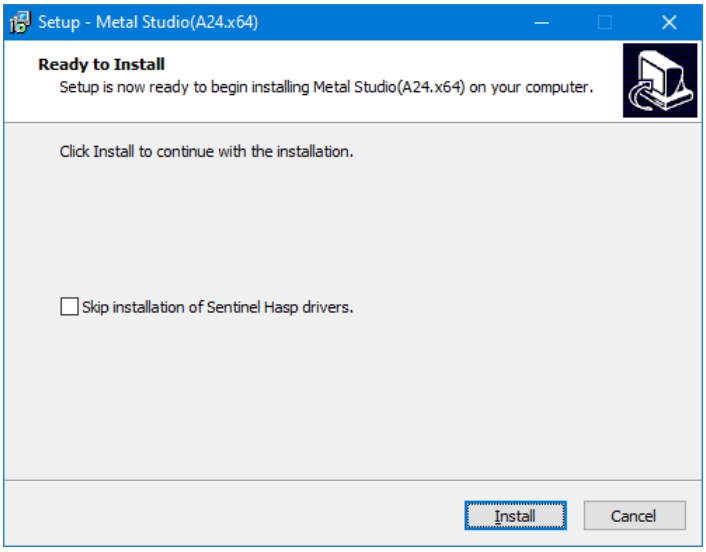
Contents

1. INTRODUCTION

1.2 Program installation

1.2.1 Individual program installation

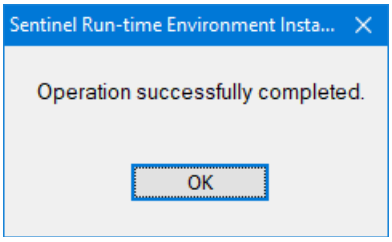
After starting the installation, a dialog box with the following appearance will open:



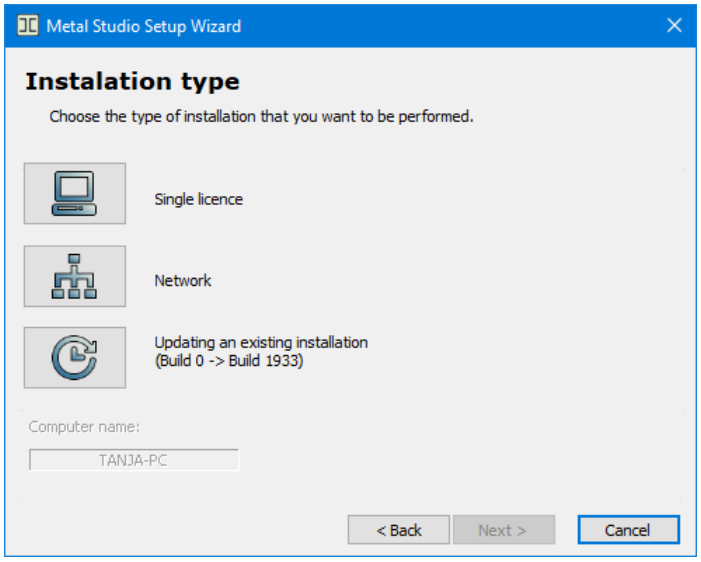
Skip installation of Sentinel Hasp drivers.

If the program is not installed for the first time, but only a new version (Build) is installed, by setting this check box to the on state, the installation of the Sentinel Hasp driver can be skipped, which will speed up the entire program installation procedure.

Now select the '**Install**' button, after which all the necessary files are unpacked into the computer's memory and the installation of the program itself begins. After installing the driver, the program will issue the following message:



Activate the '**OK**' button, after which the installation of the program will begin.



For users who install a new version (Build) of the program, a quick installation option has been introduced.

By clicking the mouse on the '**Update an existing installation**' icon, a quick installation of the program will be performed, via an already existing local or client installation, without entering the installation number and choosing a directory, while retaining all existing parameters and settings and without changing the license.

1.4 Basic concept of the program

Explode - if this AutoCAD command is applied over Metal Studio's material instances (Girders and Plates) in 3D View, AutoCAD entities 3D Solids will be obtained as a result. If this command is applied to Metal Studio's material and non-material instances in 2D View, the result will be AutoCAD lines.

1.5 3D Modeling

The Metal Studio program is a modern tool for creating highly professional drawings of metal structures. Enables the creation of quality project documentation including complete and detailed specification and recapitulation and workshop drawings. The Metal Studio program has successfully combined great ease, simplicity, speed of work with great functionality.

During the first fifteen years of its existence, the Metal Studio program went through the process of actualization and addition of new minor or major functionalities several times. One of the great advantages of the program has always been the ease and simplicity of work, which came from predominantly 2D drawing with the addition of 3D modeling tools. That 2D - 3D hybrid way of drawing, in addition to its advantages, still had its limitations.

The development direction of the Metal Studio program is almost exclusively focused on enabling true 3D modeling while maintaining the ease that exists in 2D mode of operation.

The improvement brought by Metal Studio 2 is not only in switching the entire modeling to 3D and allowing the 'freedom' to draw everything in 3D mode. The most important novelty brought by Metal Studio 2 is the possibility to use the ease of 2D (planar) mode of operation in 3D modeling.

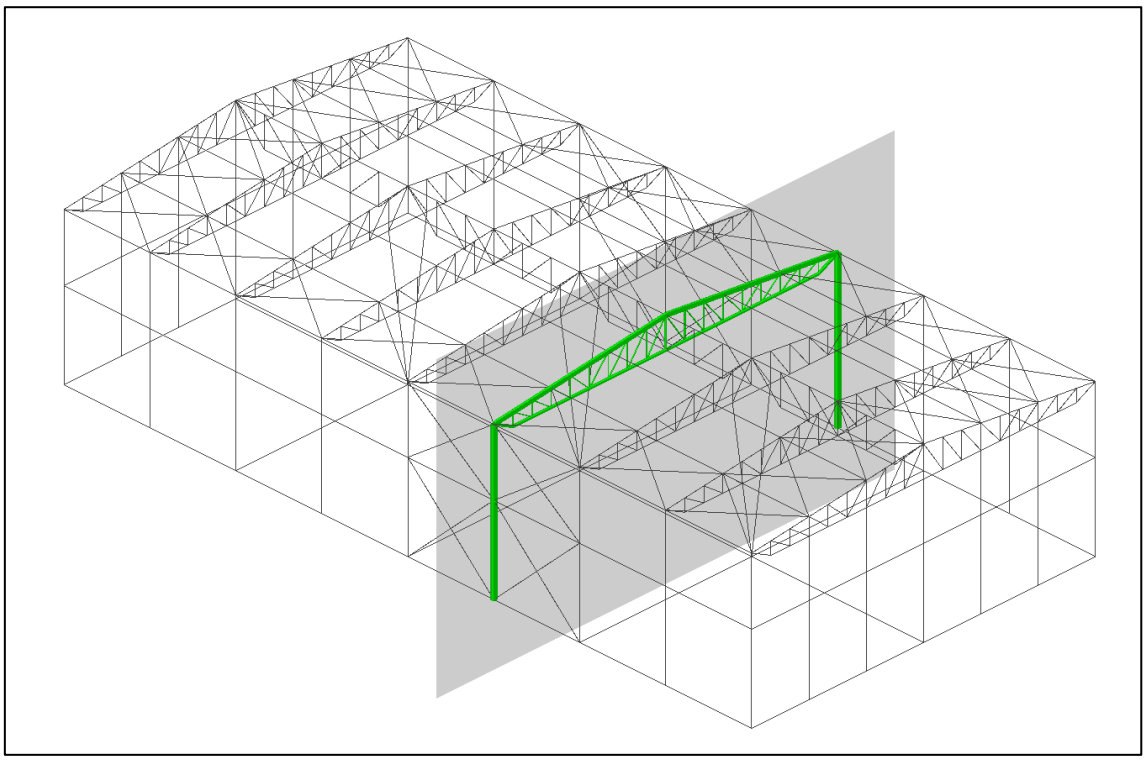
3D Modeling

As an example of 3D modeling with the ease of working in 2D views, we had our Tower program.

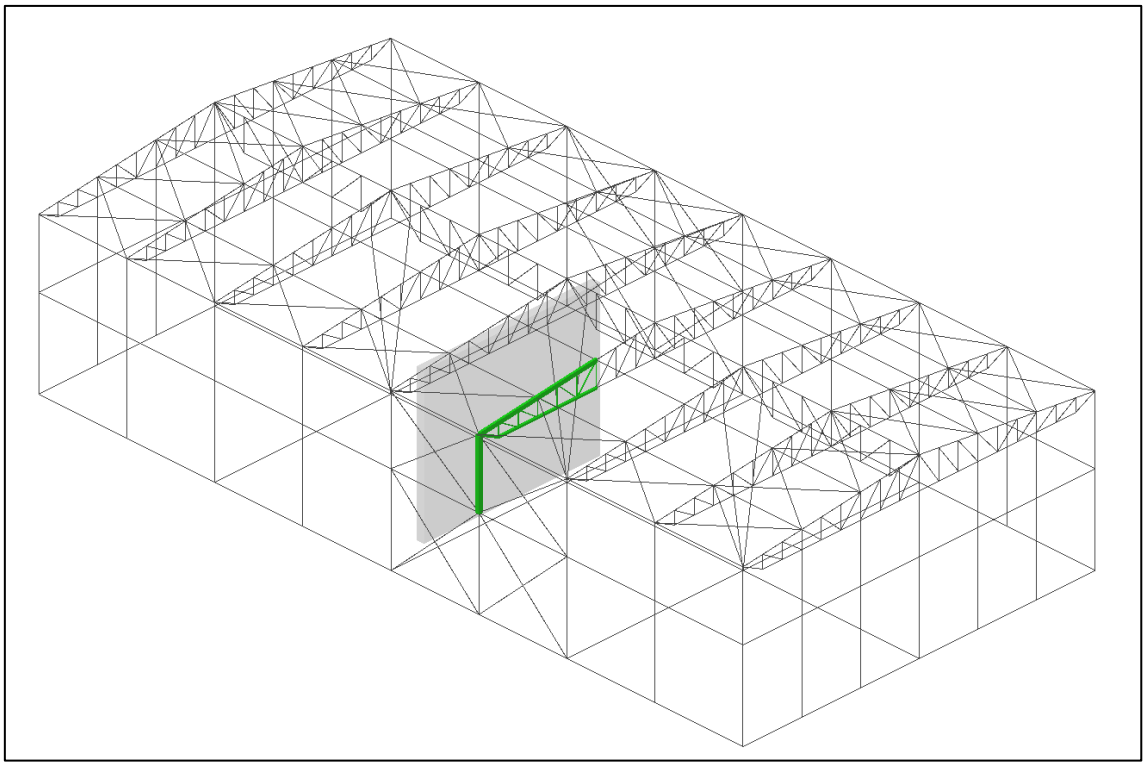
Of course, since Metal Studio is an AutoCAD application, we had to fit within AutoCAD's existing capabilities and limitations.

The principle of 3D modeling in Metal Studio 2 is based on two concepts - '2D view' and (multiple) 'viewports'.

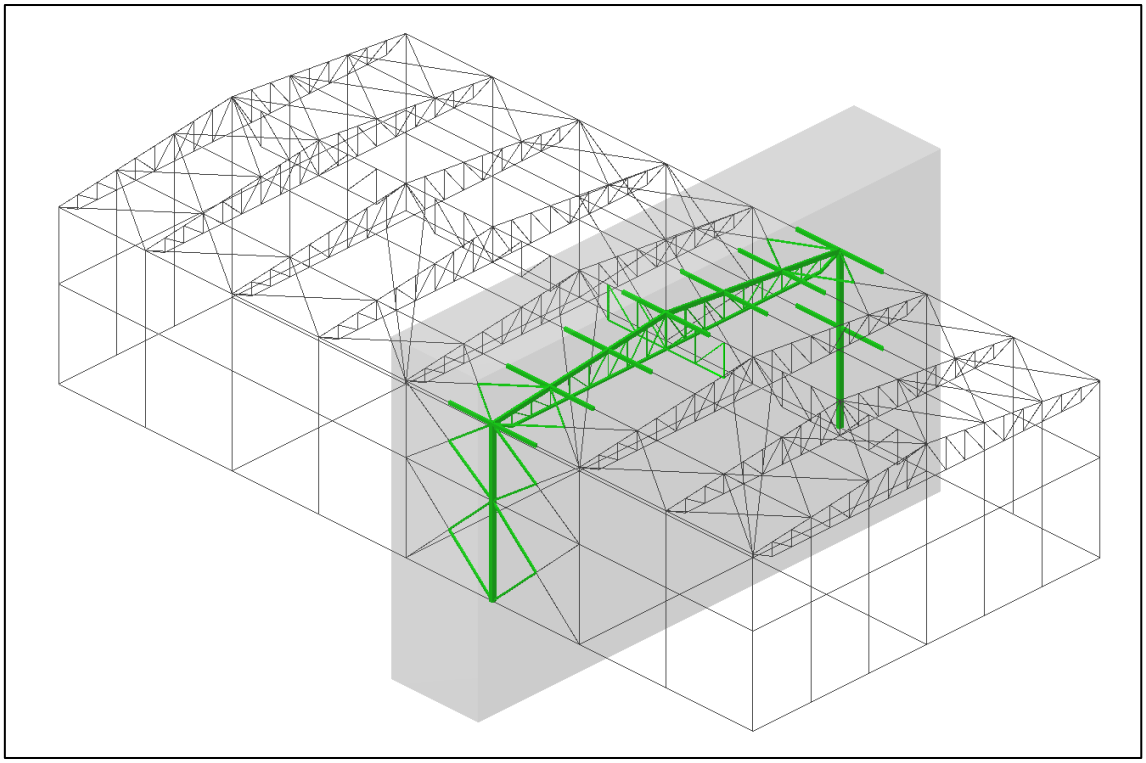
The '2D view' represents a part of the spatial model of the construction being drawn. Its characteristics are plane, region and depth. A '2D view' can represent entities such as a frame, a level or an arbitrary inclined plane (slanted frame or inclined level).



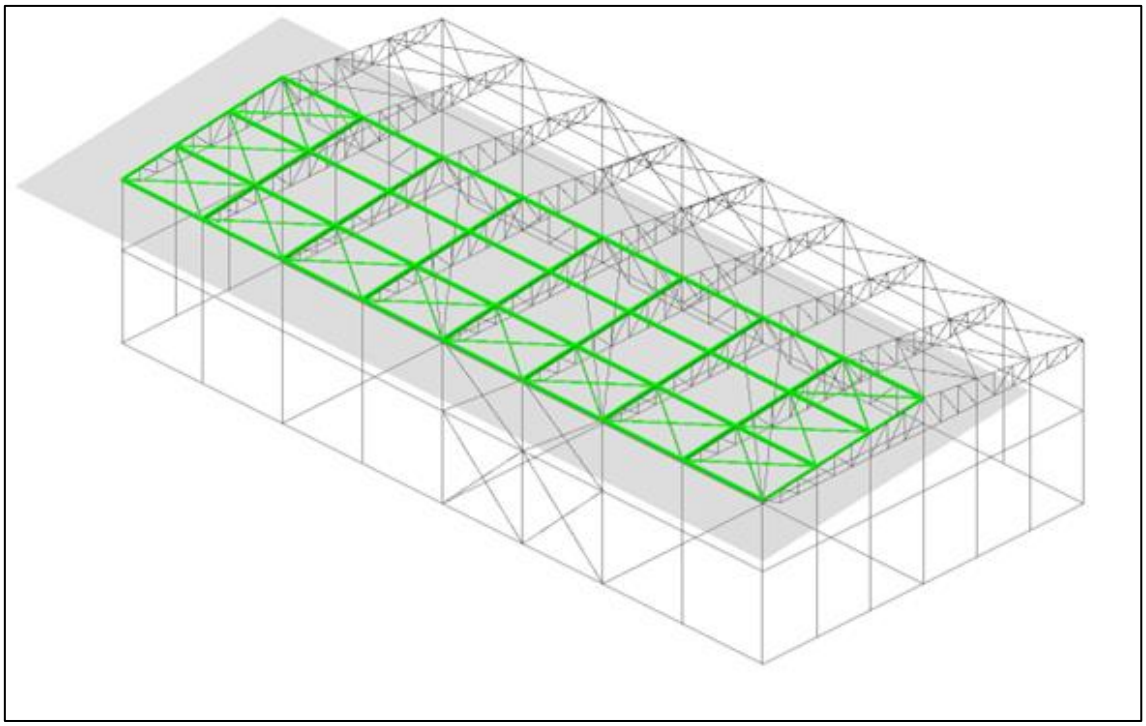
The view can be a single frame



The view can be changed, so that only part of the frame can be displayed



The view can also be given a ‘depth’, which means that the view plane practically becomes a cuboid, and everything in it is displayed



The view can be a completely arbitrary oblique plane

A Metal Studio 2 user can create any number of '2D views'.

The basic drawing mode in AutoCAD ('world draw') always shows the entire 3D model projected on the XOY plane. This means that its use cannot achieve what is desired - neither an arbitrary transformation in an arbitrary coordinate system nor an isolated representation of a part of the model.

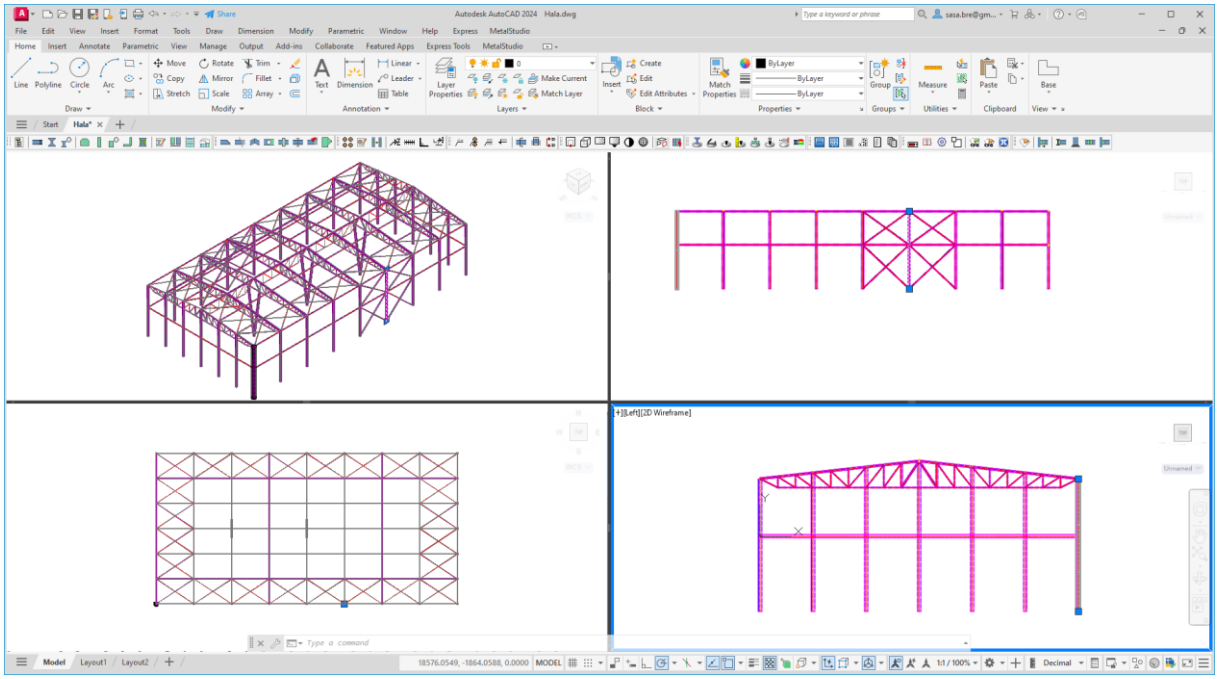
For this reason, an alternative drawing system in AutoCAD that is implemented using 'viewports' must be used.

'Viewports' in AutoCAD defines the parameters we need - plane, range and depth. For an AutoCAD user, it is almost impossible to distinguish whether the plotting is done using the viewport or the general mode.

What you get by using viewport is that in one viewport you can display the selected '2D view' and in that viewport you can draw and use the graphic editor as if it were a normal plane drawing. At the same time, everything that is done is done in a unique 3D model.

AutoCAD supports the simultaneous use of multiple viewports, each of which can display a different 2D view.

A single viewport besides being able to display any user-defined 2D view, can also display two special views - the first is the 'Canonical XOY' view and the second is the '3D view'.



The picture shows four viewports. The top left viewport shows the 3D view, the bottom left shows 'Canonical XOY', while the top and bottom right viewports show one horizontal and one vertical frame.

The canonical XOY viewport shows everything that contains the current drawing projected onto the XOY plane. The '3D view' shows everything that contains the current drawing, but drawn in space.

Two operating modes

Although we previously wrote that it is practically impossible for the user to distinguish whether drawing in AutoCAD is done through the viewport system or the general way, there are still certain differences in their use and capabilities.

On the technical side, there are some minor flaws and imperfections in AutoCAD when it comes to using viewports versus standard plotting. These defects do not affect the essence and the possibilities of work and 3D modeling, but they can come to the fore during the preparation of drawings for printing. For this reason, there are two modes of operation of the Metal Studio program, which differ in whether viewports or standard drawing mode ('world draw') are used for drawing.

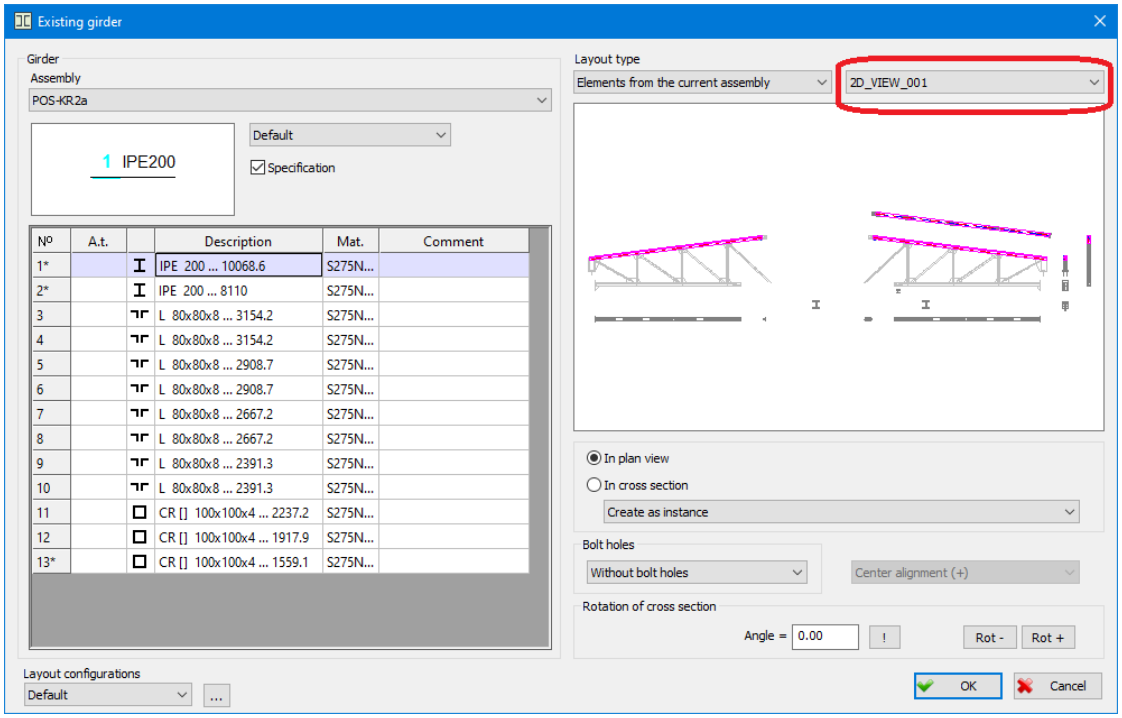
Plotting using the viewport is necessary for the 3D modeling process, and the standard plotting method has advantages in the preparation of drawings for printing and the printing process itself.

AutoCAD can use only one drawing system at a time, and in Metal Studio 2 it is possible to easily switch from one to another.

It is recommended that the entire modeling work be done in the '3D modeling' mode that works with viewports, and that the '2D Preparation' mode be used when preparing drawings for printing.

3. GIRDERS

3.3 Existing girder

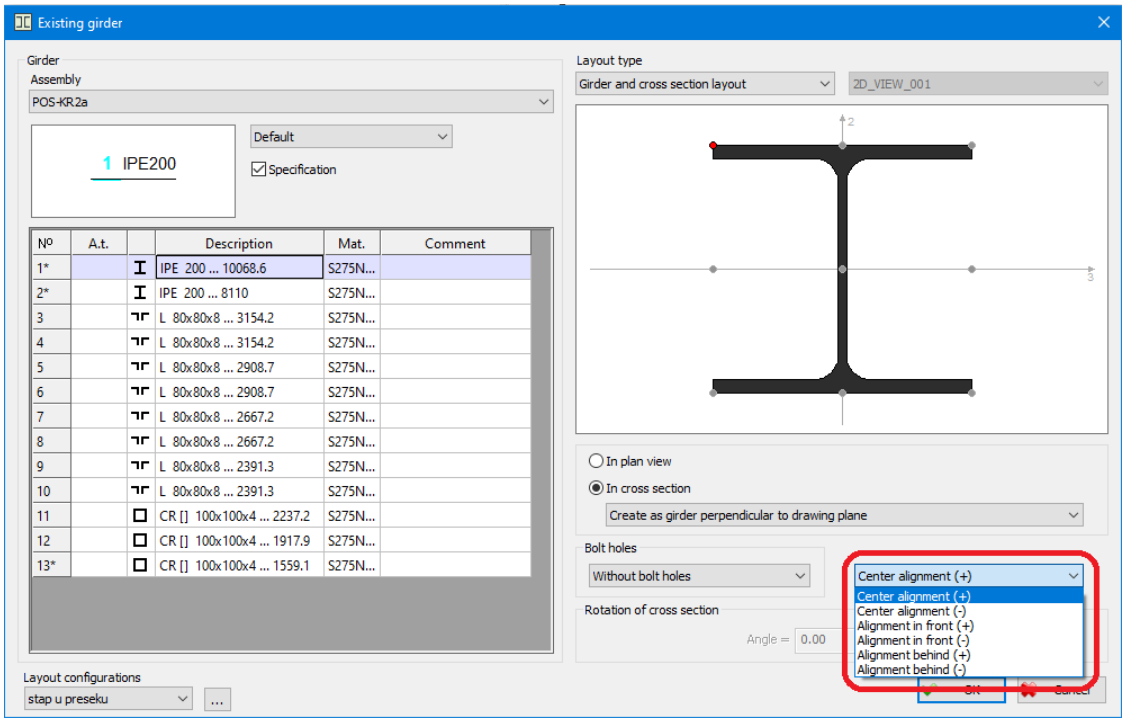


A list of view names that are set in viewports

Layout type If you are in the '3D Modeling' operating mode, and the display of elements from the current assembly or all elements is selected from the list, a list will become available from which you can select one of the views that are set in the viewports. Then the position of instances in the selected view will be displayed in the window.

In cross section

If the option 'Create as girder perpendicular to drawing plane' is selected, a list will become available from which it is possible to choose one of the offered girders alignments in relation to the plane of the current view.



A list for selecting the alignment of the girder relative to the plane of the current view

5. FORMING GIRDERS AND PLATES

5.6 Girder dividing

The program allows the division of the girders with the setting of the spacing for placing the plates, which will be used to connect them.

After selecting the split points, the command line takes on a new form:

Offset <0>:

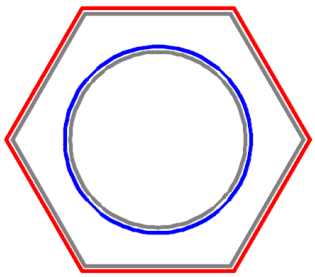
The user is now required to specify the distance between the girders at the selected split points. In square brackets is shown the value of the space that was set when the command was previously called. By activating the right mouse button or selecting the 'Enter' key without entering a new space value, the offered value will be retained.

6. CONNECTING DEVICES

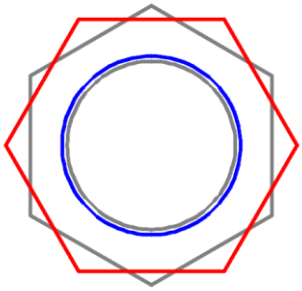
6.1 Bolt series

Aligned

This check box is only available when the safety nut is installed. When it is on, the sides of the nut and the locknut are aligned, so that in the cross-section drawing, the bolt looks like it is folded over, as shown in the picture:



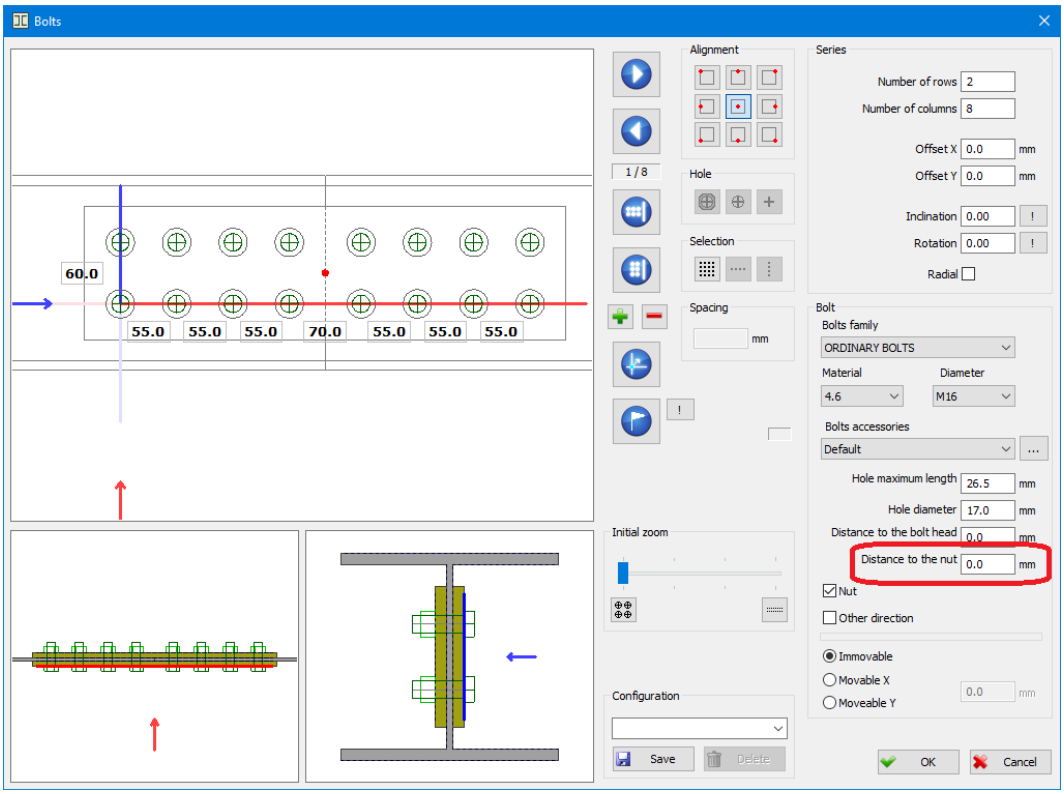
Check box 'Aligned' on



Check box 'Aligned' off

Distance to the nut

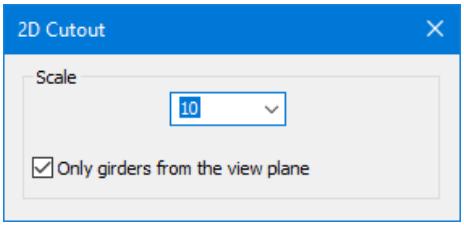
Edit box in which the distance from the nut to the nearest entity (girder or plate) previously selected for connecting with a series of screws is set.



Edit box for setting the distance to the nut

7. REFERENCES

7.6 2D Cutout



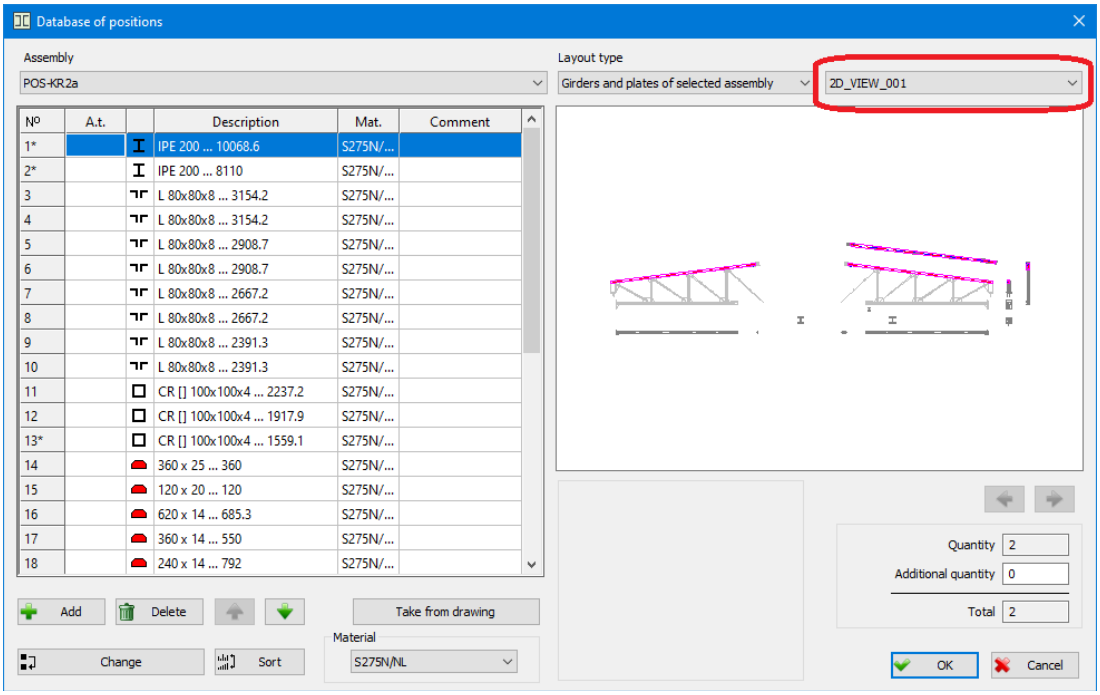
Only girders from the view plane

If the check box is set to the on state, then the detail will contain only the girders located in the view plane, while the girders perpendicular to the view plane will not be displayed. By turning off the check box in the extracted detail, all girders will be displayed.

8. EDITING ENTITIES

8.1 Database of positions

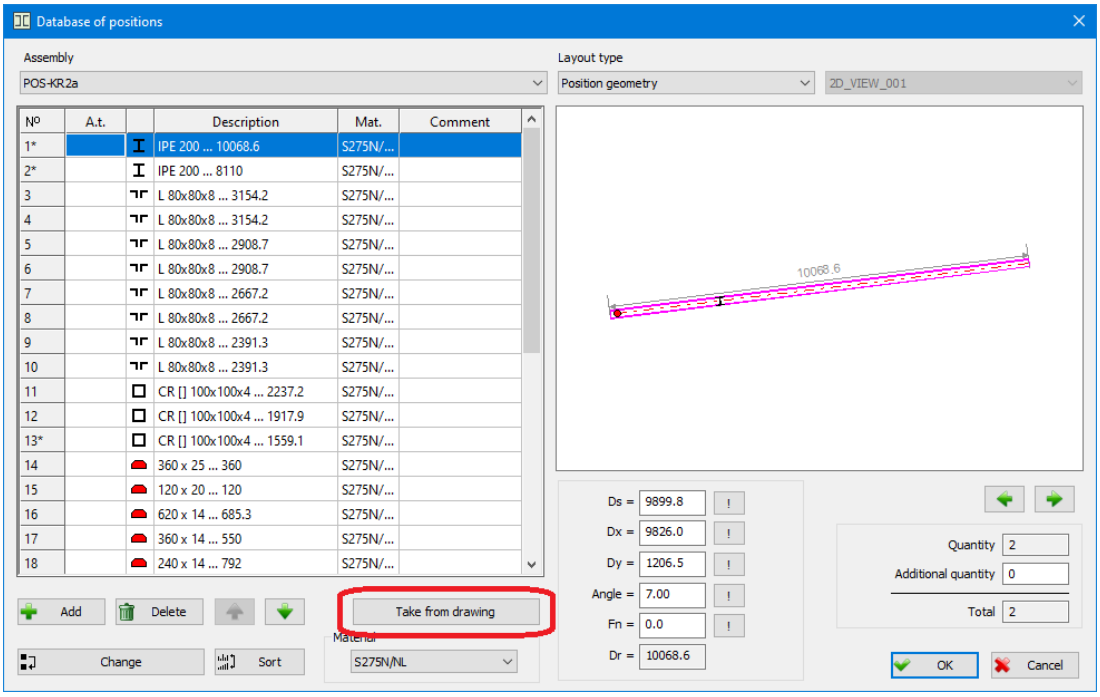
Layuot type If you are in the '3D modeling' operating mode, and the display of elements from the current assembly or all elements is selected from the list, a list will become available from which it is possible to select one of the viewports that are set in the views. Then the position of the position instances in the selected view will be displayed in the window.



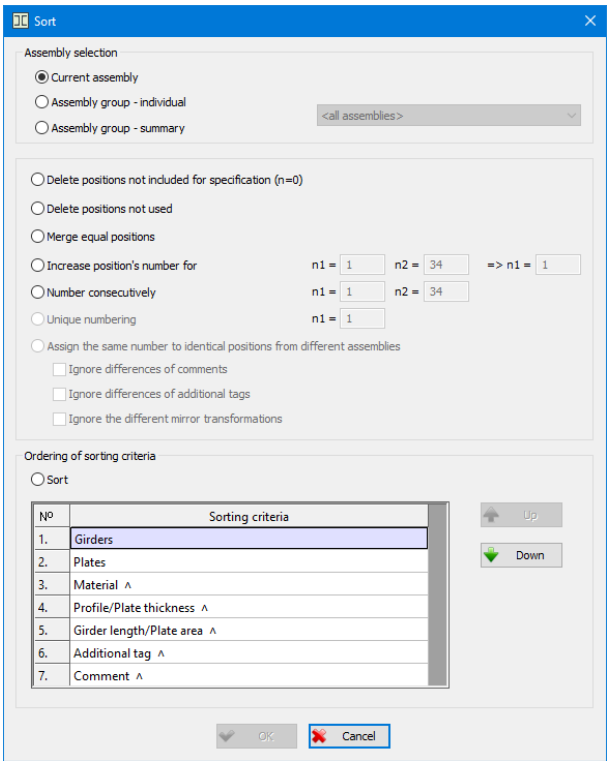
A list of view names that are set in viewports

Take from drawing

Clicking on this button opens the drawing to select an entity (girder or plate) whose assembly and position will be set as current when returning to the dialog.



Sort A button which, when activated, opens a dialog with the following appearance:



View of the dialog for sorting positions

Current assembly

Only positions that belong to the current assembly are sorted.

Assembly group – individual

Positions from all assemblies belonging to the selected group are sorted. The selection of the assembly group is made from the closed list located next to this switch. Sorting is done for each assembly separately. The effect is the same as if the assemblies belonging to the selected group were set to current one by one in order to sort positions with the same criteria for each of them.

Assembly group - summary

Items from all assemblies belonging to the selected group are sorted together.

Unique numbering

This criterion is only available when sorting for 'Assembly Group -summary'. All positions of girders and plates, from all assemblies belonging to the selected group, are numbered together, which means that each of them will have a unique serial number. The initial numbering number is set in the edit box 'n1', which is in the extension of the criteria name.

9. ADJUSTING THE ENTITY LAYOUT

9.2 Refreshing visibility

If the program is in the '3D Modeling' mode, after starting the command the command line looks like this:

Refreshing visibility in all views [Current view/Selection/All] <Selection>:

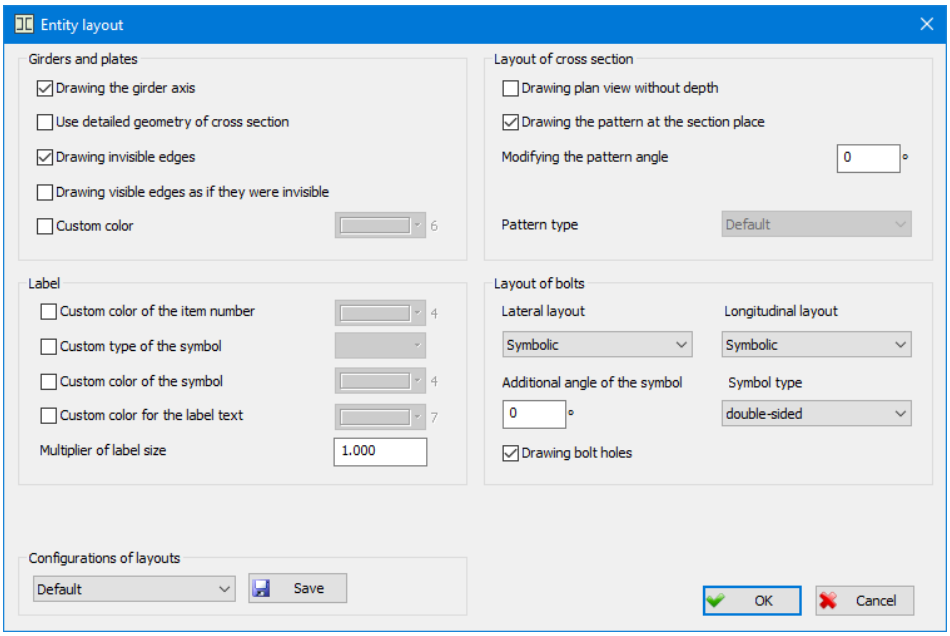
Given that the program allows working with multiple views, the user chooses whether he wants the refresh to be performed for the current view or for all views at the same time. If the active mode is as shown on the command line, visibility will be refreshed in all views. By selecting the '**Current view**' sub-option, the command line takes on a new form:

Refreshing visibility in current view [all Views/Selection/All] <Selection>:

In this mode of operation the command will refresh the visibility only in the current view.

After selecting the mode of operation of the command, it is necessary to select one of the two options offered from the command line: 'Selection' or 'All'.

9.3 Entity layout



Dialog layout for setting the entity display mode

Custom color

All selected entities can be assigned a completely arbitrary color with which they will be displayed in the drawing. By turning on this check box, a button becomes available, that when activated, opens the color selection dialog.

Label

Custom color of the item number

All selected entities can be assigned a completely arbitrary color to print the ordinal item number in label. By turning on this check box, a button becomes available, which, when activated, opens the color selection dialog.

Custom type of the symbol

All selected entities can be assigned their own symbol type for writing the ordinal number of the position in label. By activating this check box, a list for choosing one of the offered symbols becomes available.

Custom color of the symbol

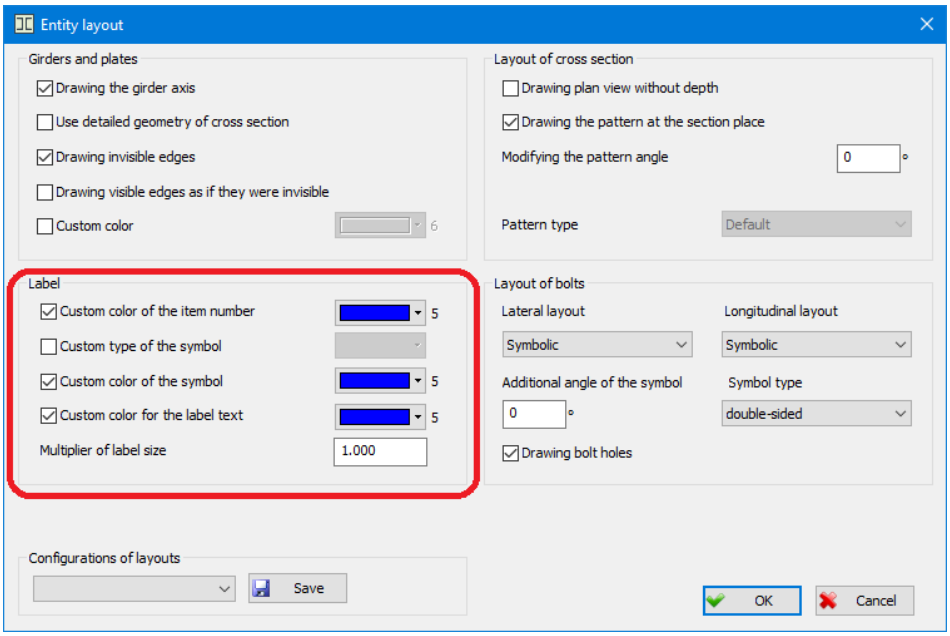
All selected entities can be assigned a completely arbitrary color to print the symbol of the ordinal number of the position in label. By turning on this check box, a button becomes available, which, when activated, opens the color selection dialog.

Custom color for the label text

All selected entities can be assigned a completely arbitrary color to print the text in label. By turning on this check box, a button becomes available, which, when activated, opens the color selection dialog.

Multiplier of label size

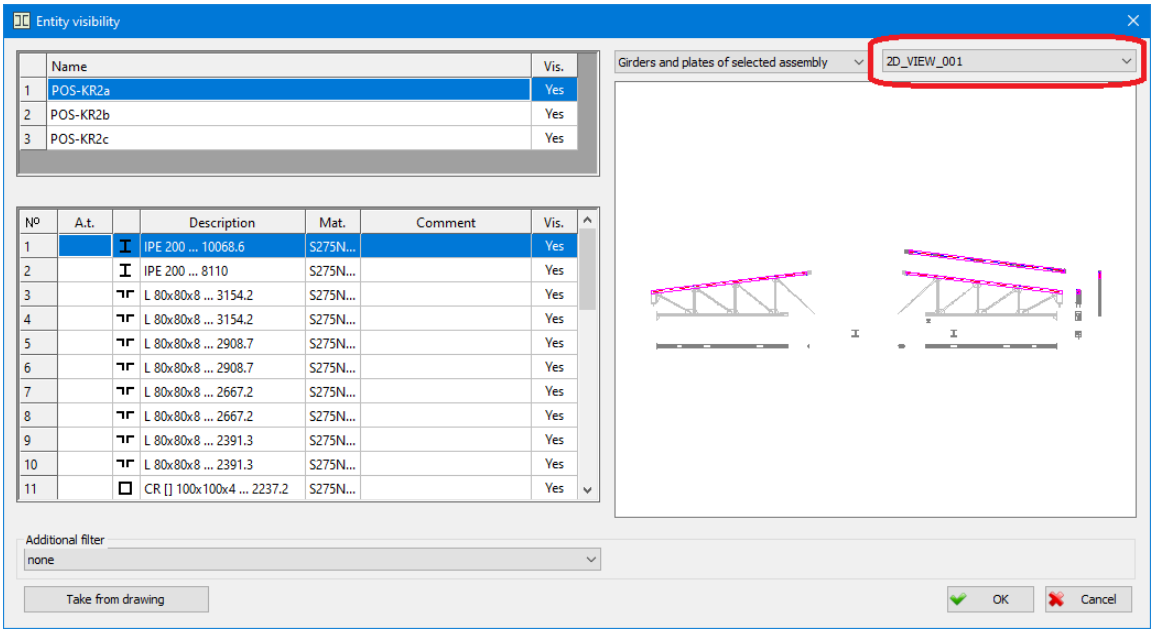
Edit box in which the coefficient that affects the size of label in the drawing is set. The size of the label can be influenced in two ways. The first one is assigning a coefficient to the entity, which means that all labels with which the entity is labeling after that will be multiplied by the given coefficient, but the labels that were previously set will not change. Another way is to select already set label from the drawing and change their size by entering a coefficient in this edit box.



Parameters for setting the label appearance of selected entities

9.5 Adjusting the visibility of 'Metal Studio' entities (VISIBILITY)

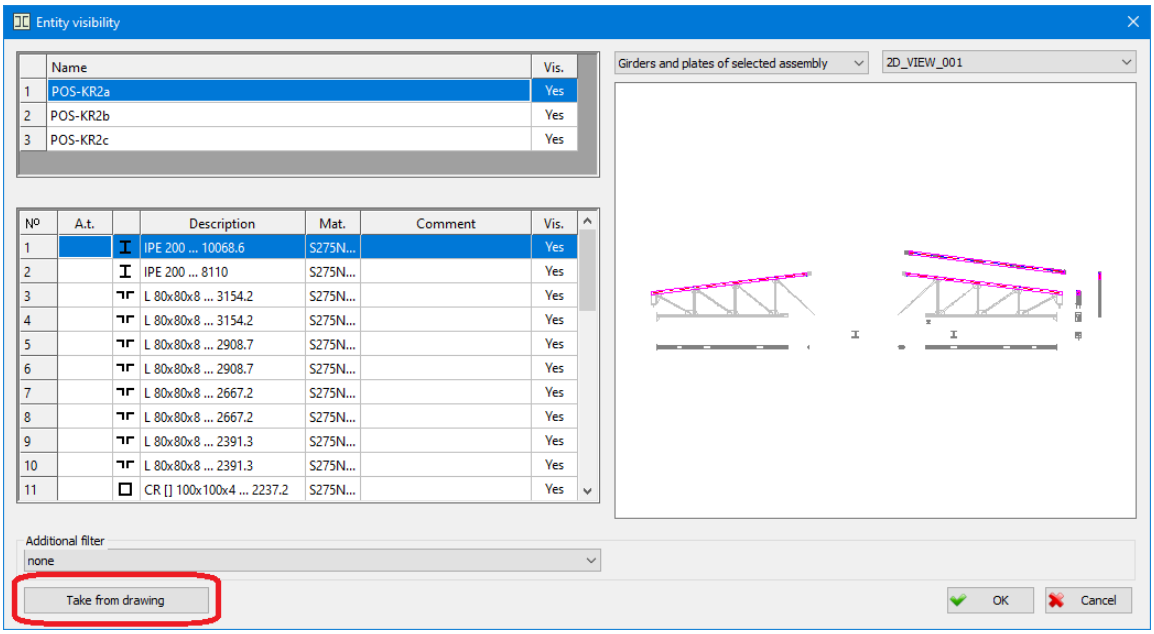
If you are in the '3D modeling' operating mode, and the display of elements from the current assembly or all elements is selected from the list, a list will become available from which it is possible to select one of the views that are set in the views. Then the position of the position instances in the selected view will be displayed in the window.



A list of view names that are set in viewports

Take from drawing

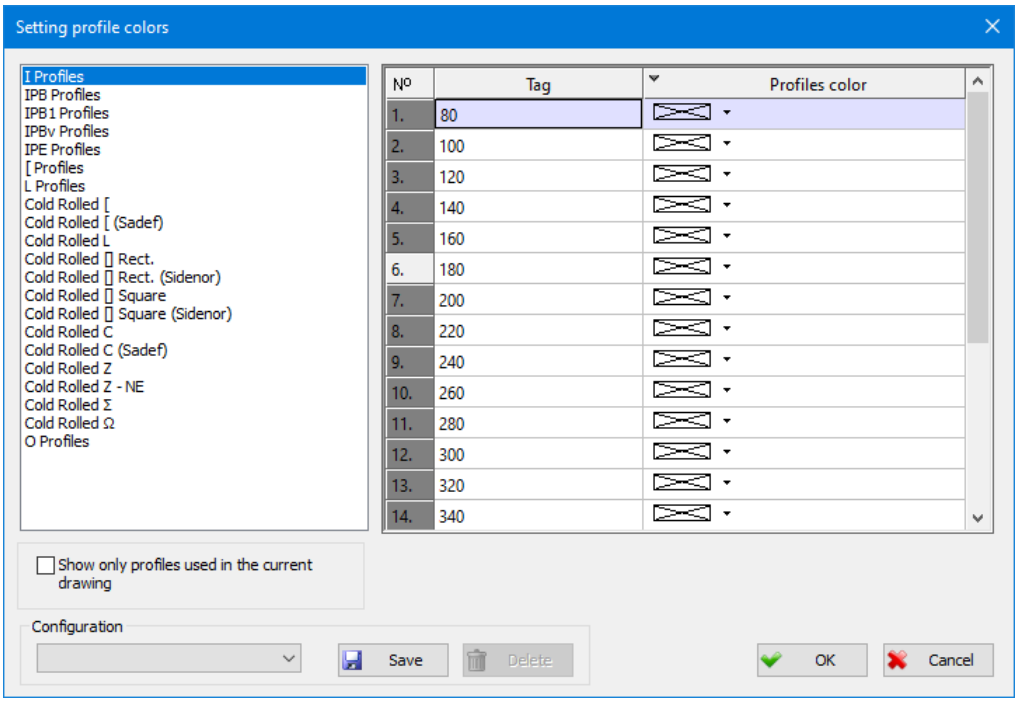
Clicking on this button opens the drawing to select an entity (girders or plates) whose assembly and position will be set as current when returning to the dialog.



10. CREATING DATABASES USED BY THE PROGRAM IN ITS OPERATION

10.7 Setting profiles colors

Using the '**Setting profiles colors**' command, a completely arbitrary color can be assigned to each profile in the currently active profile database. Selecting it from the '**Metal Studio**' drop-down menu or clicking on the icon opens a dialog with the following appearance:

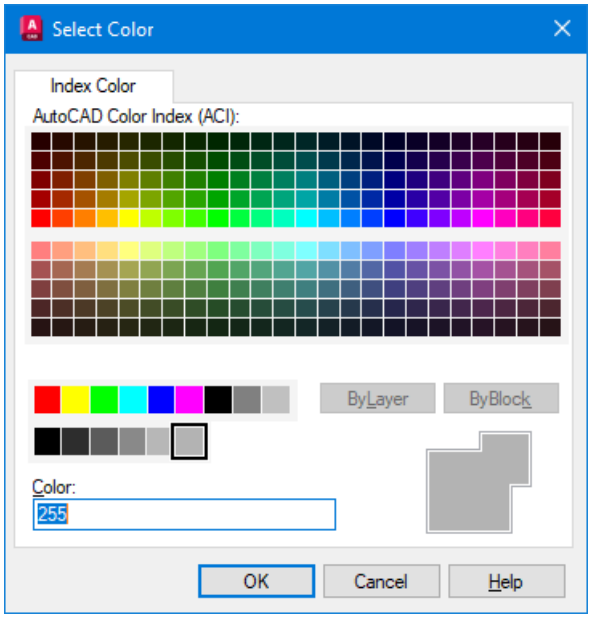


In the left part of the dialog there is a list of all types of profiles that exist in the currently active database. By selecting one of them, a table with all profiles of the selected type will appear in the right part of the dialog. Table columns have the following meaning:

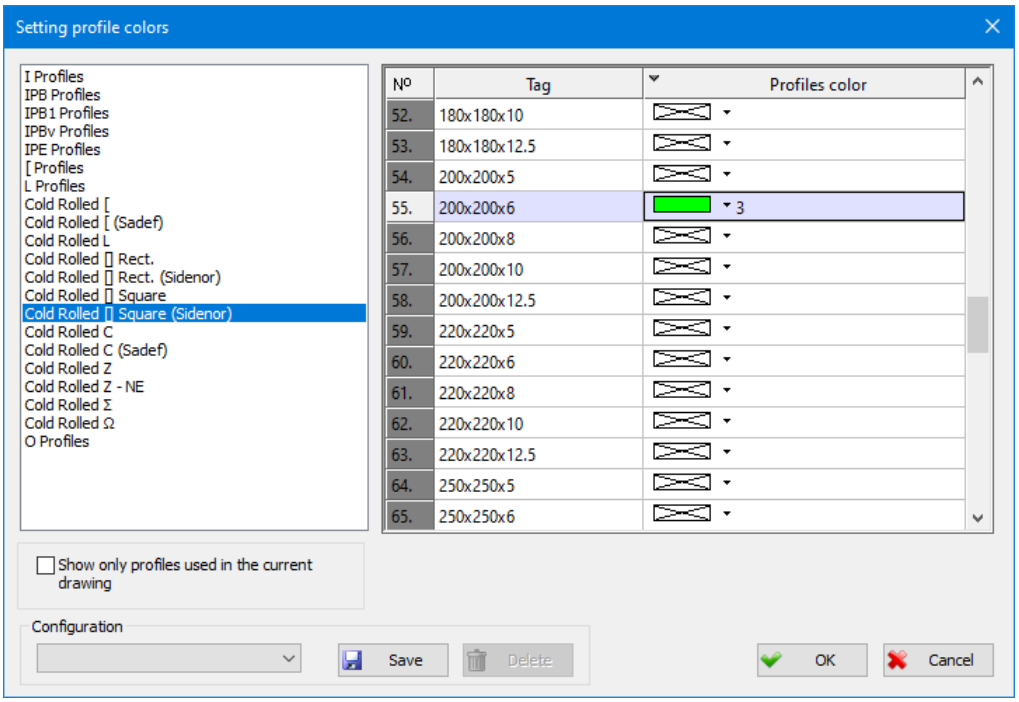
Nº Serial number of the profile in the profile database

Tag The tag of a given profile assigned to it in the profile database

Profiles color The column in which the given profile is assigned a color. Left-clicking the mouse over the field in this column opens a dialog for choosing the desired color:

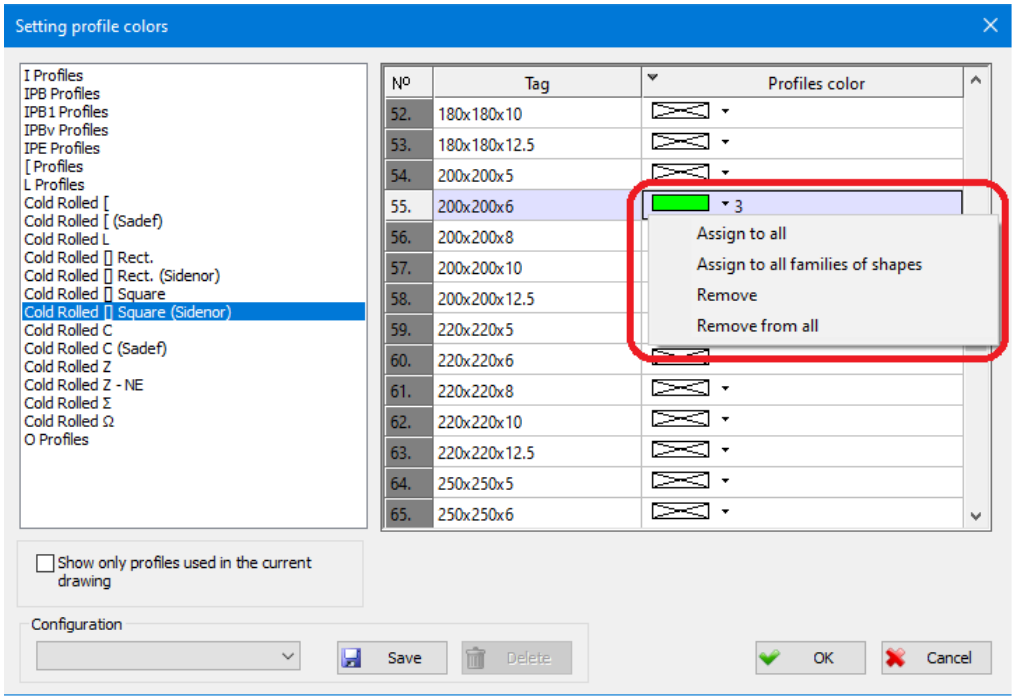


The selected color will be displayed in the corresponding field of the table:



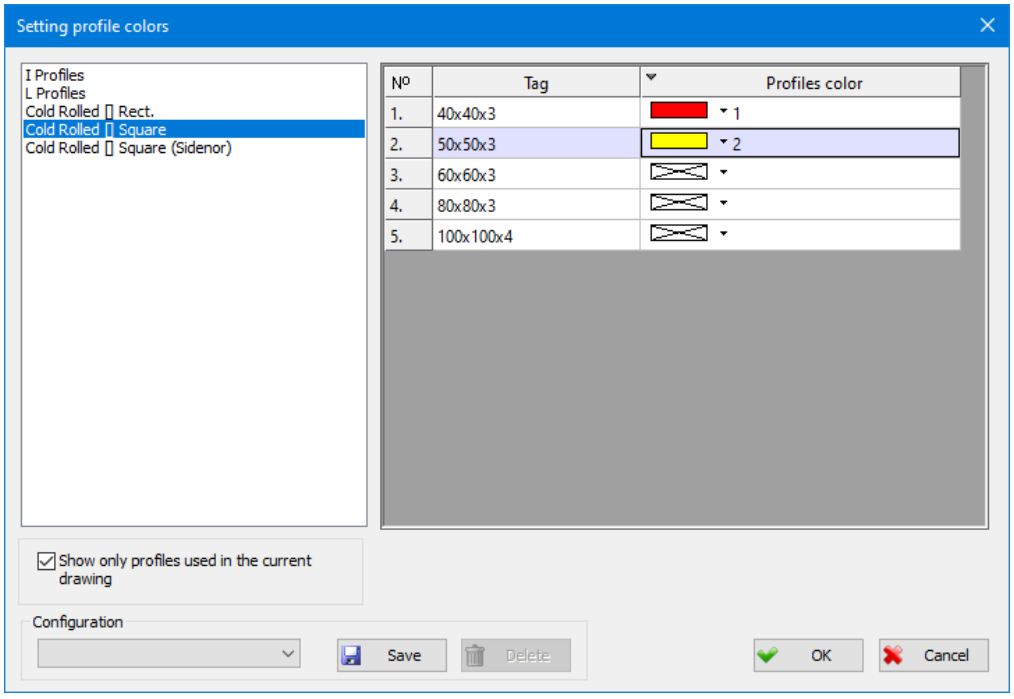
The HOP profile labeled 200x200x6 is given a green color

Left-clicking the mouse over the field in this column opens a drop-down menu with the following appearance:



Assign to all - The color assigned to the given profile will be assigned to all profiles of the selected profile type from the list.
Assign to all families of shapes- The color assigned to a given profile will be assigned to all profiles from the profile database.
Remove - Selecting this menu item will remove the color previously assigned to the given profile.
Remove from all - Selecting this menu item will remove the colors previously assigned to all profiles of the selected type from the list.

Show only profiles used in the current drawing - As the name suggests, when this switch is on, only the profiles used in the current drawing are displayed in the table:



The table shows only the profiles used in the current drawing, and belong to the profile type HOP [] square

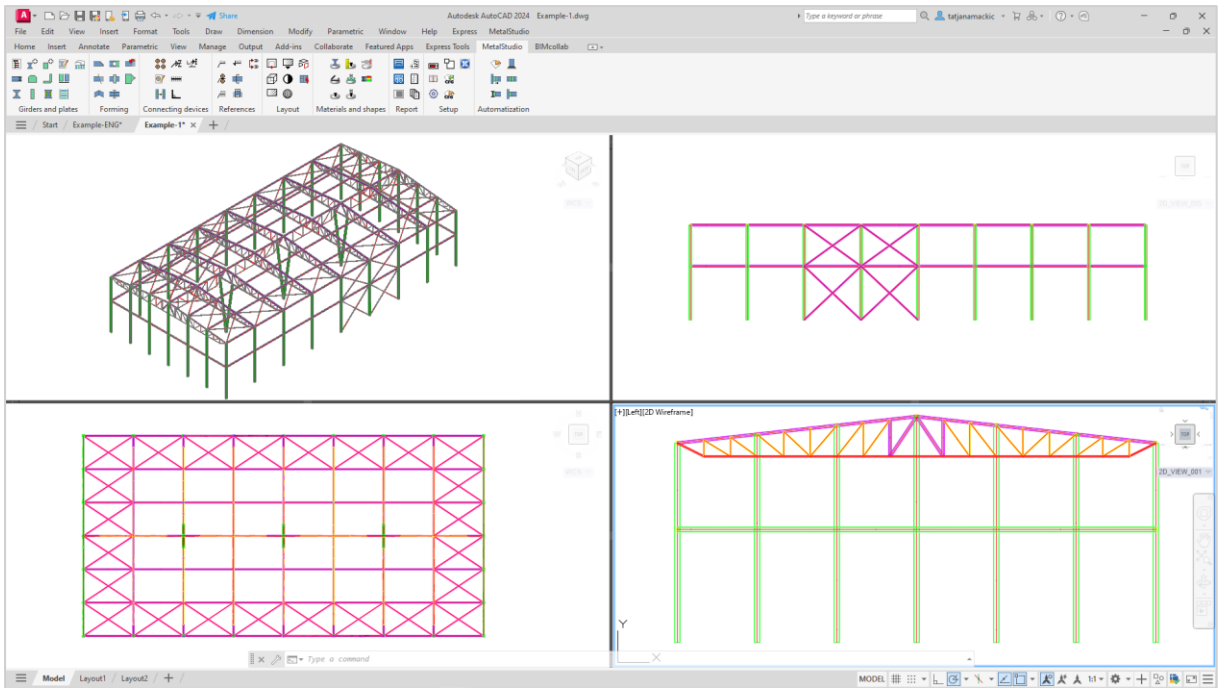
Configuration

From the closed list, you can choose one of the previously saved profile color configurations.

Save A button with which the state of all parameters set in this dialog can be recorded under an arbitrarily given name.

Delete A button that can be activated to delete the current configuration.

After exiting the dialog of this command, all existing girders in the drawing will be displayed with a new color, if it is assigned to their profile. Also, all new bars that are drawn after it is assigned will be displayed with the given color.



All HOP profiles marked 200x200x6 are shown in the drawing with the default green color

Note: In Metal Studio, girders can be colored in several ways. Therefore, one must take care of the hierarchy, that is, the importance of each of them, in order to get the desired result in the end. Here we will show all the ways to assign colors from the weakest to the most important:

- Entity color set within the 'Parameters' command
- Color set using the 'Entity layout' command
- Color set using the 'Setting profiles colors' command
- Color set using the 'Assembly positions' command

The 'Entity layout' and 'Setting Profiles Color' commands in this hierarchy can be replaced by changing the 'Girder Colors' setting in the 'Functionality' command dialog.

This would mean that if the girden color is specified within all the above commands, the girdens will be displayed with the color specified within the 'Assembly Positions' command.

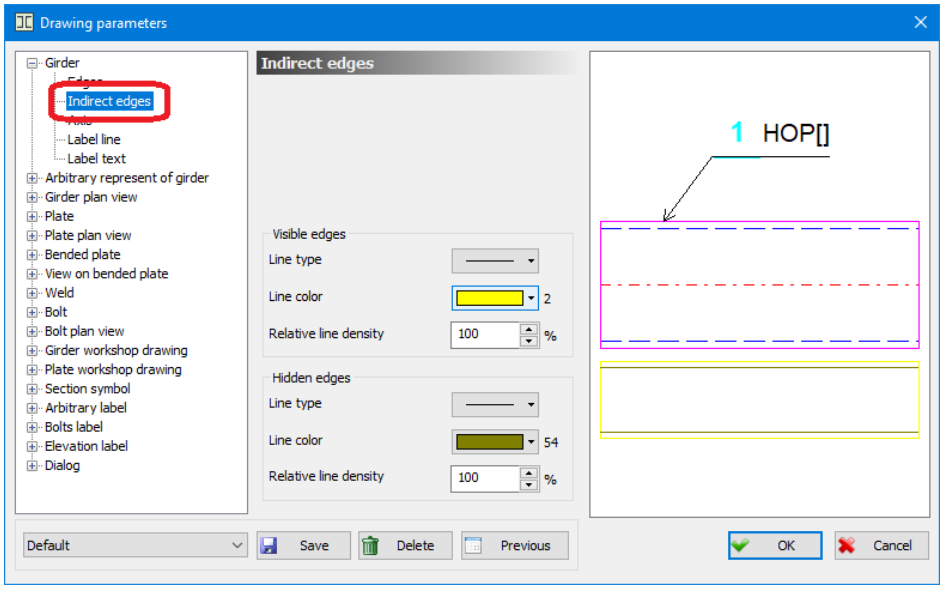
12. CUSTOMIZING PARAMETERS USED BY THE PROGRAM IN ITS OPERATION

12.1 Adjusting colors and fonts for the 'Metal Studio' entities (DRAWING PARAMETERS)

Girder

Indirect edges

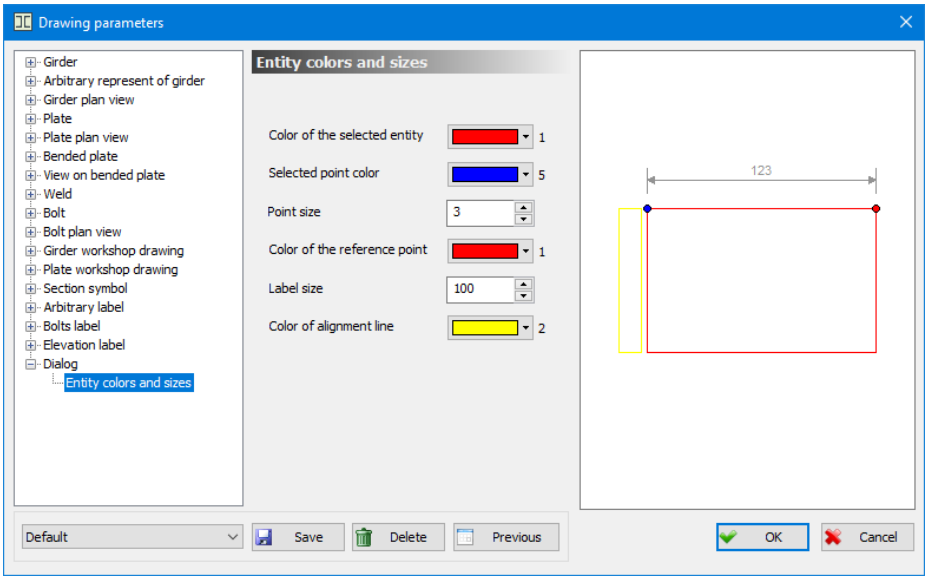
Subheading whose selection will appear in the central part of the dialog with parameters that define the appearance of visible and invisible edges of girders that are not in the plane of the current view.
Line type - opens a drop-down menu for choosing one of the line types provided by the program.
Line color - the color of the lines for the edges of the girder is set.
Relative line density - set the density for dashed lines expressed in percentage.



Dialog

Entity colors and sizes

Subheading whose selection will appear in the central part of the dialog with parameters used to define the appearance and size of entities in dialogs.
Color of the selected entity - sets the color of the selected entity in the dialog.
Selected point color - the color of the selected point in the dialog is set.
Point size - the point size in the dialog is set.
Color of the reference point - the color of the reference point in the dialog is set.
Label size - the size of the label is set in the dialog.
Color of alighment line - the color of the alignment line in the dialog is set.

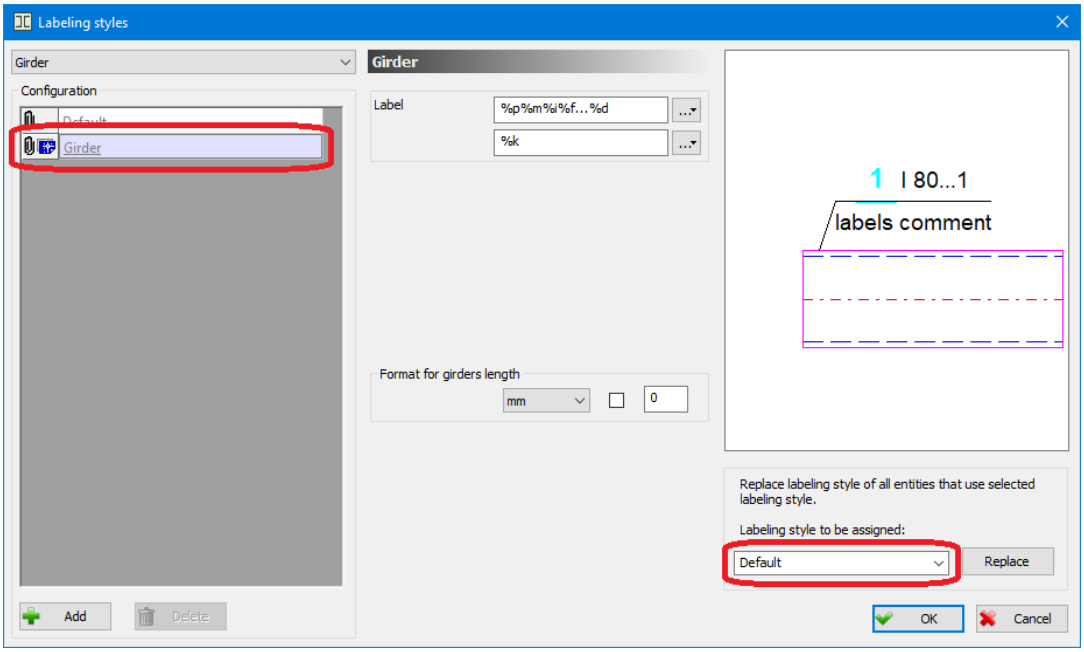


12.2 Defining the labeling styles of 'Metal Studio' entities (LABELING STYLES)

Replace labeling style of all entities that use the selected labeling style.

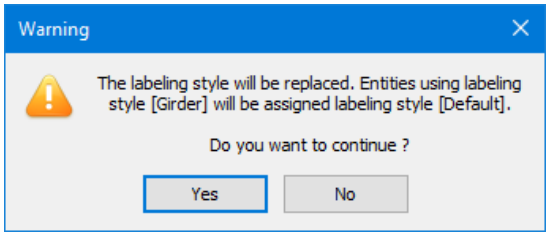
Labeling style to be assigned

A closed list from which to select a labeling style that will be assigned to all entities that use the selected labeling style.



Entities using the 'Girder' labeling style will be assigned the 'Default' labeling style

Replace This button becomes available only when a labeling style is selected from the 'Labeling style to be assigned' list. By activating it, the labeling style is replaced by all entities that use the labeling style selected in the 'Configuration' table with the labeling style selected from the list. As these are changes that significantly affect the drawing, the program will open a new dialog with a detailed description of the requested replacement of the labeling style and will request its confirmation.



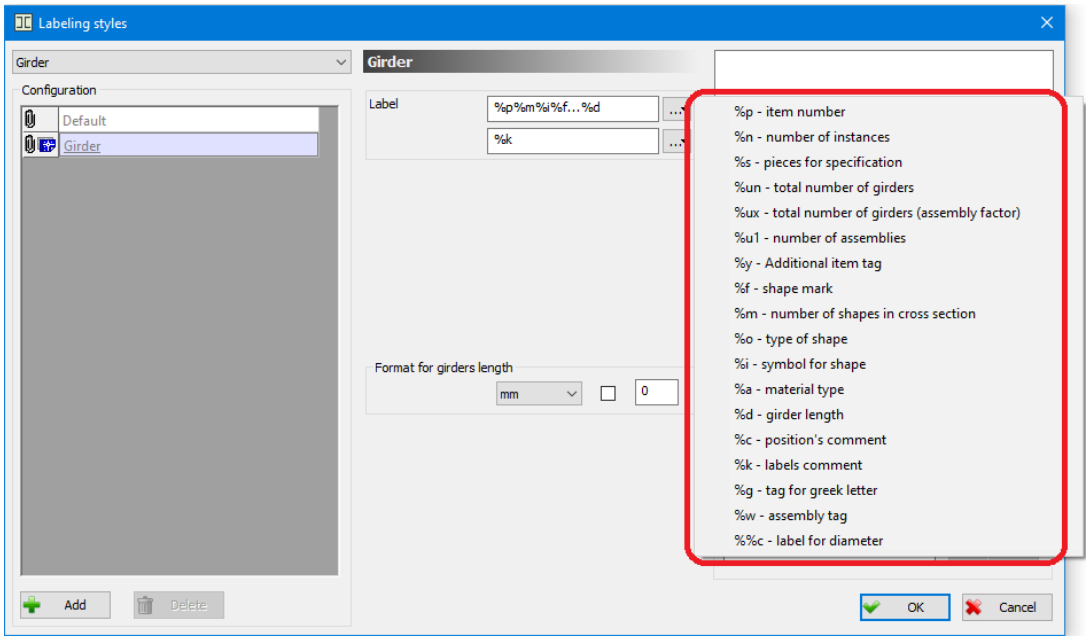
The program automatically saves the changes made to the labeling styles in the configuration database every time the dialog is exited by clicking the '**OK**' button.

Deleting duplicates

While working with the program, several of the same labeling styles may accumulate in the database. This most often happens when working on the same drawing on several different computers with different labeling styles. Using the 'Delete Duplicates' command, accumulated labeling styles can be quickly removed from the database. The command is launched from a drop-down menu that is opened by hovering the mouse pointer over any labeling style in the list and pressing the right button.

Girder

Labeling



Drop-down menu to select the parameters that can be displayed in the labeling text

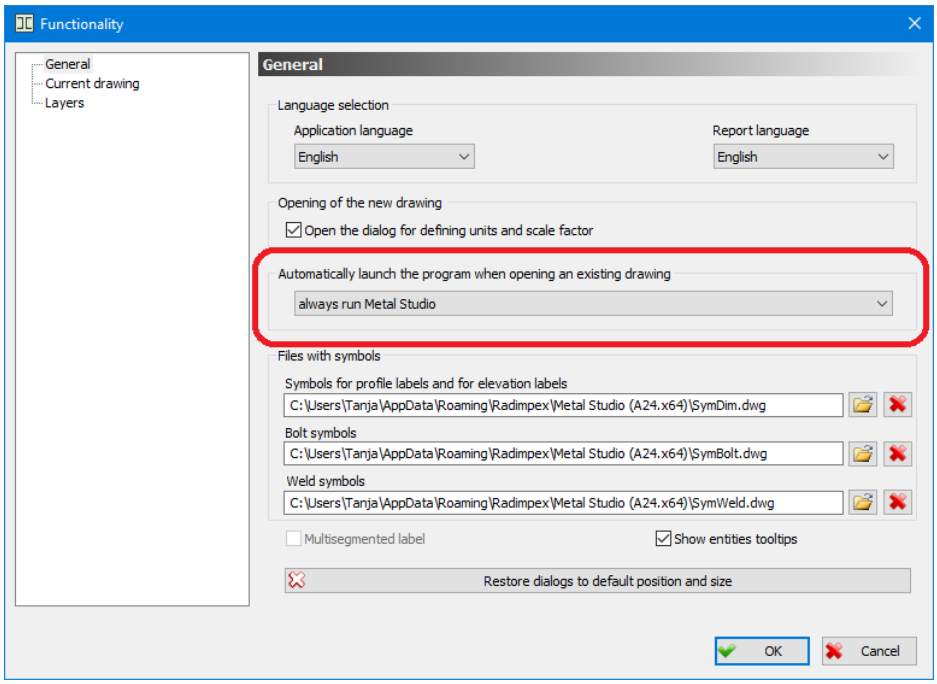
%un - total number of girders - the total number of pieces of girders of a given position multiplied by the quantity assigned to a given assembly in the dialogue of the 'Assembly positions' command is written in the label.

%ux - total number of girders (assembly factor) - the total number of pieces of girders of a given position multiplied by the quantity assigned to a given assembly in the command dialog 'Assembly positions' is written in the label, but in a developed form.

%u1 - number of assemblies - the quantity assigned to a given assembly in the 'Assembly Positions' command dialog.

12.3 Functionality

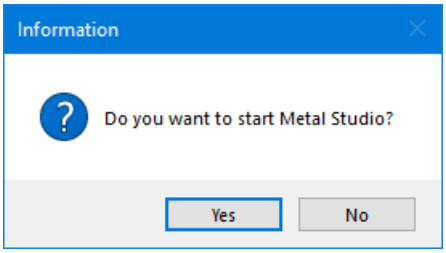
Automatic launch the program when opening an existing drawing
Introduced the ability to adjust the behavior of the program when opening a DWG drawing with Metal Studio entities in AutoCAD where Metal Studio is not currently running, to prevent unwanted starts of Metal Studio.



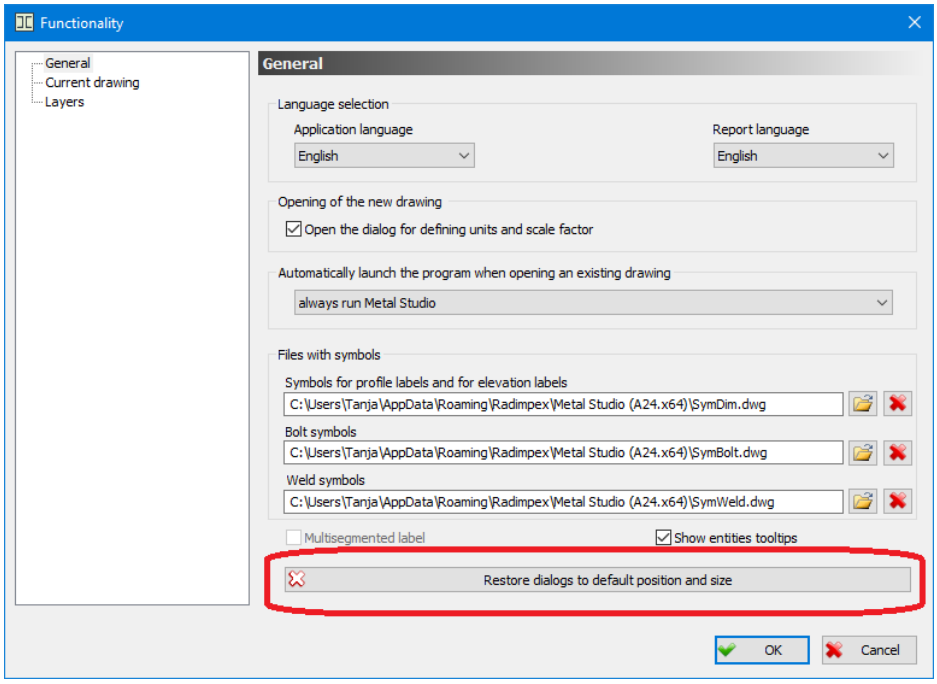
List for defining the behavior of the program when opening a drawing

Choose one of the following options from the closed list:

do not start Metal Studio - the program will not start when loading drawings.
always run Metal Studio - the program starts when loading a drawing. This is the default behavior.
ask about starting Metal Studio - when this option is selected, Metal Studio asks the user whether to start it every time an existing drawing is opened.



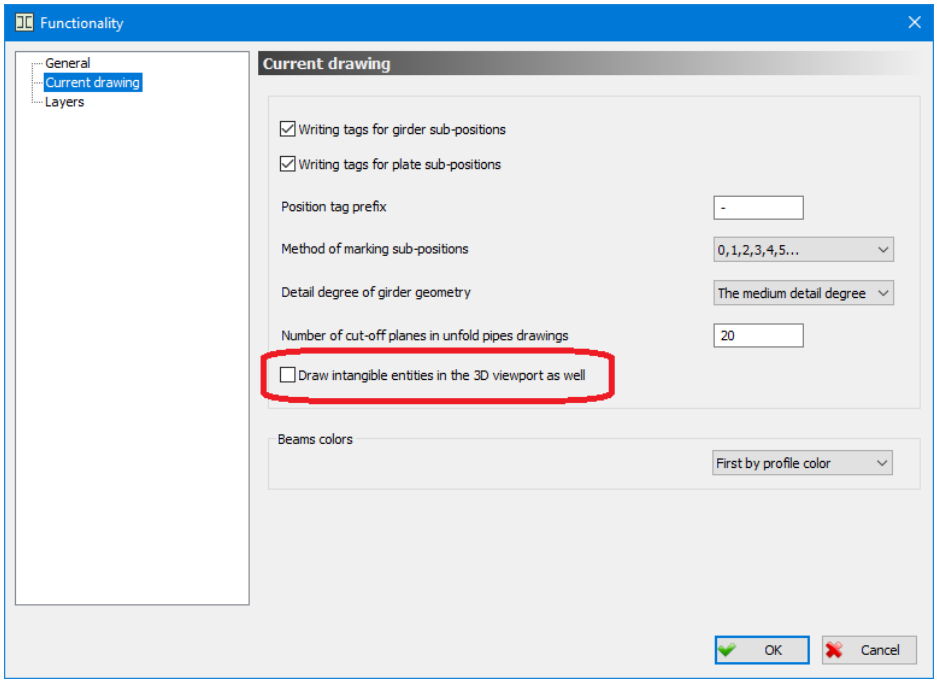
Restore dialogs to default position and size
Most dialogs in Metal Studio can be resized and positioned on the screen. In order to change the size of the dialog, it is first necessary to place the mouse pointer over one of its edges or over a corner, so that it takes the shape of an arrow that shows the possible stretching directions. After that, press the left mouse button and drag the selected page/corner to the new desired position. Changing the size and position of the dialog is remembered and used every time it is opened. Clicking on this button returns all dialogs in the program to their default position and size.



A button to restore the dialog to its default position and size

Current drawing

Draw intangible entities in the 3D viewport as well
When this check box is disabled, only material instances of girders and plates are drawn in the 3D view. When the check box is turned on, in addition to the material entities, all intengible entities placed using the Metal Studio program are drawn, such as for example: girder in cross-section, plate in cross-section, workshop drawings of girders and plates, cross-section symbols, elevations, welds, ...



Check box 'Draw intangible entities in 3D viewport as well'

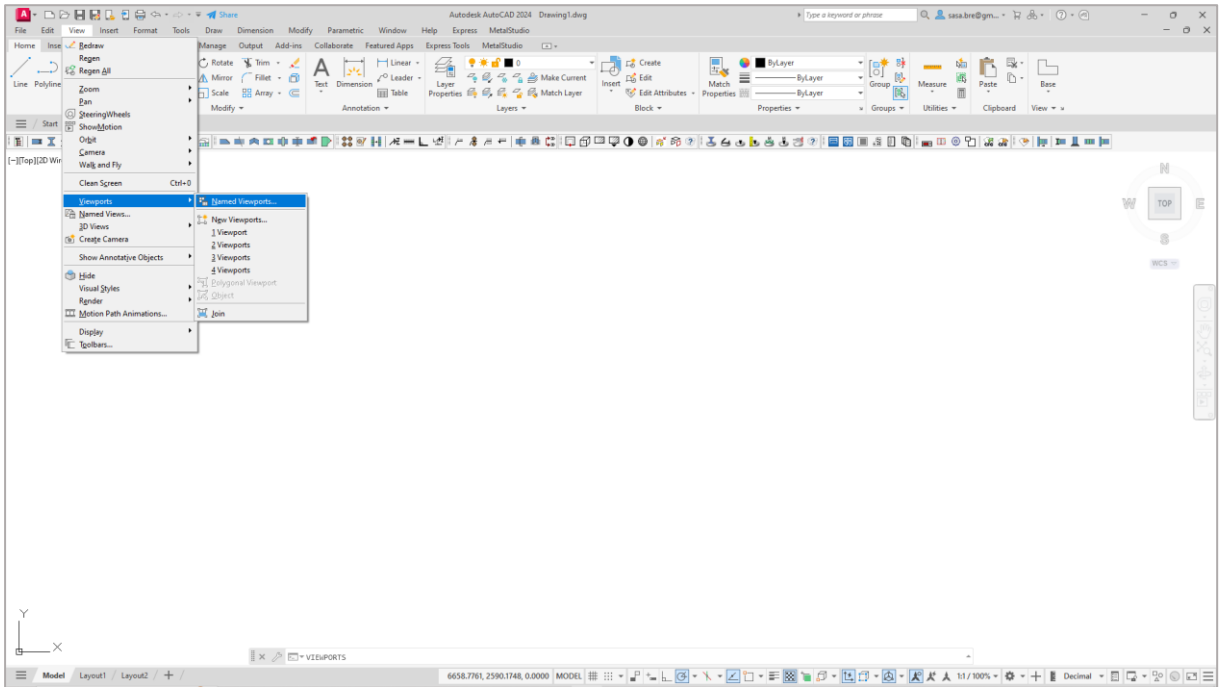
Beams colors

First by entity color - if this option is selected from the list, the girders are drawn with the color specified in the 'Entity Layout' command.
First by profile color - if this option is selected from the list, the girders are drawn with the color specified in the command 'Setting profiles color'.

16. 3D MODELING - VIEWPORTS AND VIEWS

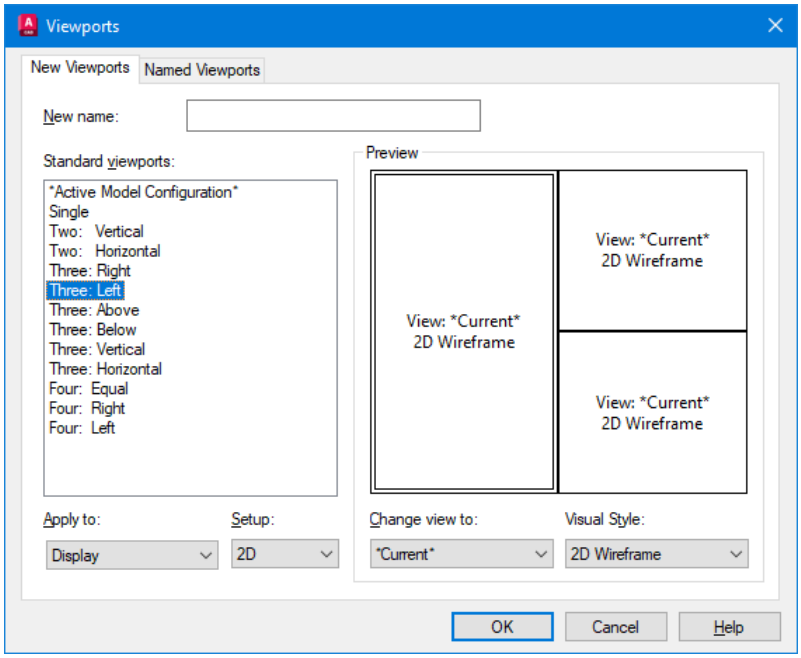
16.1 Assigning Viewports (AutoCAD's Viewports command)

Viewports in AutoCAD can be specified in several ways. The first is when the 'Viewports' item is selected from the 'View' drop-down menu, and then the 'Named Viewports... ' item is selected from the new menu.



Selecting the 'Named Viewports... ' command from the 'View' drop-down menu

Running the command opens a dialog that looks like this:



New Name – assigning a name to the new view configuration. If no name is given the viewport configuration will be applied but not saved.

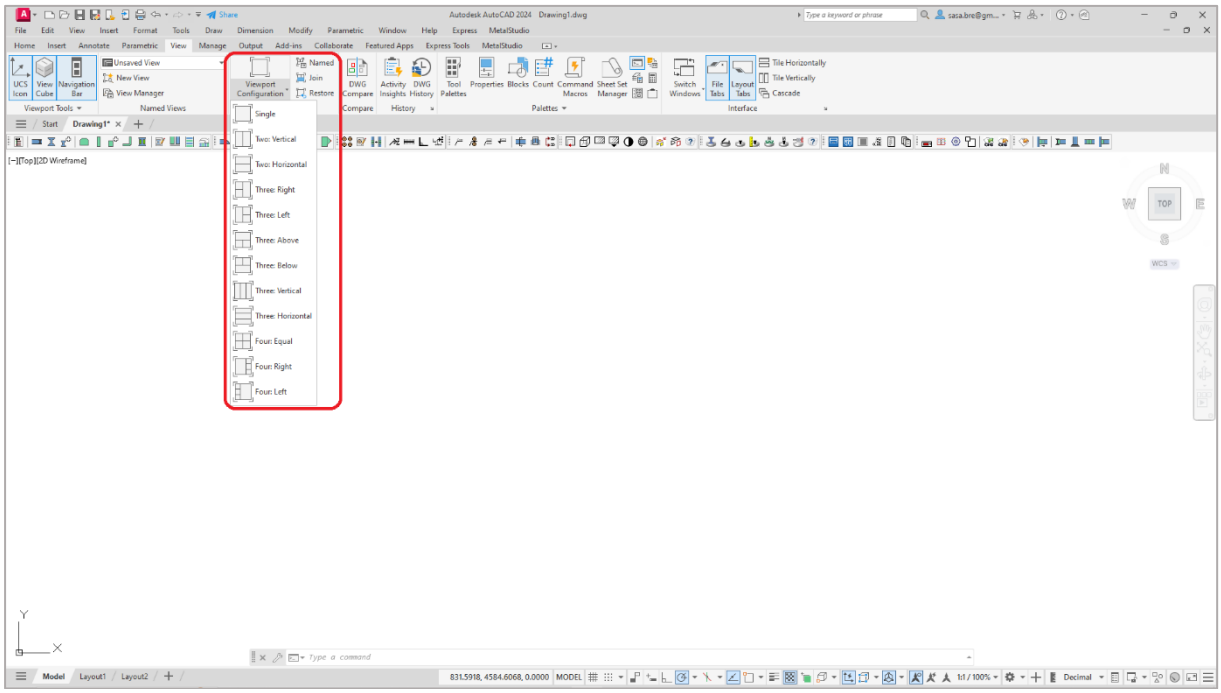
Standard Viewports - a list from which one can choose one of the offered standard viewport configurations.

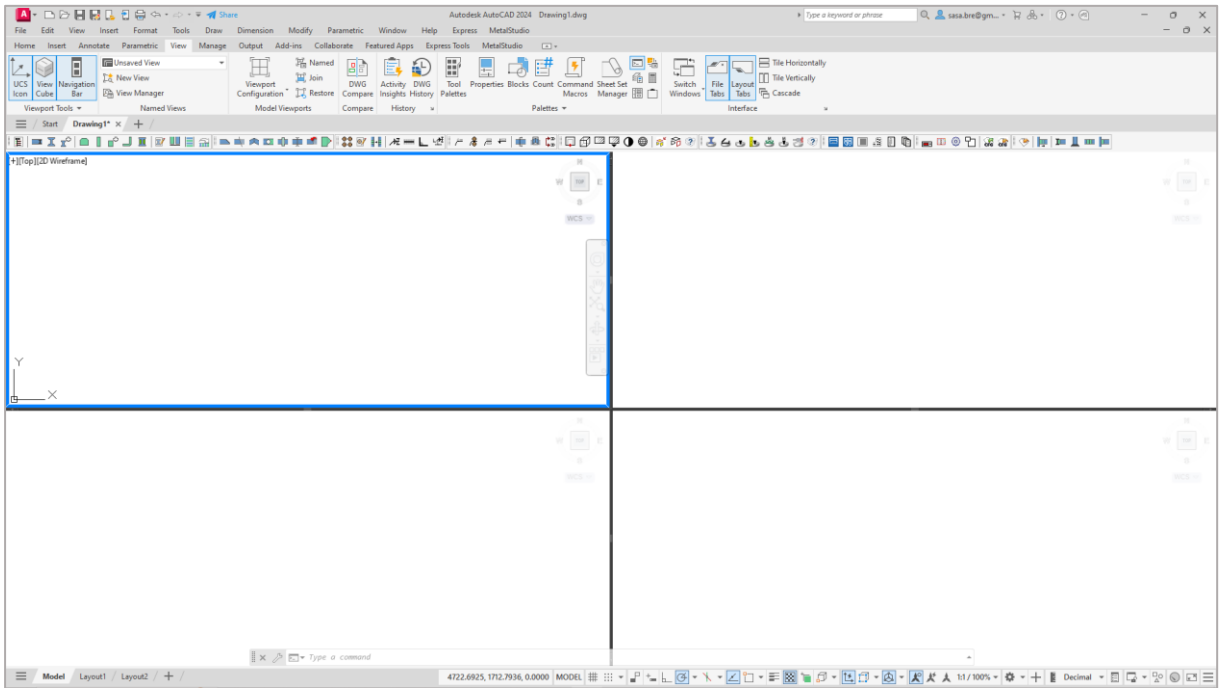
Preview – part of the dialog in which the layout of views from the selected configuration is displayed.

To work in the Metal Studio program, it is enough to select one of the standard configurations and exit the dialog. Other important parameters for each of the views will be defined using the 'Create and edit views' command.

Some of the offered standard viewport configurations can be selected directly from the 'Viewports' menu, without opening a dialog.

Also all these commands are available through the 'View' panel:

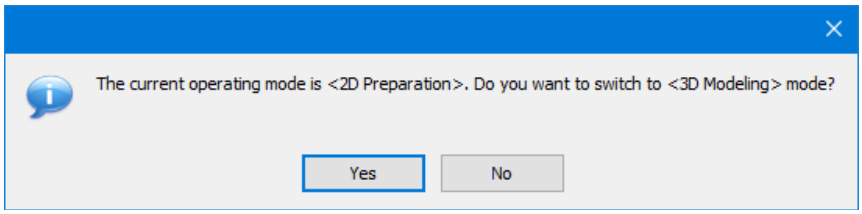




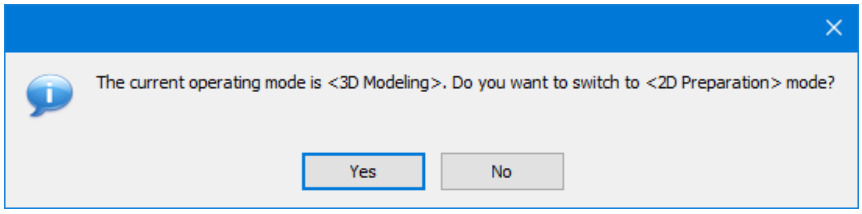
A configuration with four viewports of the same size was chosen

16.2 Change of operating mode: 3D Modeling <--> 2D Preparation

Using the command '**Change operating mode**', the operating mode of the program 'Metal Studio' can be changed at any time. Selecting it from the 'Metal Studio' drop-down menu or clicking on the icon will open a dialog with the corresponding question. If the current mode is '2D Preparation', the following dialog will open:



Clicking the 'Yes' button will switch to the '3D Modeling' mode. And if the current operating mode is '3D Modelling', a dialog will open with the following appearance:

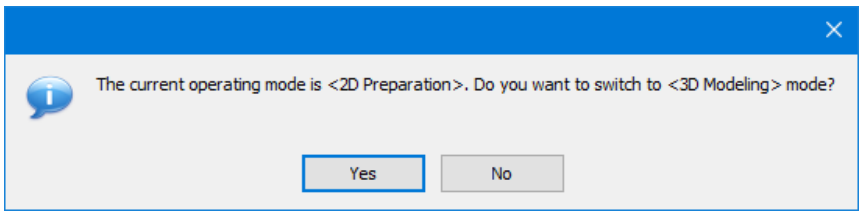


Clicking the '**Yes**' button will switch to the '2D Preparation' operating mode.

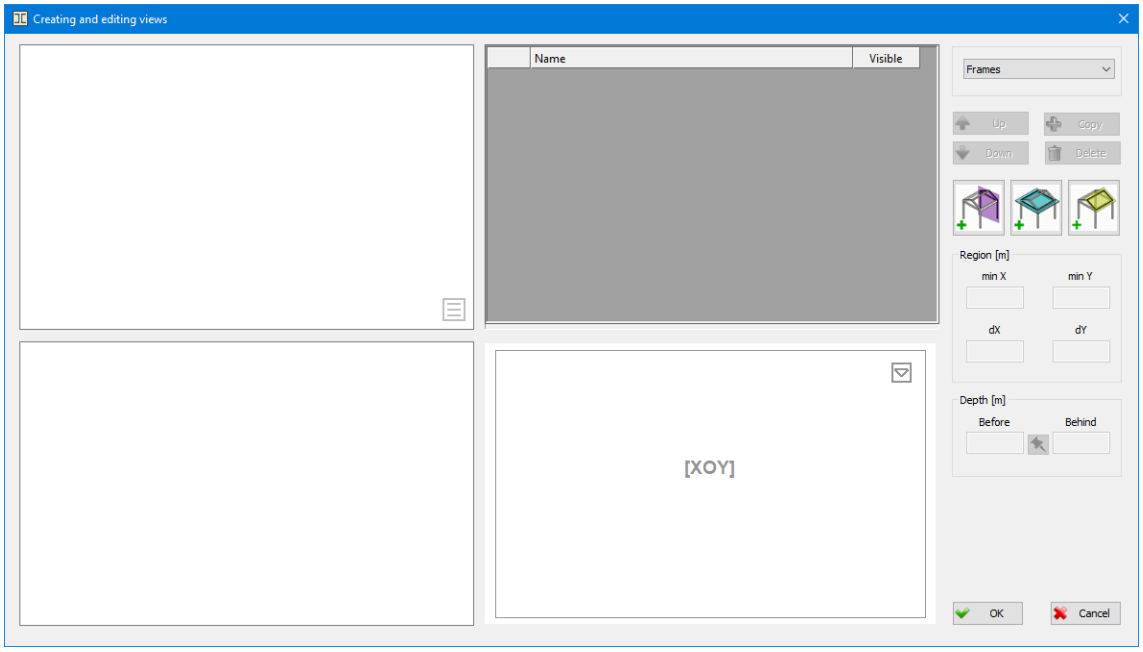
16.3 Creating and editing views

By selecting the command '**Creating and editing views**' from the '**Metal Studio**' drop-down menu or by selecting the icon , a dialog opens in which it is possible to define '2D views' and place them in viewports.

In case you are in the mode of the 2D preparation program, in which it is not allowed to define views, the program will first show the appropriate message:

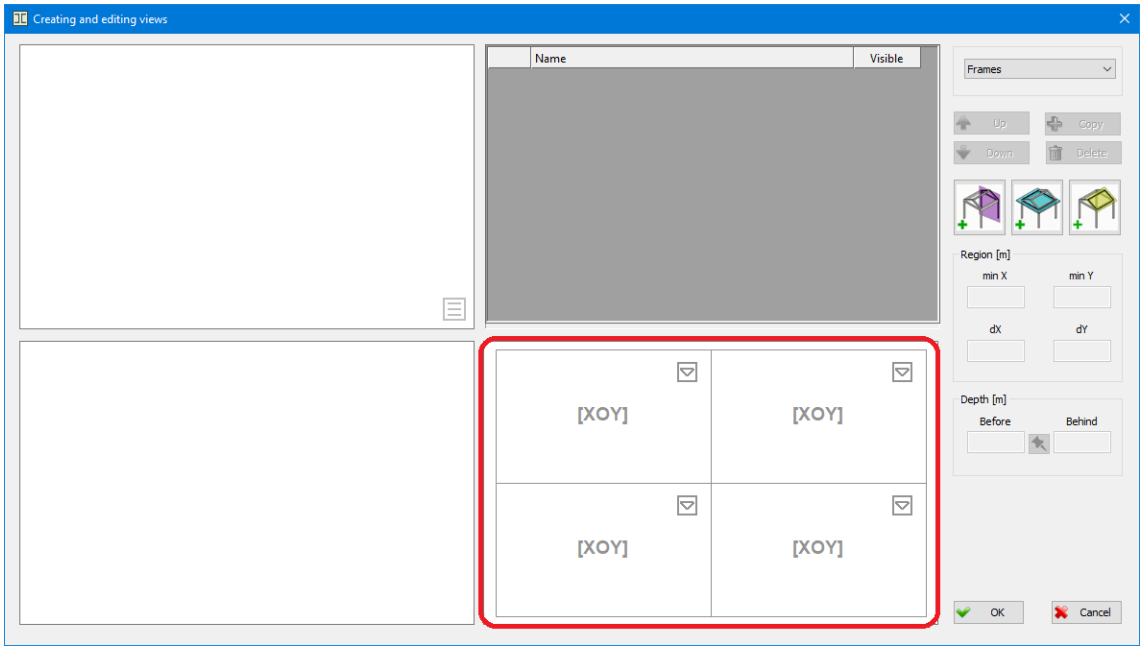


By selecting the '**Yes**' button, the program will switch to 3D modeling mode and open a dialog for creating and editing views:



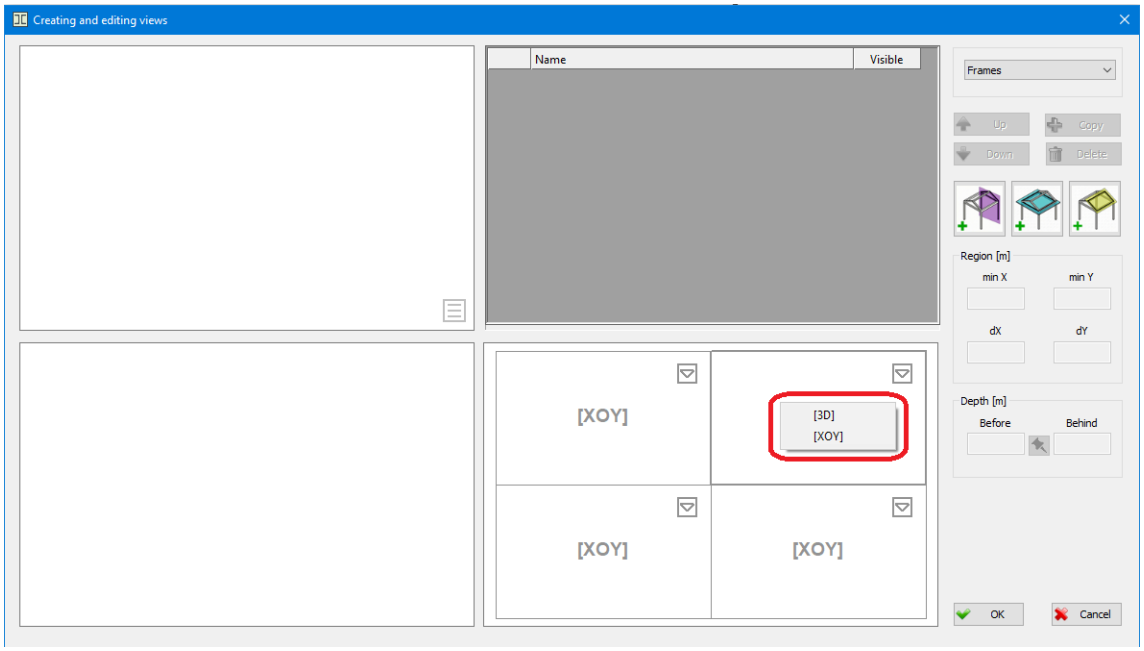
Dialog layout for creating and editing views

In the Metal Studio program, you can work with more than one view. Different assemblies can be displayed in them at the same time: frames, levels and oblique views. This feature of the program significantly facilitates the selection of points when drawing the model and provides greater visibility to different parts of the structure. In the lower part of the dialog, there is a space reserved for the display of the screen layout, i.e. the view layout, which the user previously defined.



AutoCAD defaults to four viewports, the layout of which is shown in the dialog

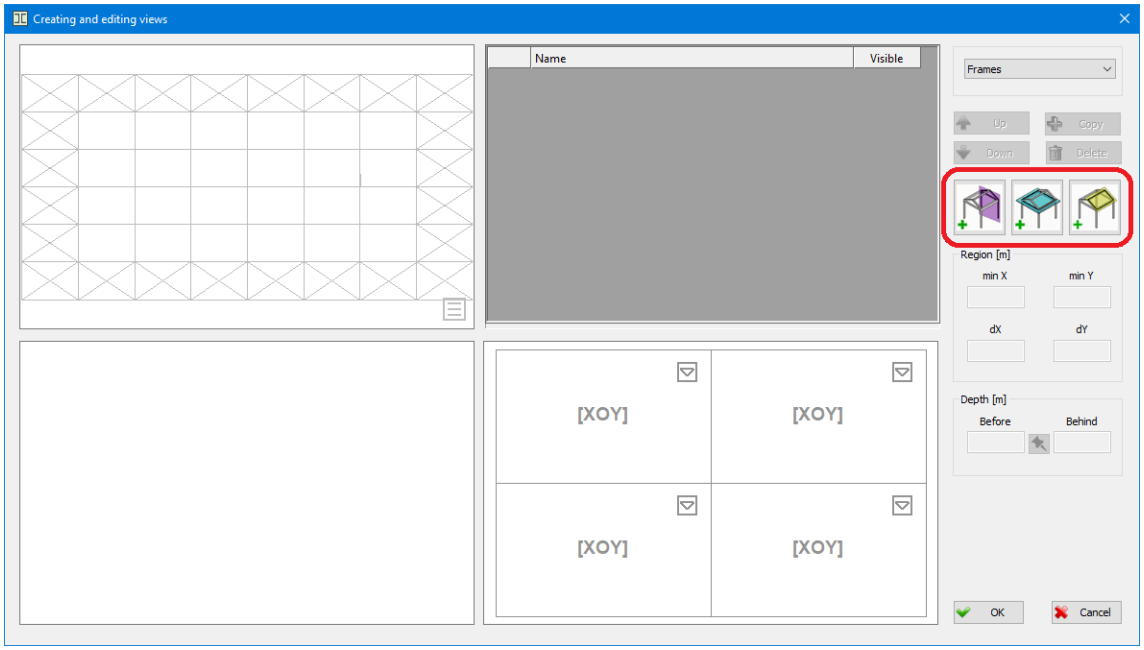
The user can assign the desired view to each of the viewports. Upon right-clicking the mouse over the field in which the given viewport is displayed, a menu appears from which the user can choose one of the previously defined viewports, as well as two programmatically defined viewports: '**3D**' and the canonical '**XOY**'. In case the user has not created '2D views', only '3D' and canonical 'XOY' views will be found in the menu.



A view selection drop-down menu, which is assigned to the selected viewport

Creating '2D viewport'

The program allows the creation of '2D view', located in vertical, horizontal or oblique planes using one of the three buttons, located in the upper right part of the dialog:

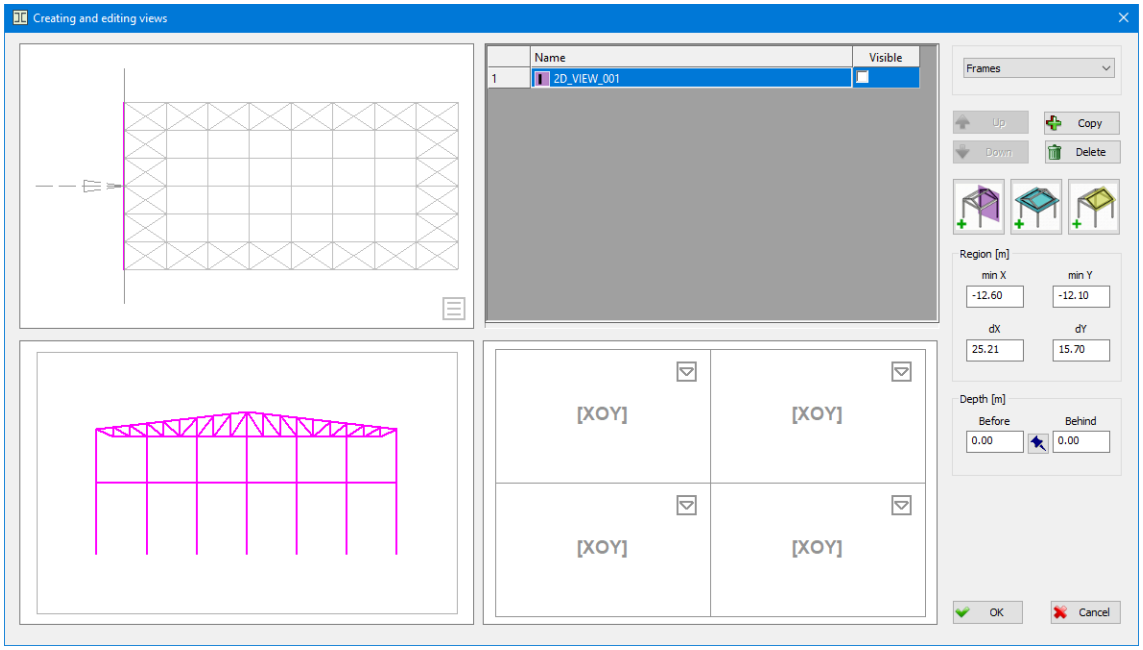


Command fields for creating '2D view'

With the command '**New frame**' you have the possibility to define a completely arbitrary position of the new frame. After activating the button, the program closes the dialog, and the command line takes the following form:

Select the lines [Exit]:

This message will remain on the command line until you complete the line selection procedure by selecting the 'Exit' sub-option or right-clicking the mouse, after which the dialog will open again. The user is expected to select AutoCAD lines or girders drawn in the Metal Studio program on the drawing in one of the views, whose position will determine the vertical plane, that is, the frame. As each of the frames in the drawing can be represented by only one segment, if more lines or girders are selected, the program will create the same number of new frames. Each of the created frames will be associated with a programmatically assigned name that will be displayed in the dialog. After selecting lines or girders, the program returns to the dialog for creating and editing views:



A new frame '2D_VIEW_001' has been inserted into the list

In the central part of the dialog, a list of '2D views', created by the user, is displayed.

Name Column named '2D views'. When creating views, the program automatically generates their names, which the user can subsequently modify.

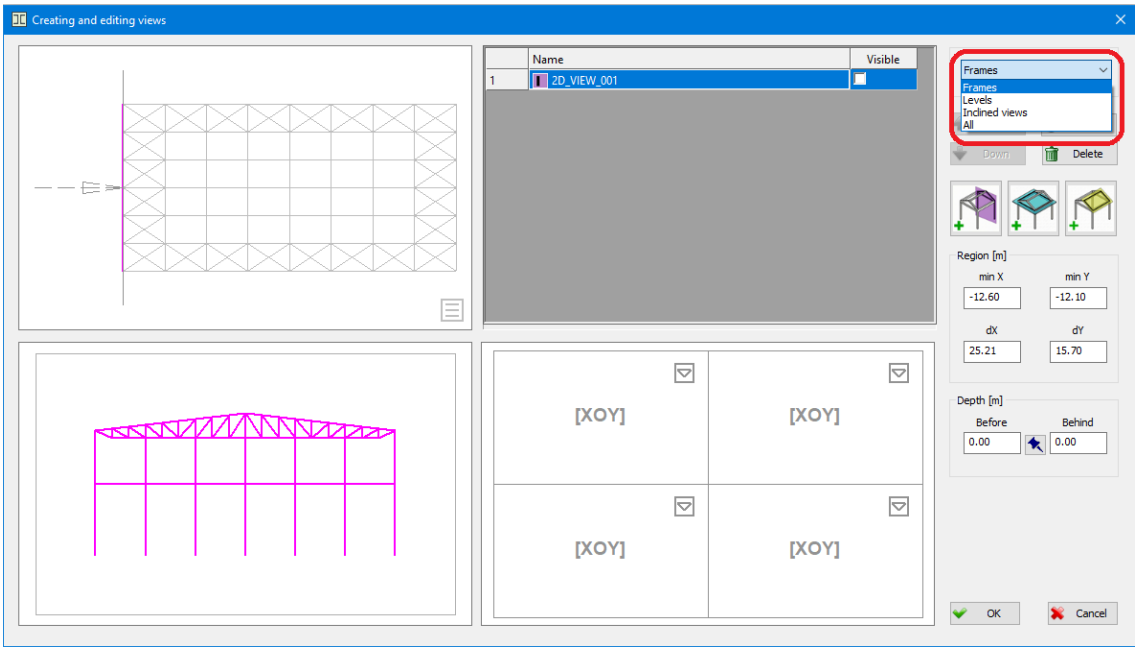
Visible Column with check boxes. By setting the check box to the on state, in the window to the left of the list of views, in addition to the entity, the plane of the selected '2D view' will be drawn. By right-clicking on the column name, a drop-down menu with options appears:

- **Turn all on** A button which, when activated, includes all check boxes in the list.
- **Turn all off** Button, when activated, turns off all check boxes in the list.
- **Turn on selected** Button, when activated, the check boxes of the selected views in the list are included.
- **Turn off selected** Button, when activated, the check boxes of the selected views in the list are turned off.

If you want to make a copy of the currently selected view, you need to activate the button '**Copy**'. Deleting the selected view from the list is done by selecting the button '**Delete**'. Using the commands '**Up**' i '**Down**' you have the option to change the order of the views in the

list. Namely, selecting one of these command fields moves the currently selected view in the list one place up or down.

Given that the list can contain a large number of '2D views', for better visibility, the user is enabled to choose from the closed list, set only one of the offered types of views: '**Frames**', '**Levels**', '**Inclined views**' or '**All**'.



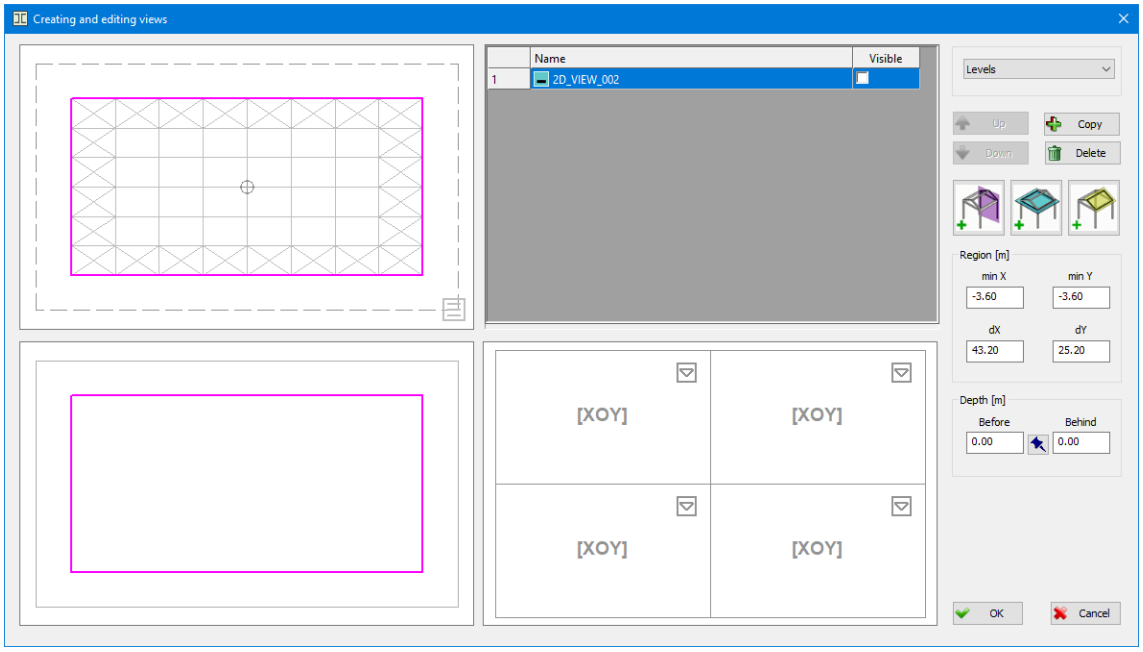
List from which to select the type of view to display in the table

If the type of view 'Frames' is selected, the table will display all '2D views' located in vertical planes, if 'Levels' is selected, all '2D views' located in horizontal planes will be displayed, and selecting 'Inclined view' will display all '2D views' located in arbitrary inclined planes. If you want to display all previously created views in the table, select '**All**' from the list.

Using the '**New Level**' command, the position of the horizontal plane is defined, whose position in space is determined by the global Z coordinate. After activating this command field, the program closes the dialog and from the command line requires the user to enter a point by specifying the coordinates from the keyboard or to select a point from the drawing where he wants to set the level:

Point:

After setting the point, the dialog will be opened again, and a level will be added to the list, which is associated with the name given by the program:



A new level '2D_VIEW_002' has been inserted into the list

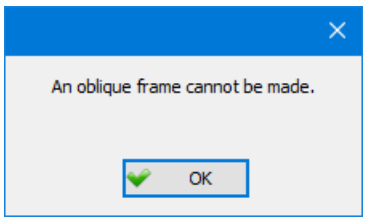
Selecting the '**New oblique view**' command enters the procedure of defining a completely arbitrary view plane.

Three points [Selecting girder or plate]:

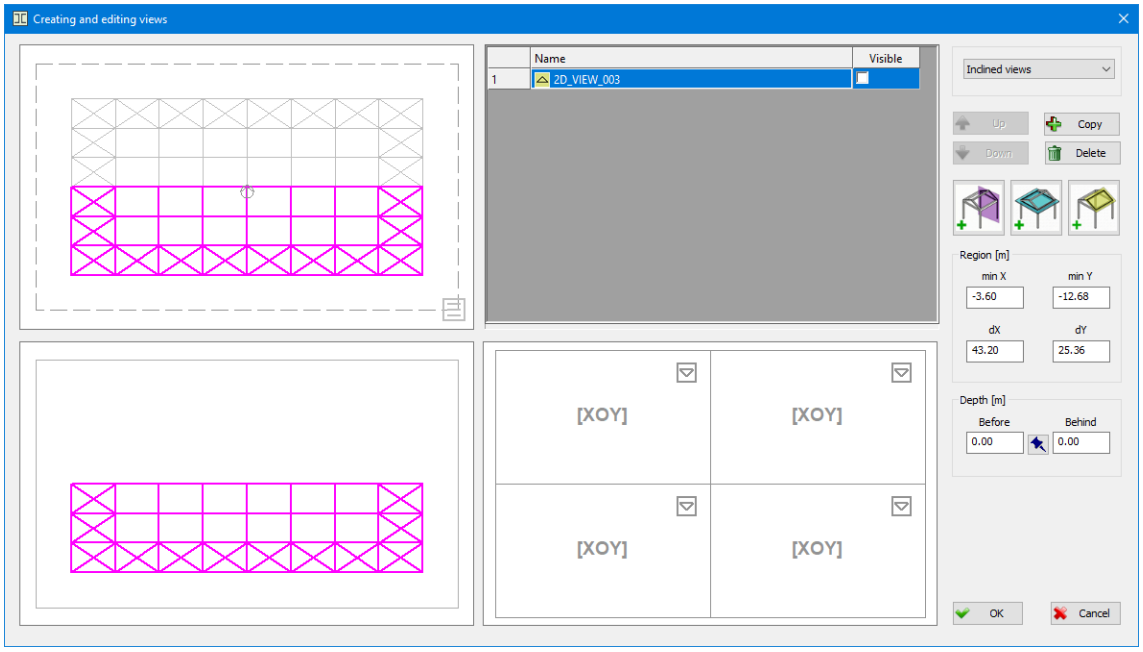
The program from the command line requires you to select the first point that defines the desired plane, and by selecting the sub-option 'Selection of girder or plate' you can enter the procedure of defining the view plane by selecting an existing entity, which can determine the position of the given plane.

Selecting girder or plate [Exit]:

So, the program provides two ways to define the desired plane. The first is by selecting three non-collinear points, and the second is by selecting an existing entity. In the event that you select points and entities in such a way that the plane containing the selected entity or points cannot be created, the program will issue a corresponding warning:



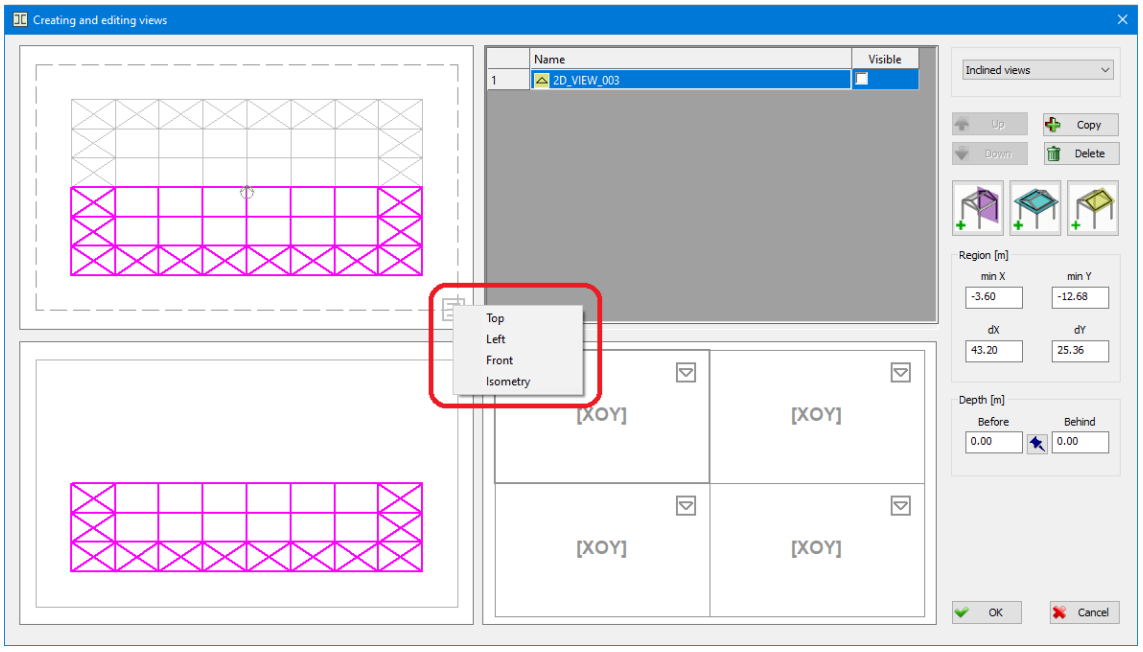
When the program determines that a sufficient number of elements that define a plane have been entered, the dialog will be opened again, and an oblique view will be added to the list, to which the name assigned by the program is attached:



A new oblique view '2D_VIEW_003' has been inserted into the list

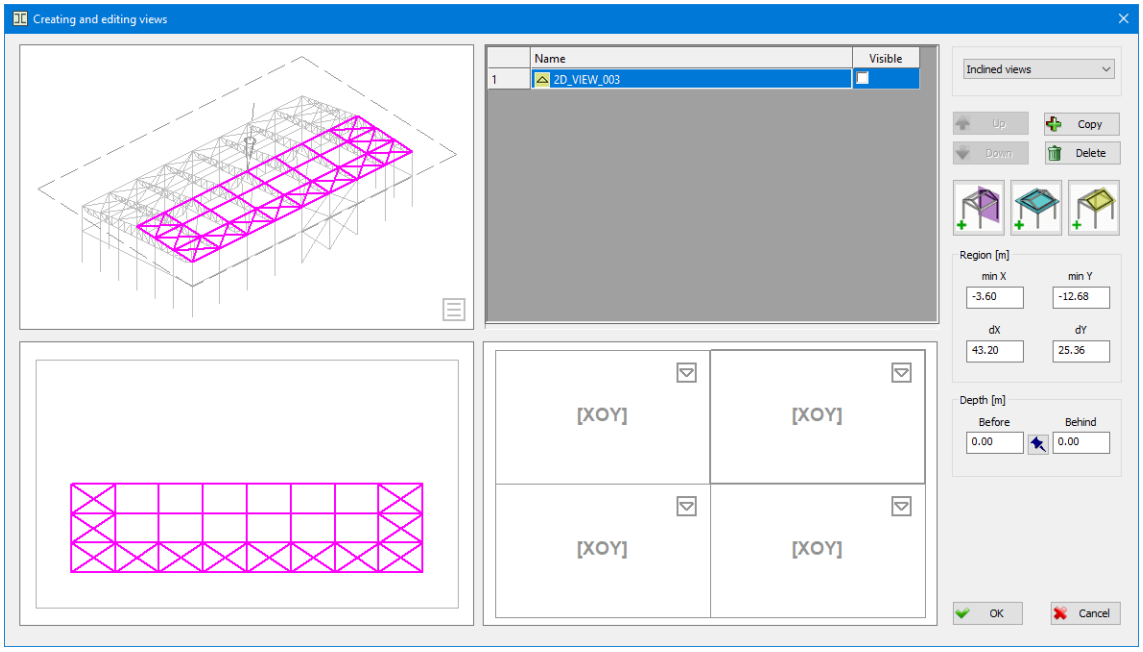
In the upper left part of the dialog, there is a window that is reserved for the schematic representation of the geometry of the positions of the rods and sheets that are in the drawing. Entities belonging to the currently selected '2D view' in the list are drawn with their parameters, while other construction elements are drawn in gray. In this way, the current '2D view' is visually separated from the rest of the spatial model.

Right click on the icon '  ' in the lower right corner opens a menu to set the default view.



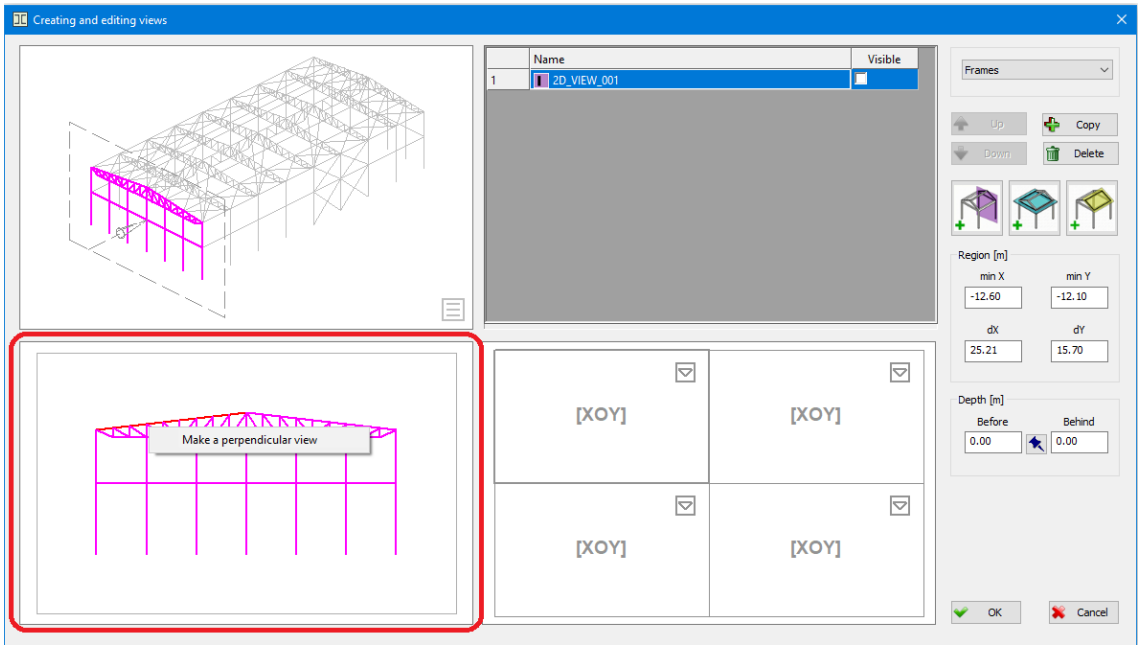
Drop down menu to choose a view

By selecting one of the views 'Top', 'Left' or 'Front', a view of the geometry of the positions from different sides is enabled, while by selecting the view 'Isometry', an isometric view is enabled.



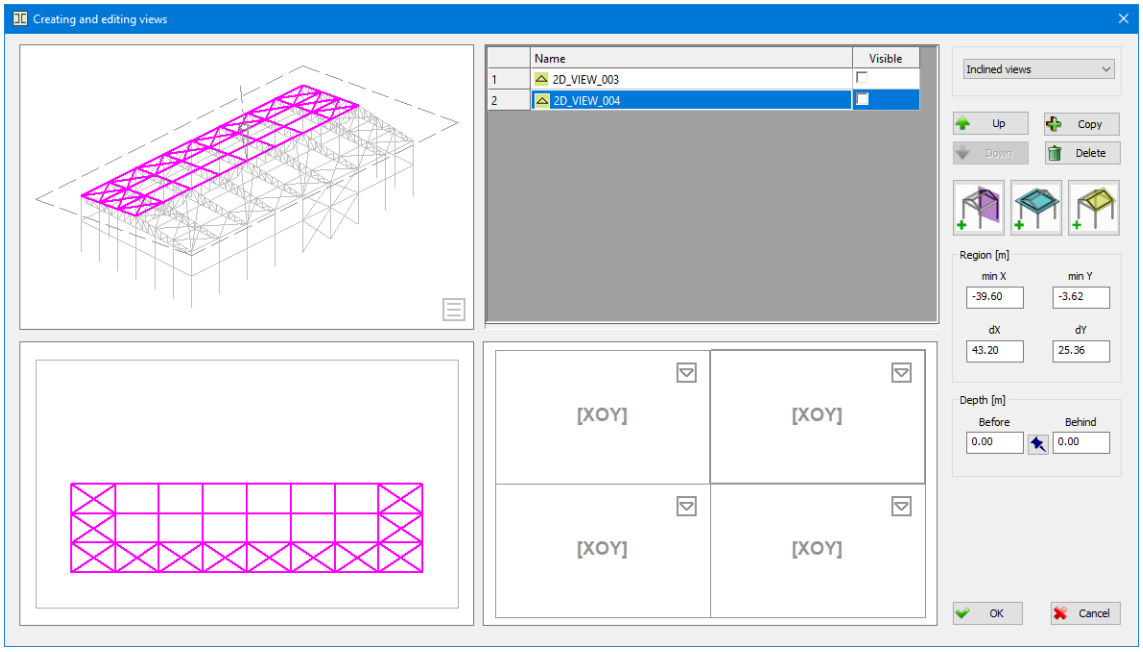
An isometric view is placed in the left window

Assigning a '2D view' can also be done directly from the view creation and editing dialog. First, it is necessary to select a girder in the lower left window by clicking the mouse, which, in addition to the currently selected '2D view' in the list, also belongs to the view that you want to assign. The selected girder will be specially marked on the drawing in the dialog. After that, from the menu that opens with the right click of the mouse, you should select the command 'Make a perpendicular view'.



Command to make a perpendicular view from the currently selected girder

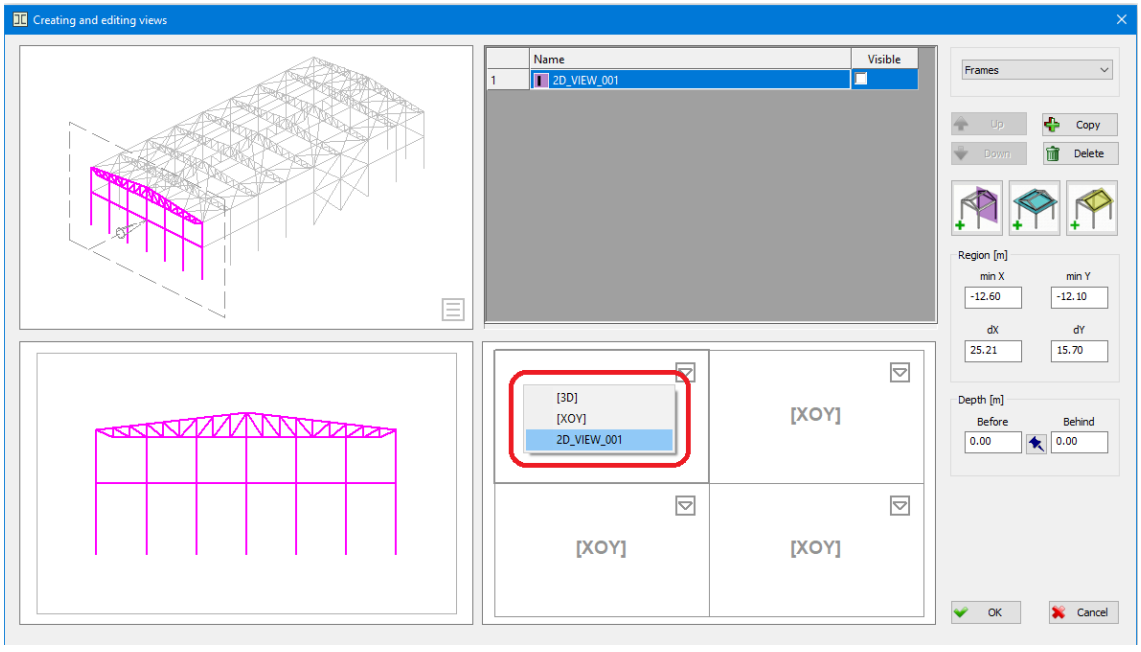
Selecting the 'Make a perpendicular view' command will create a new view, which will be displayed in the dialog:



A new oblique view '2D_VIEW_004' has been inserted into the list

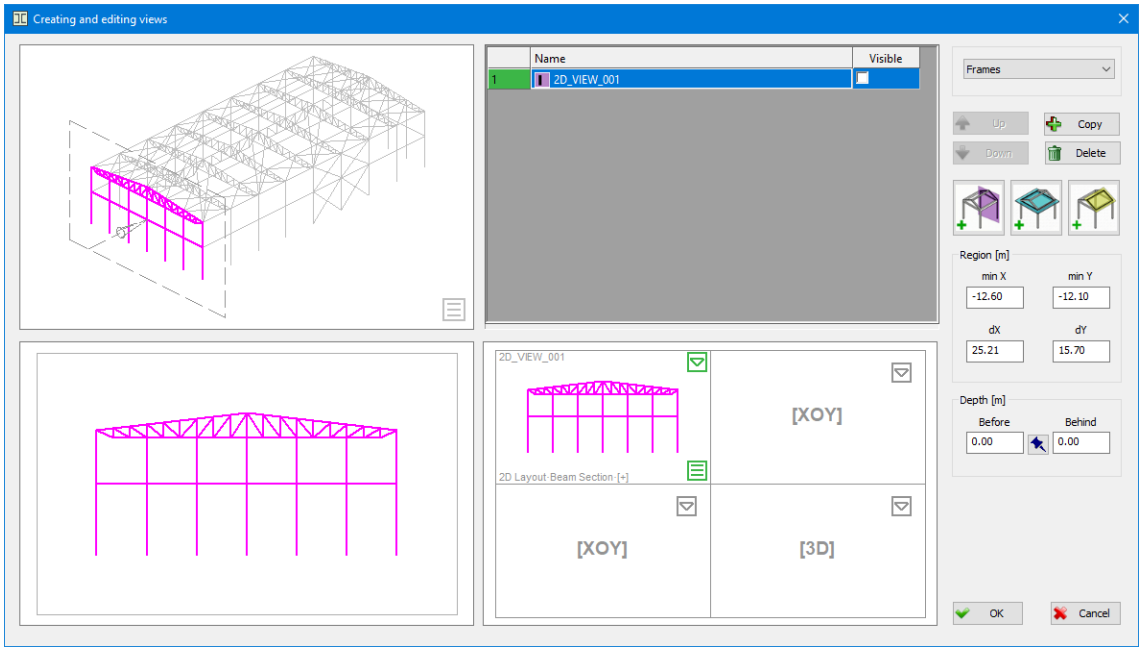
Placing the created '2D views' in viewports

We have already said before that all created '2D views' can be placed in viewports. First, in the list of views for the current one, select the '2D view' that you want to place in the viewport, and then from the menu that opens when you right-click on the currently selected viewport, select the given view.



The currently selected '2D view' is in the drop-down menu

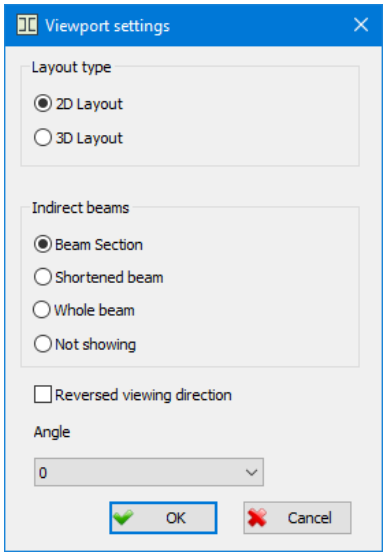
After selecting '2D view' from the drop-down menu, the given viewport will be placed in the selected view, and the cell with the ordinal number of the view in the list and the icons in the viewport will be specially marked:



Frame '2D_VIEW_001' is placed in the upper left viewport

In the upper left corner of the window in which the viewport is displayed, the name of the set viewport is printed, while at the bottom, information about the viewport setting is displayed: the type of view, the way indirect elements are displayed, as well as the viewing direction.

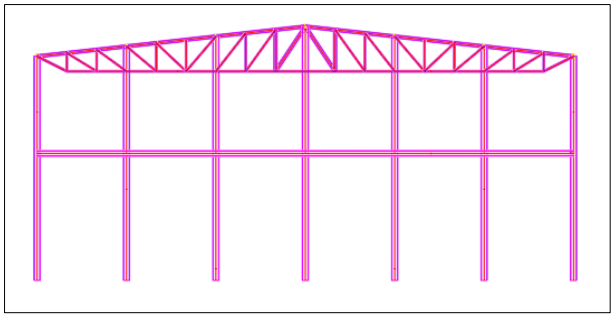
By clicking the icon '', a dialog opens in which the viewport setting is made:



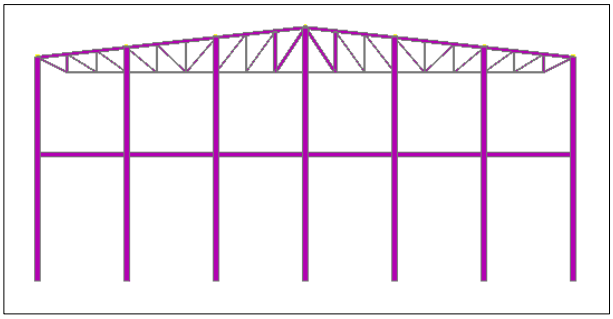
Viewport settings dialog

2D Layout The on state of the switch indicates that beam and plate instances in the viewport will be rendered as intangible.

3D Layout The on state of the switch indicates that beam and plate instances in the viewport will be rendered as material.



Display of beams when '2D Layout' is on

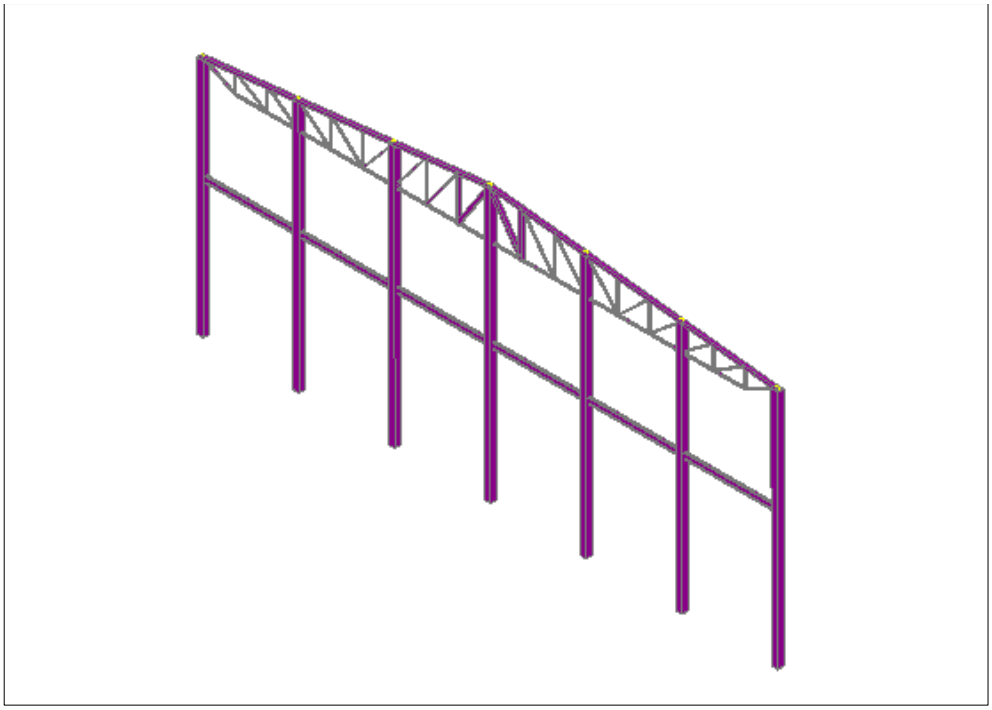


Display of beams when '3D Layout' is on

In the 'Indirect beams' section of the dialog, the way to display indirect beams in the viewport is determined:

Beam section

The on state of the switch indicates that instances of indirect beams will be rendered as intangible beam sections.

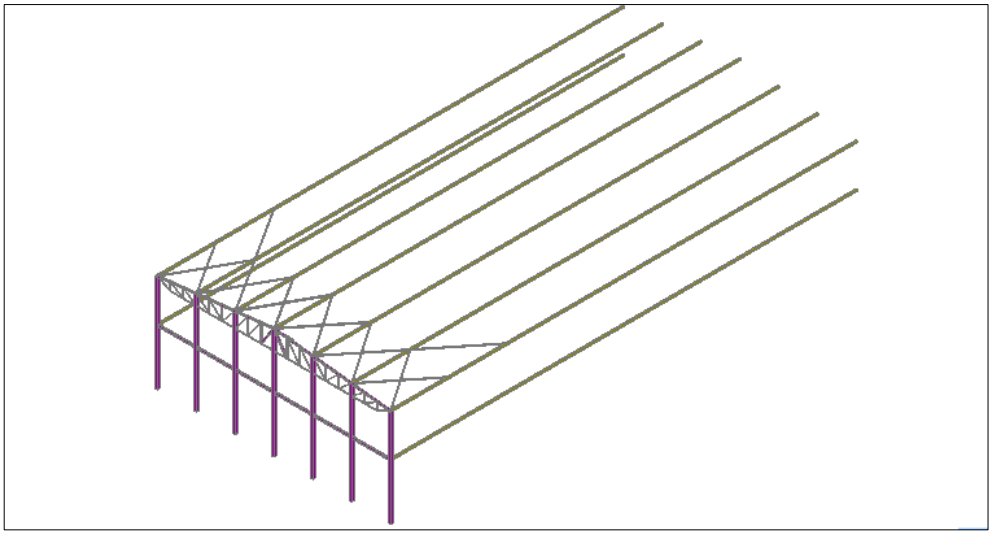


Shortened beam

The on state of the switch indicates that material instances of indirect beams will be rendered as material beams with a length truncated by the given depth of viewport.

Whole beam

The on state of the switch indicates that instances of indirect beams will be rendered as beams at their full length.

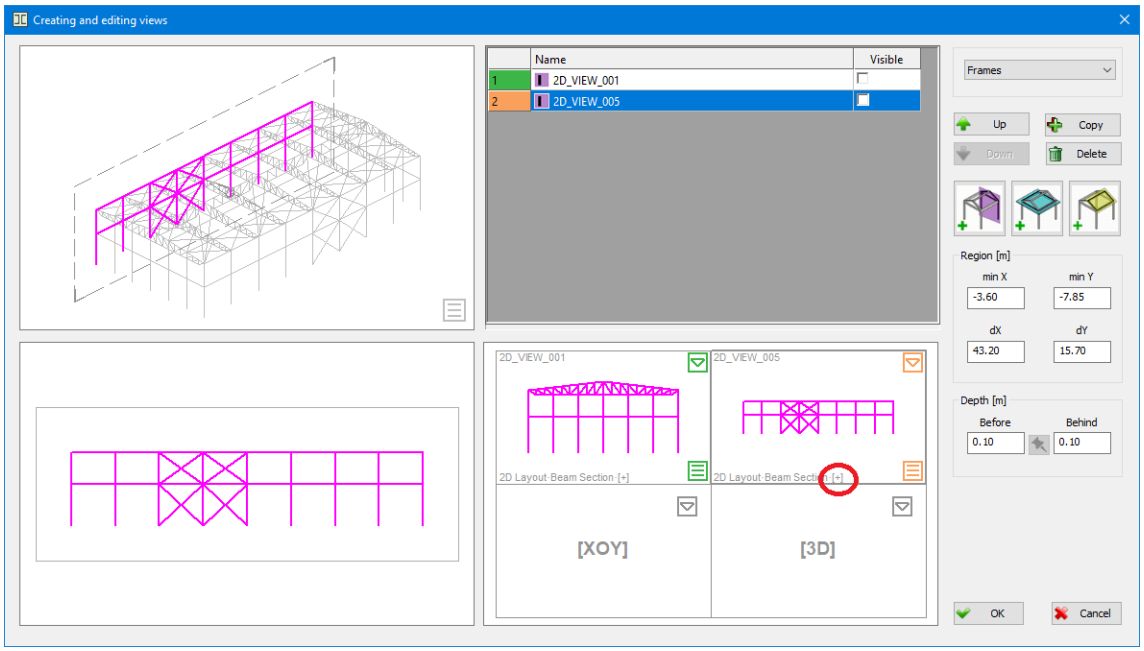


Not showing

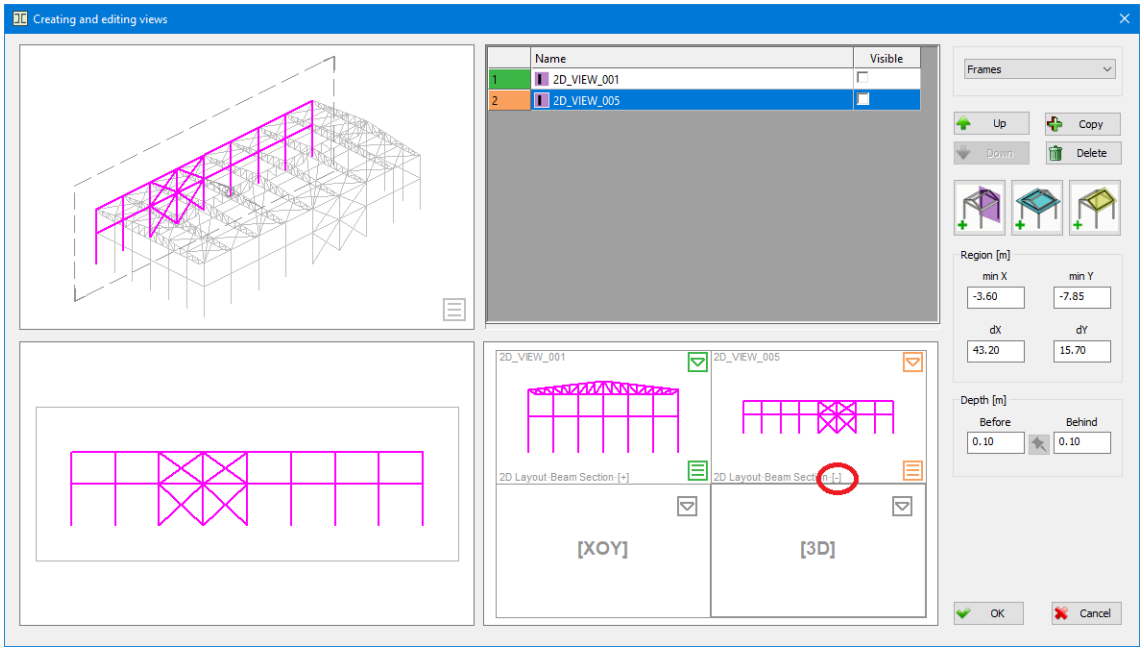
The on state of the switch indicates that material instances of indirect beams will not be displayed.

Reversed viewing direction

By means of the check box '**Reversed viewing direction**', the user is enabled to adjust the viewing direction of the viewport.

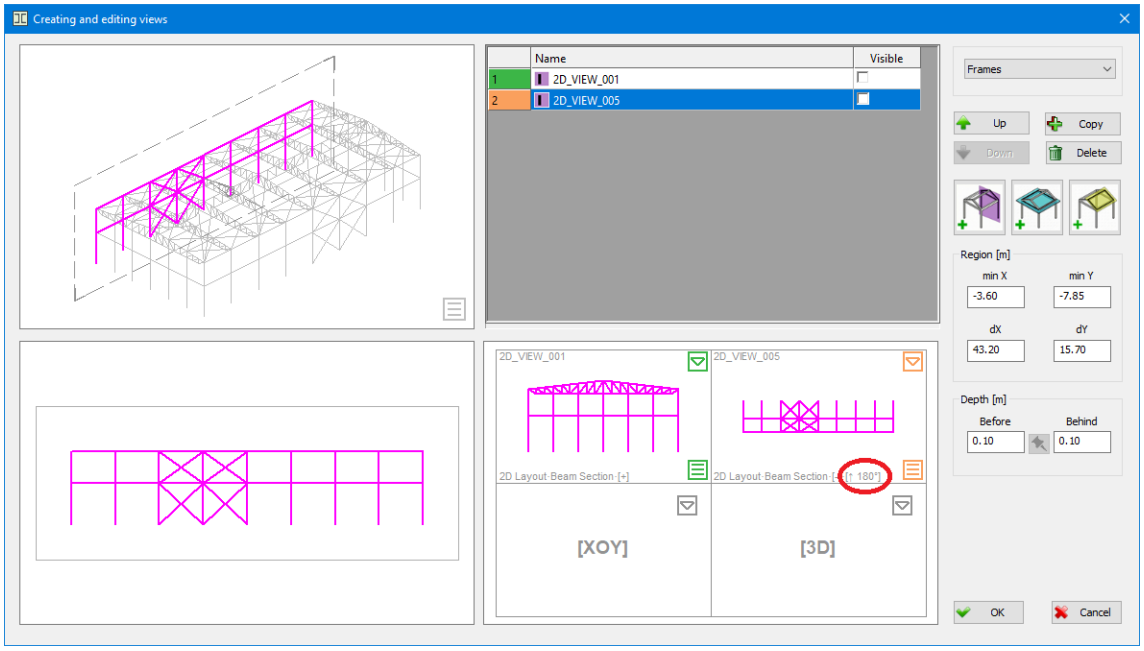


A label indicating that the 'Reverse viewing direction' check box is off



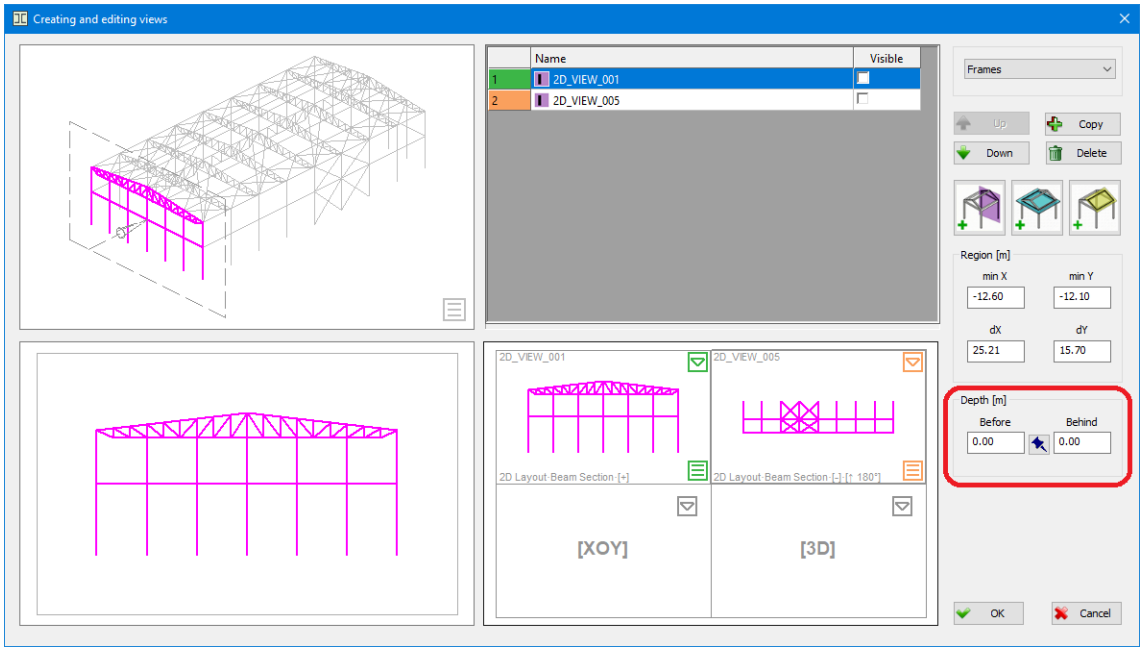
A label indicating that the viewing direction has been changed

Angle A closed list from which to choose one of the four offered angles for which the '2D view' will be rotated in the viewport.



The '2D view' is given a rotation angle of 180°

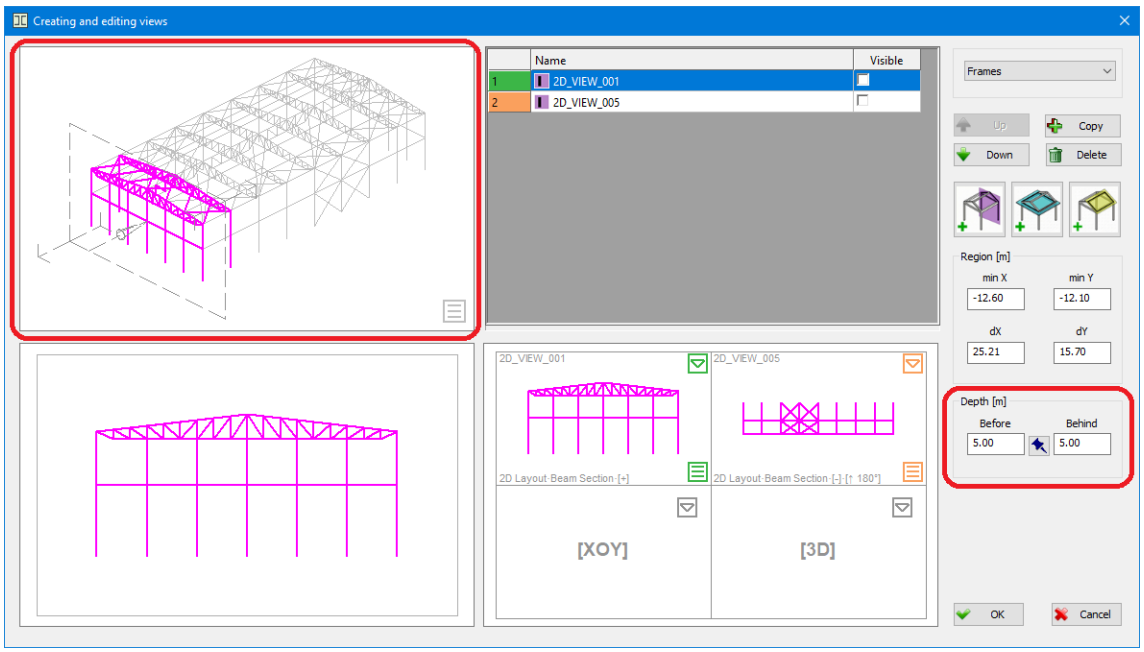
In the Metal Studio program, it is possible to set the depth of viewport, so that it will display only entities that enter the space defined by the user by setting values in the corresponding edit boxes.



Edit boxes for setting the depth of viewport

Before Edit box in which the value of the depth of view from the front is entered.

Behind Edit box in which the value of the depth of view from the back is entered.

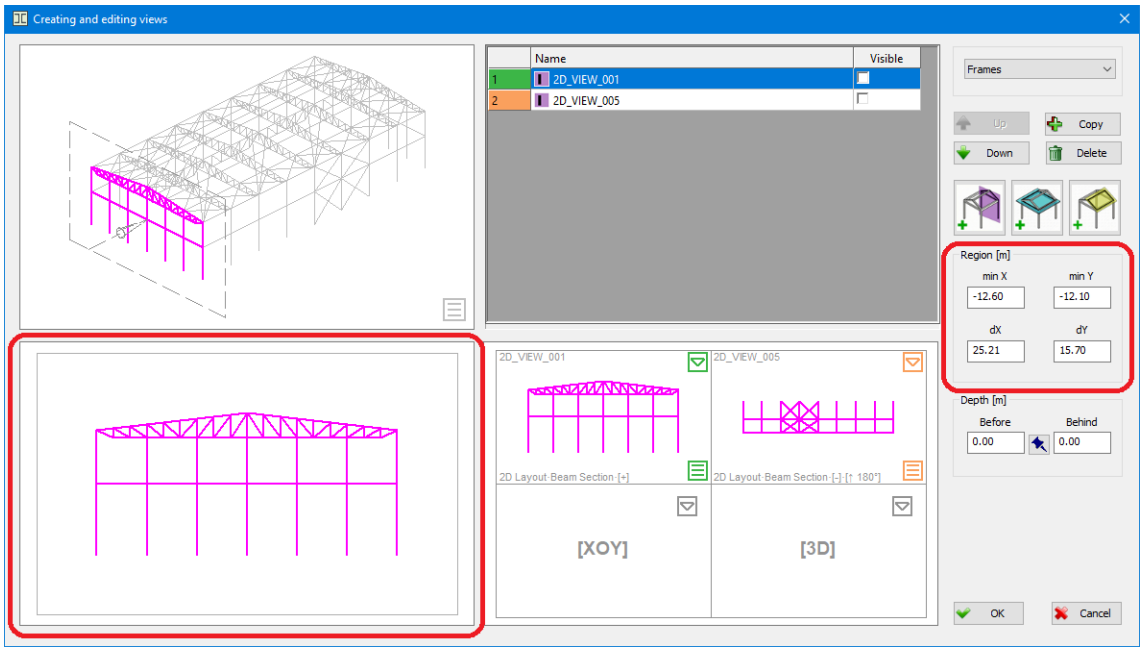


By setting the depth, all entities that enter the defined space will be displayed in the viewport

Please note that it is not possible to make adjustments to viewports, which have been assigned programmatically defined views ‘3D’ and canonical ‘XOY’.

Specifying the region of viewport

In the 'Region' part of the dialog, users are enabled to change the viewport region, which is represented by a gray rectangle in the dialog, by setting values in the corresponding edit boxes:



A window reserved for displaying the given region of viewport

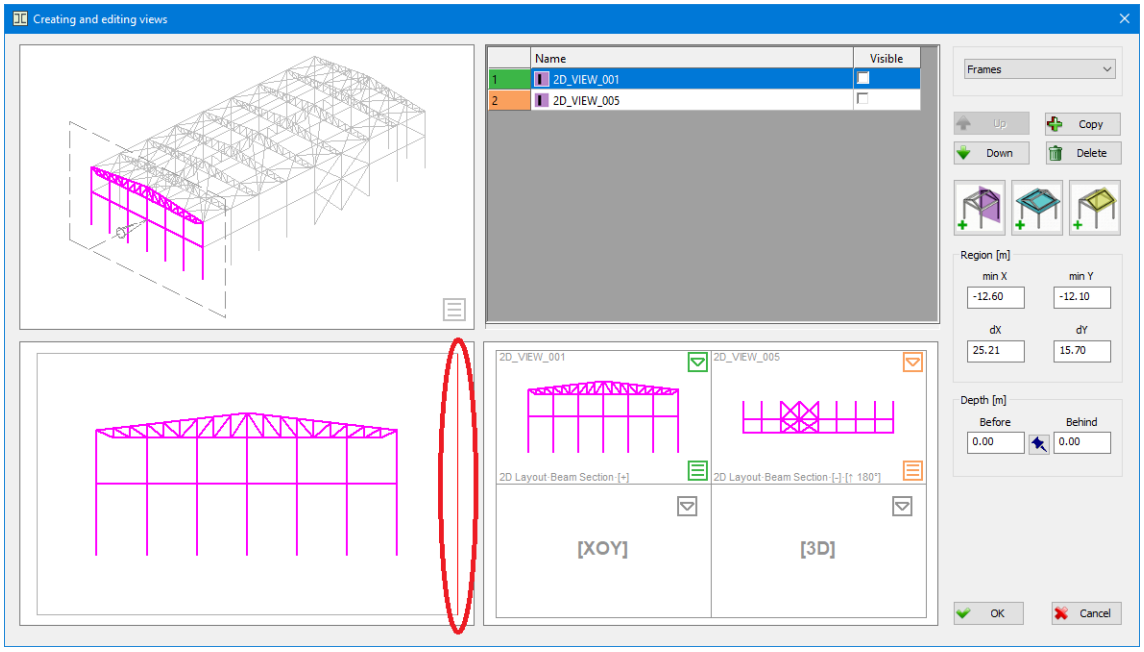
min X Edit box for entering the value of at minimum X coordinate of the region of viewport.

min Y Edit box for entering the value of the minimum Y coordinate of the region of viewport.

dX Edit box for entering the length of the region of viewport.

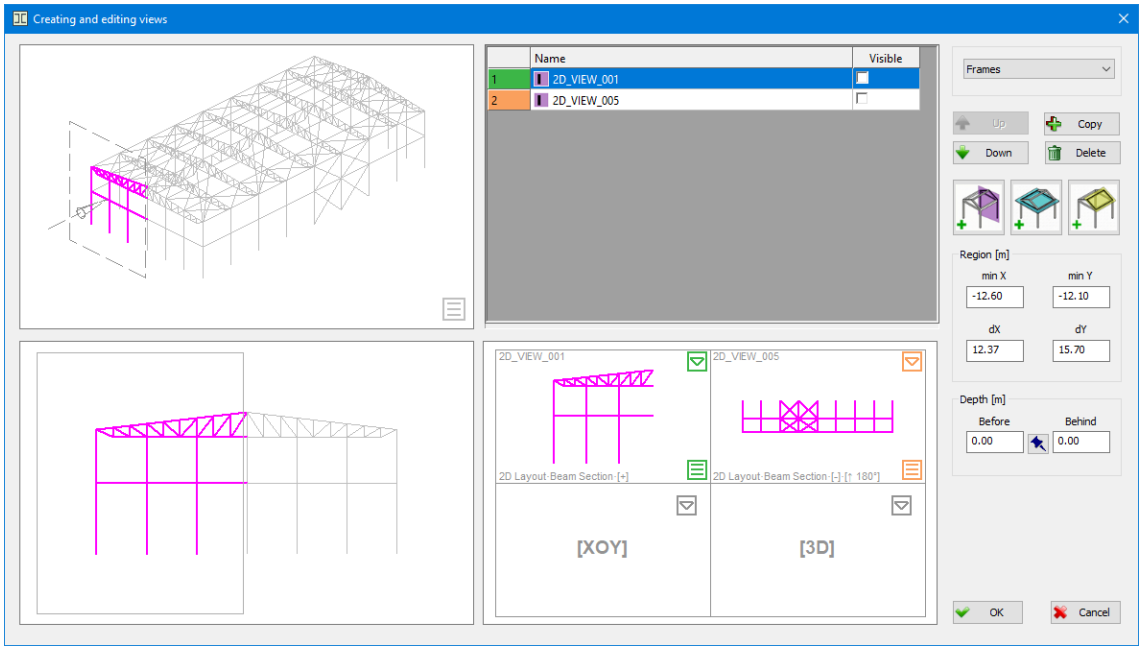
dY Edit box for entering the value of the height of the region of viewport.

The region of viewport can also be adjusted on the drawing itself in the dialog. Changing the region is done by placing the mouse pointer over a segment of the contour of the region and pressing the left mouse button, while that segment changes color to red, which means that it is selected for moving:



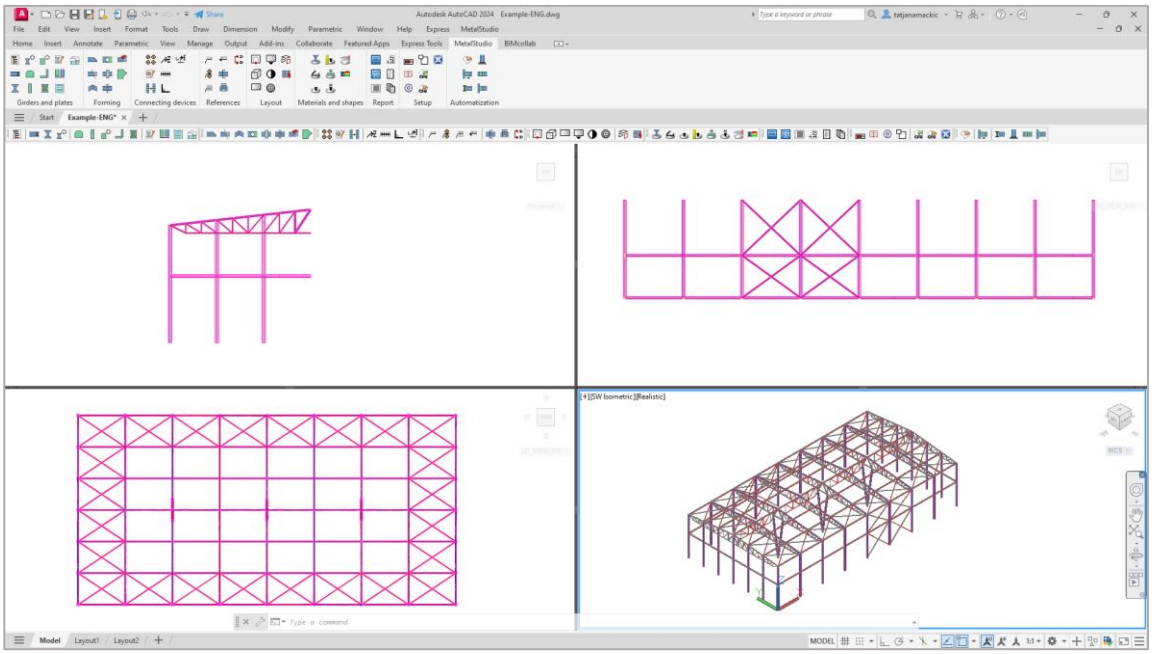
The selected segment for moving is marked in red

The movement itself is very simple, the mouse pointer is placed in the desired place on the drawing and the left mouse button is pressed. The change of the region is immediately visible on the drawing, and the new values of the changed region are displayed in the corresponding edit boxes 'dX' and 'dY'.



Entities located within the changed region are specially marked on the drawing

By exiting the dialog for creating and editing views with the 'OK' button, the created views with their settings will be placed in the viewports:



Viewports show set ‘2D views’

16.4 Limitations of AutoCAD in working with viewports

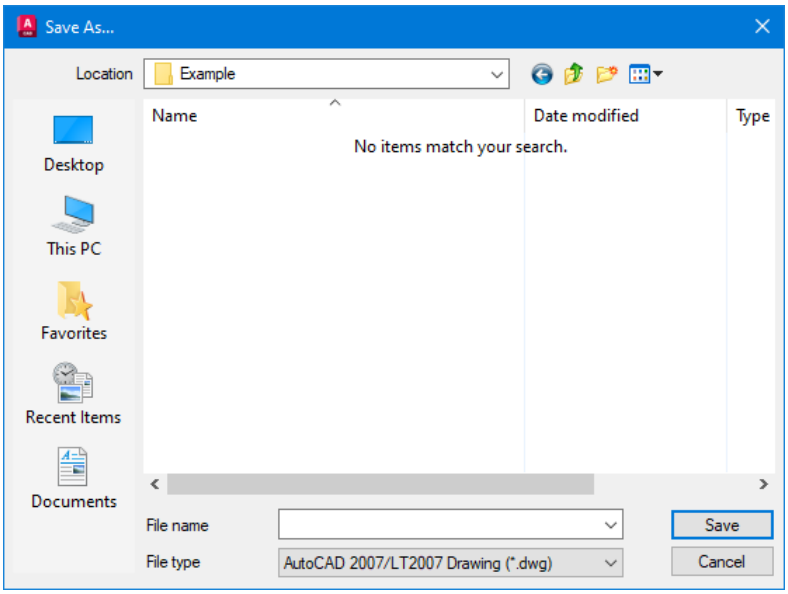
- ORTHOMODE and Polar Tracking work only in the viewport plane that was active at the time the command was run. This can cause some difficulty when setting points in viewports that become active after running a given command. The most obvious example is when taking sections or details from a frame/ceiling/slanted view and then placing them in a viewport showing the XOY view. It is recommended that in such cases, the angle necessary for their placement is set by entering a value on the command line, and not by selecting a point from the drawing.

- Proxy Entity - Entities created in Metal Studio will not be displayed as ‘Proxy Entity’ when the drawing containing them is opened in AutoCAD without the presence of Metal Studio, if the drawing is recorded in the ‘3D Modeling’ mode. If you need to send a drawing to someone who does not have the Metal Studio program, it is necessary to record the drawing from the ‘2D Preparation’ program mode, because only then will Entities created in the Metal Studio program be displayed as ‘Proxy Entity’ when the drawing containing them is opened in the AutoCAD program.

17. SAVE TO METAL STUDIO 1 FORMAT

17.1 Save to Metal Studio 1 format

Drawings created with the Metal Studio 2 program are saved using this command in a format that can also be loaded by the Metal Studio 1 program. A drawing exported in this way, opened in the Metal Studio 1 program, will be identical to the original drawing, except that it will not have all the new details and display options inherent in the Metal Studio 2 program. By selecting the command from the '**Metal Studio**' drop-down menu or by clicking on the icon , a dialog with the following appearance will open:



Now you need to choose a place on the computer disk where the drawing will be saved, and then enter a name in the edit box '**File name**'. From the closed list '**File type**', select the oldest version of AutoCAD into which the recorded file can be loaded. Saving the file under the given name is done by activating the '**Save**' button, after which the dialog closes and the command ends.