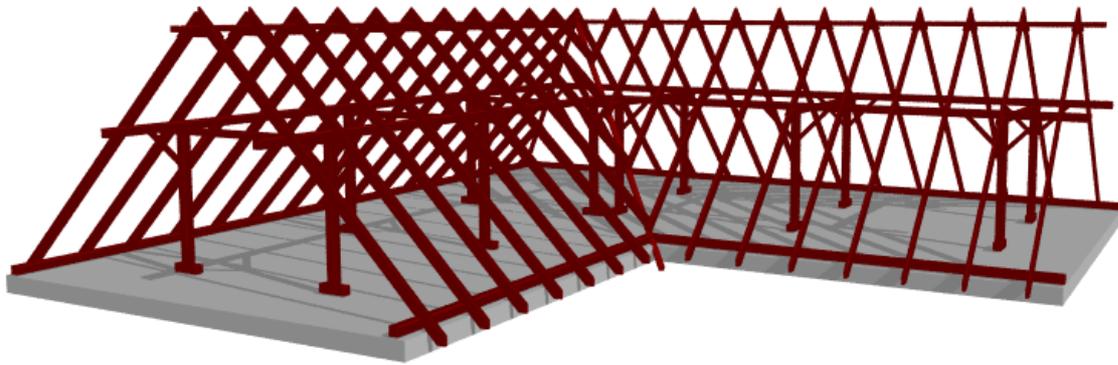


# Roof Structure Designer

User's Guide



**DesignSoft**

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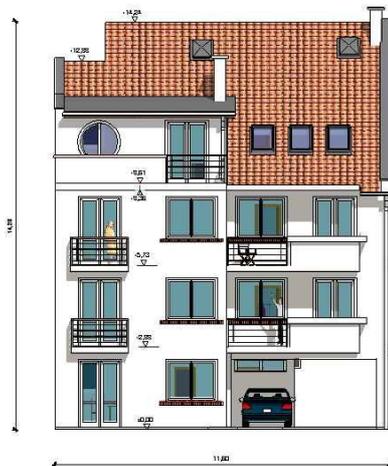
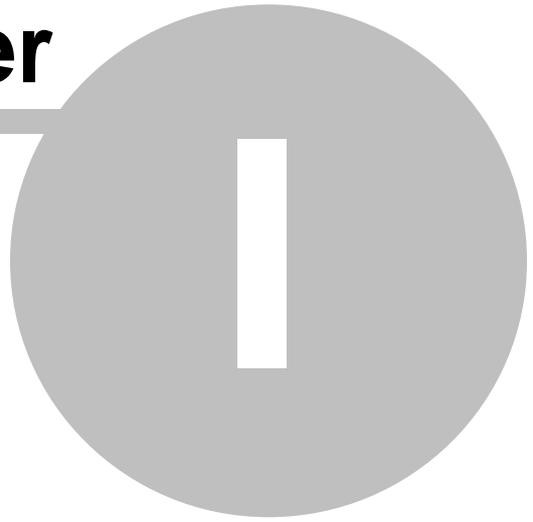
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# Chapter



## 1 Basic parameters of the roof frame designer

The roof frame designer uses the same layout as the roof designer, with a workspace made up of four windows, three view windows and an axonometric window. Editing is done in the three view windows and the result can be viewed in 3D in the axonometric window.

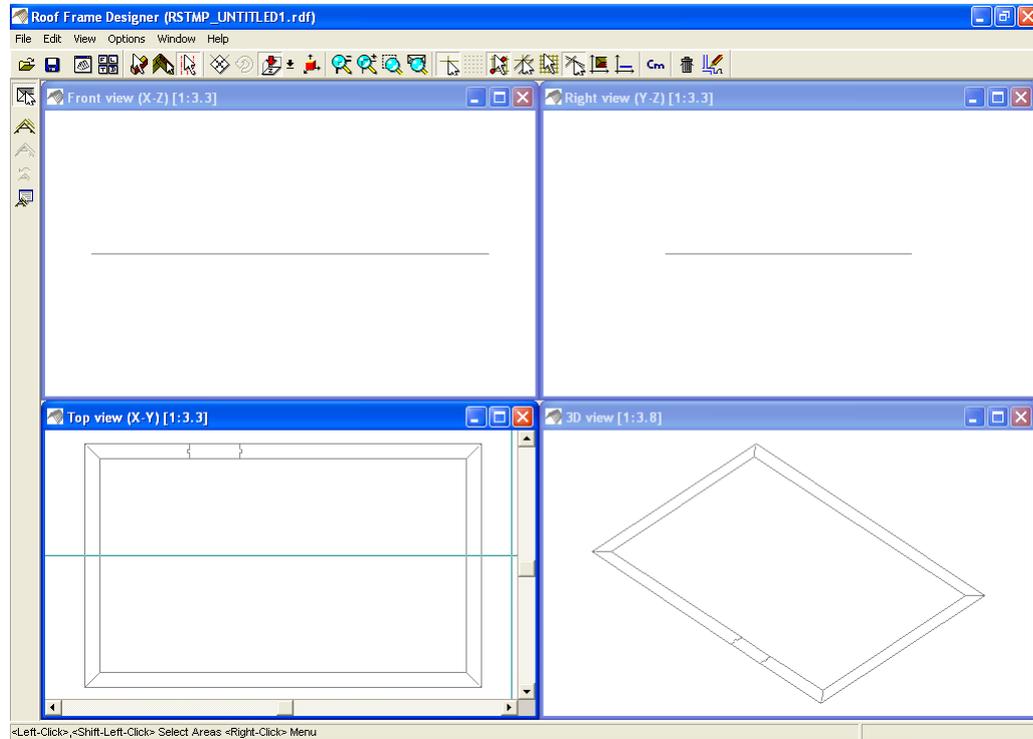


Fig. 1. Opening screen of the roof frame designer

A roof frame is designed by combining individual elements such as rafters, beams, purlins and columns, or by working with frame designs included with the program. Properties for individual elements can be specified in their dialogues. The elements can be joined, rotated, reflected and multiplied.

Commands are selected from the upper and side icon bars or from the right click or main menu.

The right click function plays a crucial role in the roof frame designer, just as it does in the roof designer. Most commands that can be selected using icons can also be selected using the right click menu.

It is possible to use roof shells created in the roof designer when planning a matching frame. In this case the roof shell structure is visible in the three view windows. Just as in the roof designer, X and Y coordinate pertaining to the currently active window appear in the coordinate field at the bottom right corner of the screen.

## 1.1 Function keys

Pressing these keys during editing result make possible the following operations:

**X,Y** Press to go into *dataentrymode* and open data entry fields

Holding down **Ctrl**

- If you press Ctrl it is enough to draw a frame around one part of an element with the cursor and the entire element will be selected. If Ctrl is not held down, the entire element must be enclosed in the frame before the element is selected.
- When modifying a selected element while holding down Ctrl the original directionality is retained. The dimensions may be altered at will by dragging the endpoints with the cursor.

Holding down **Shift**

- When selecting elements: you may select more than one element at a time.
- When modifying elements: the end points of elements may be oriented so they come together at an intersection point. Select the elements and, starting at one endpoint and holding down Shift, the other endpoints will shift orientation to meet at the selected endpoint of the first element. The selected element determines which endpoint of the other elements will join to the intersection point. In the direction of the intersection point, every element will have the same direction.

The functional keys are the same as in the roof editor:

**F1** Help

**F3** Faster/more fine-grained movement and generation (cursor will move in increments of 1cm/1mm or 1inch/1/16inch)

**F4** Zeroing coordinates, shifting the reference point

**F5** Shift grid points to the current position of the cursor

**F6** Refresh screen

**F10** Turns on/off the detailed calculation of the elements' intersection points. Turning this option off speeds up calculation time and allows the program to operate faster. It is recommended to turn the function on in the final stages of a project.

**F11** Refresh elements, regenerate all elements

## 1.2 Division of the screen

### The screen is divided into the following parts:

#### **Upper menu row:**

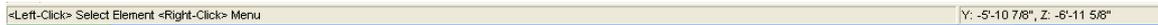
File Edit View Options Window Help

#### **Upper icon row:**



**Side icons:** Scroll down for sub-commands

**Bottom row:** The cursor's X and Y values appear here. These facilitate precision editing. The values may be viewed in inches or centimeters.



### **The four editing windows:**

X-Y Top view  
 X-Z Front view  
 Y-Z Side view  
 3D view - Axonometric window.

## 1.3 The upper menu row

This menu appears in conjunction with the editing windows:

**File Edit View Options Window Help**

### 1.3.1 File

#### **File menu commands**

|  |   |
|--|---|
| <b>New</b>                               | Opens a new roof frame project  |
| <b>Open Ctrl+O</b>                       | Open an existing roof frame file  |
| <b>Open roof shell only Shift+Ctrl+O</b> | Open an existing roof shell   |
| <b>Save and Exit</b>                     | Close active project  |
| <b>Save Ctrl S</b>                       | Save the roof frame project   |
| <b>Save as</b>                           | Save the roof frame under a new file name                                       |
| <b>Export</b>                            | Save the roof frame in an M3D file suitable for exporting to the MODELER module |

**Exit**

Exit the program

### 1.3.2 Edit

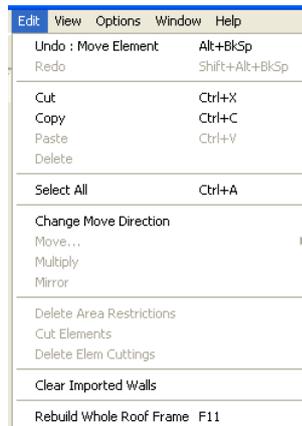


Fig 2. The Edit menu

The following are the *Edit* menu commands:

**Undo** Alt+BackSpace or Ctrl-Z

Undo the previous action/edit

**Redo** Shift+Alt+Backspace or Ctrl Y

Redo the last reverted action/edit

**Cut** Ctrl X

Cut out the selected element and place it on the clipboard

**Copy** Ctrl C

Copy the selected element to the clipboard

**Paste** Ctrl V

Paste the element from the clipboard to the editing screen

**Delete** Del

Delete the selected element

**Select all** Ctrl A

Select all elements on the plan

**Change direction of movement** Tab

The three directions of movement in the program are horizontal, vertical and free. Selecting the direction of movement restricts an element's movement to the selected direction. The selected direction is indicated on the cross hairs. Free movement is indicated by a four-arrowed cross hair, horizontal by right/left arrows and the vertical direction by up/down arrows.

**Move**

Move elements by the specified values. Enter these values in the dialogue.

**Multiply**

Multiply the selected element.

**Mirror**

Reflect the selected element.

**Delete area restrictions****Cut elements****Delete element cuttings****Clear imported walls**

The contour lines of the floor plan are visible in the top and 3D views. Erase the contour lines with this command.

**Rebuild whole roof frame**

F 1 1

Erase the small discrepancies\* that may arise between the elements.

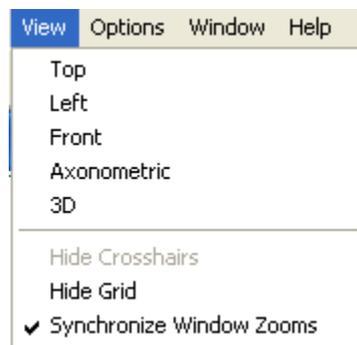
**1.3.3 View**

Fig. 3. View commands

Use the view menu to set window characteristics such as to show the cross hairs or grid. These parameters may also be switched on and off using the icons from the upper icon row and the

 icon. Clicking on one of the snapping icons automatically turn on the cross-hairs. The *Synchronize window zooms* option can also be turned on/off here. When it is engaged, magnification will be carried out to the same degree in all windows. When it is switched off, magnification is only applied to the active window.

**1.3.4 Settings**

Set parameters for editing in this menu. The **Edit** parameters can modified where indicated.

**Grid point spacing:** Grid points can be placed on the screen. Enter the distance between grid points in the dialogue in the desired units of measurement. The grid points may be turned on/off using the

 icon located in the upper icon row. Grid points can also be requested during editing by clicking the  icon from the upper icon row. Snapping applies to the

nearest points. Reposition the grid by pressing F5, then moving the cursor to the desired new origin. If you want the grid to originate from a given point, place the cross hairs on the point where you would like to place a grid point and press F5, or select *Place grid* from the right click menu. The grid is then redrawn taking into account the specified distance between grid points.

Click the following to:



Snap to *grid points*



Snap to *endpoints*



Snap to *lines*



Snap to *intersection points*

Modify the snapping sensitivity by adjusting the **Point sensitivity range** values. These values correspond to pixels, therefore depending on the level of magnification they relate to different centimeter or inch values.

**Line sensitivity range:** Using line snapping it is possible to place or remove points from a given line. Modify the level of sensitivity of line snapping by adjusting the line sensitivity radius values. The values correspond to pixels, therefore depending on the level of magnification they relate to different centimeter or inch values. Turn line snapping on/off by clicking

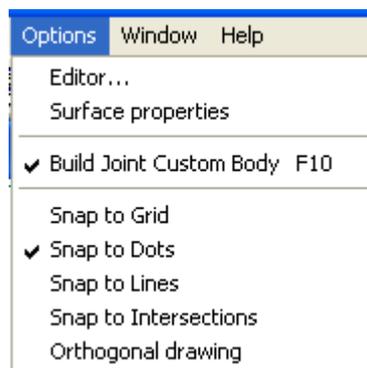


**Size of selected element points:** Points on the screen are indicated by small circles. The radii of these may be set in pixels. Note that too large a radius will interfere with editing.

**Libraries:** Specify the location of working libraries.

**Maximums:** Specify the maximum number of points, lines and polygons.

**Colors:** Specify the colors of elements, including those of cross hairs.



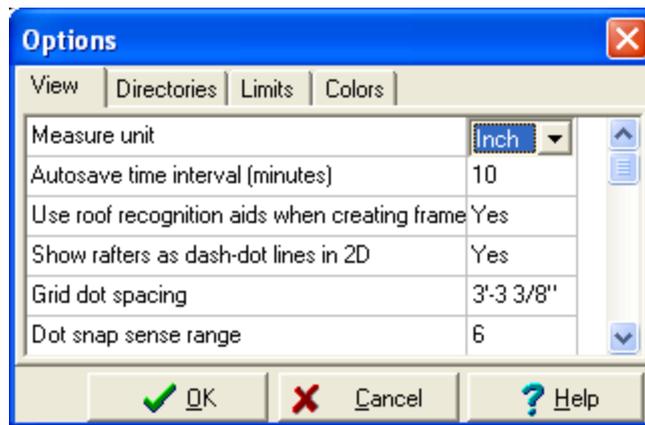


Fig. 4-5. The Options menu and Options settings dialog

Settings menu features particularly useful in roof frame design:

*Roof recognition:* When selected, the program will attempt to determine the span and angles of incline of the roof planes after the ridge is drawn.

*Show rafters as dash-dot lines in 2D:* When selected, rafters are indicated by broken lines along their axis. If not selected, they are visible on the top view of the rafters.

*Hip rafters' default joint size:* This value (in either centimeters or inches) will be used as the default value in the roof frame design.  
Default value: 3 cm

### 1.3.5 Window

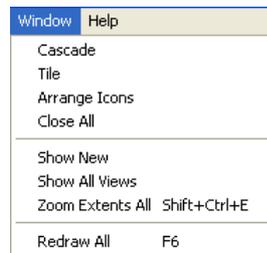


Fig. 6. Window

Use this menu to manage window settings, open and close windows and refresh the screen. Note that the screen may also be refreshed by pressing F6.

### 1.3.6 Help

Get help from this menu.

# Chapter

# II



## 2 The upper icon row



New window



New windows - opens four windows simultaneously

There are three groups of basic operations with which to plan a roof frame design.



Work with elements



Work with joints



Work with frames



Moving elements in the active window. The elements themselves are not modified.



Rotating elements in the 3D window. The elements themselves are not modified. To continuously rotate the structure in the 3D window, press the right or left mouse button in the appropriate view window.



Change the currently active window using the view icons



Create 3D image



Zoom functions



Icons for placement and orthogonal editing.

The program uses a snap algorithm to position elements. Choose the type of snapping using the     icons.



Snap to *grid*.



Snap to *grid points*. These points may be a corner of an element or an axis point.



Snap to *lines*. This line may be the edge line of an element.



Snap to *intersection points* of lines. These may be the intersection points of the roof contour or roof shell.

The snapping function makes editing faster and more precise. Although there are instances when it is not necessary to use snapping, in general it is advisable.

Adjust snapping sensitivity in the Settings/ Editing dialogue.

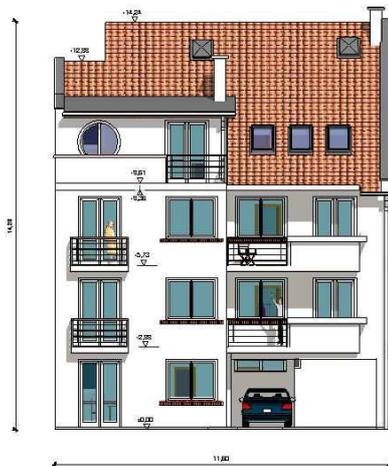
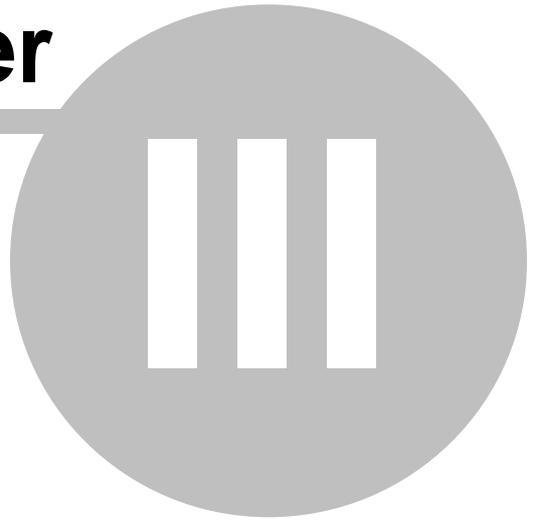
 Orthogonal editing. When this option is selected elements may only be moved and drawn at orthogonal angles.

 Editing orthogonal to the roof. This is activated when the roof planes are selected first. Select the roof planes after clicking

 or by selecting

 by clicking in the top view window. Then, similarly to in orthogonal mode, the cross hairs may only be moved in certain directions when designing, reflecting, and moving elements. The possible directions of movement are the angle of incline of the selected roof plane and perpendicular to it. Thus it is possible to edit precisely with respect to the roof plane's angle of incline.

# Chapter



### 3 Editing with the roof designer

First, let's look at the elements that can be used in designing a roof. The basic operations are divided into three groups:



*Work with elements*



*Work with joints*



*Work with frames*

Using the simple operations in the *Work with elements*



group, we can create prisms. Link them by clicking the *Work with joints*



icon and selecting from the resulting commands. When elements are linked, the program inserts the necessary wooden supports as well, increasing the detail of the plan. Select specific operations from the *right click menu* or using the *scroll down icons*.

Let's take a closer look at the options.

#### 3.1 Work with elements

Use the element operations to draw prisms. Later the prism can be elaborated into a custom element for the roof's support structure.

The following scroll down icons are found on the side bar:

##### Select

**Create new element**

**Create hip rafter on roof hip**

**Create element above other elements**

**Create element below other elements**

**Create element on the roof plane**

##### Element properties

**Delete**

**Movement by offset**

**Multiply**

**Mirror**

**Unify**

**Delete element area restrictions**

**Cut elements**

**Delete element cuts**

**Delete element zone boundaries**

Choose an operation by clicking the appropriate side icon after selecting the main icon, or by choosing from the right

click menu.

### 3.1.1 Create new elements

Once you have chosen a command and created a prism, you may set its endpoints graphically, or enter them in the **Element properties** dialogue. The dialogue automatically appears after you place the first point, but may be brought up at any time by clicking the

 icon or pressing P.

Specify the prism's position in the dialogue: its X,Y and Z coordinates, top view orientation, length, slanting, width, height, and end cut options.

*Topvieworientation:* Angle measured on the top view

*Length:* Distance between the two endpoints of the prism

*Slanting:* Angle on the side view

*Elevation:* Prism's elevation

*Rotation:* Angle of rotation around the axis in the given view

*Crosssectionwidth:* Width of a cross section of the prism

*Crosssectionheight:* Height of a cross section of the prism

*First/SecondEnd:* End cuts of the prism

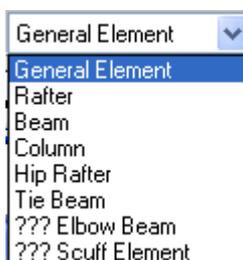
End cuts may be of the following types:

Perpendicular, Horizontal,Vertical, Cut V and H: (vertical and horizontal),

Angle: Cut to a given angle

*Elementfunction:* enter information regarding the element type. *This information affects the appearance of the structures on the floorplan.*

These may be of the following types:

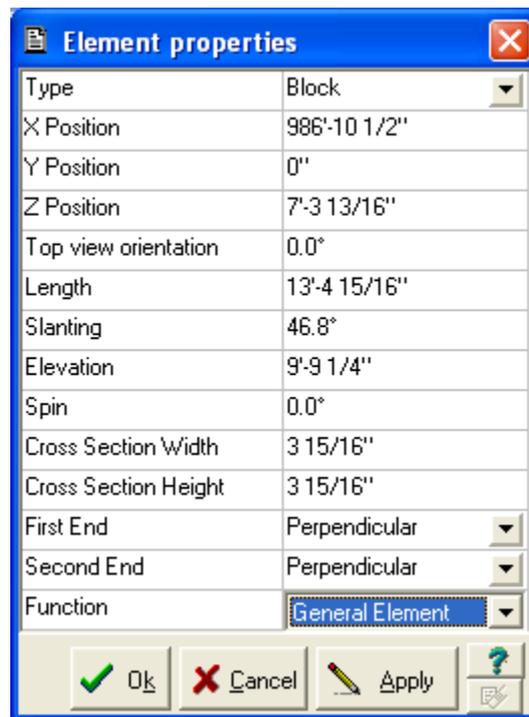


A prism can either be

drawn according to values entered in the dialogue

or drawn freehand using the mouse. Here the X,Y and Z coordinates assist in precision editing.

These prisms can later be elaborated into custom elements for the wooden support structure of the roof.



**Fig. 8-9. The Element properties dialogue**

When placing an element it is possible, using the right click menu, to enter it on the plan (identical with the *Ins* function), cancel it (identical with the *Esc* key function), or open the Element properties dialogue (identical with pressing *P*).

The values entered in the dialogue are interrelated. After changing one value, delete the other values, press Enter and the program will automatically recalculate the new values.

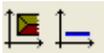
When an element is selected it has three key points, the two endpoints and the midpoint. Selected elements may be modified, for example, by adjusting the endpoints and axis points. To change the length of an element while maintaining its directionality, hold down Ctrl while moving the endpoints to the desired positions. Press *P* at any time or click the side bar icon

 to open the **Element properties** dialogue and enter new values.

The snapping



and/or orthogonal editing



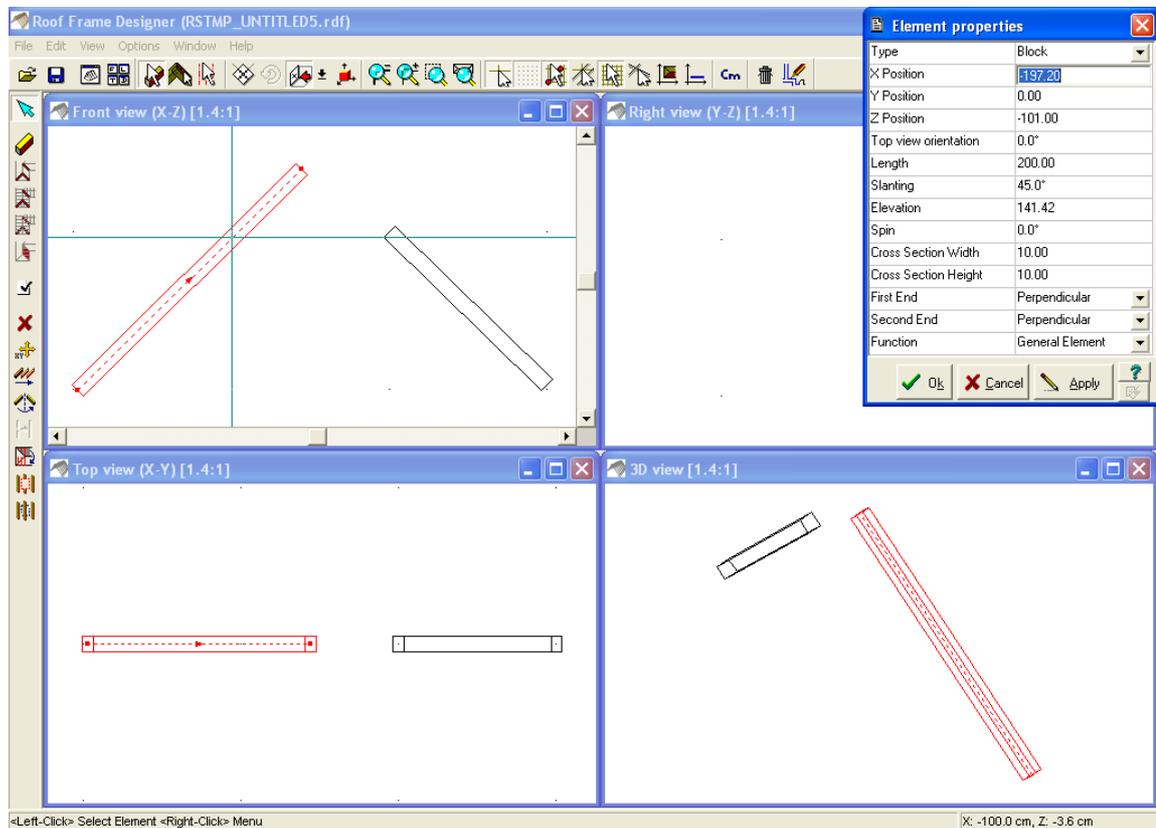
icons assist in precise placement when drawing. Holding down Ctrl allows you to modify the length of an element while retaining its directionality.

The endpoints of elements may be oriented so they come together at an intersection point. Select the elements and, starting at one endpoint while holding down Shift, the other

endpoints will shift orientation to meet at the selected endpoint of the first element. The directionality of the selected element determines which endpoint of the other elements will link to it. Facing the intersection point all elements will be facing in the same direction. When an element is selected a triangle in the center indicates its directionality.

We will see examples of the editing process in Chapter 4. Here we will only draw two beams with length 200 cm and an angle of incline of 45 degrees and observe the result. In the dialogue we enter *Length=200 cm*, *Angle of incline=45 degrees*. The new Rise value is calculated automatically.

Note, that for the newly entered values to take effect we must delete the *Rise* value. Press Enter and the program recalculates the *Rise* value.



**Fig. 11. Two prisms of given length and angle of incline**

If your plan includes a roof shell, then it is possible to place the elements to only certain portions of the roof. To do this, click anywhere on the top view of the roof. Press Shift to select multiple roof planes. The selected roof planes are indicated by light gray shading. Elements created subsequently will be applied only to these selected areas. The practical value of this option will be discussed in detail in the section on

automated roof frame design.

### 3.1.2 Hip rafters

The position of a prism may be set in relation to other elements. This may only be done in the top view window. When placing an element above or below other elements, the existing elements influence the new element's directionality and angle of incline.



**Fig. 13. Hip rafter dialogue**

Enter the purlin width, angle of incline, end cuts and joint size in the dialogue. Joints can be turned off to speed up generation, as this reduces the amount of computation required.

### 3.1.3 Create element above, below other elements and on the roof

The program attempts to set the element at an angle that will allow it to be below or above the other, while making its direction appropriate to the other elements. It is possible to set the prism in relation to existing elements in three ways using icons:



**Create element above other elements**



**Create element below other elements**



**Create element on the roof plane**



Enter the purlin width, angle of incline, end cuts and joint size in the dialogue. Joints can be turned off to speed up generation, as this reduces the amount of computation required.

### 3.1.4 Other element operations on the side icon bar

These operations can be carried out on one or more selected elements.



Delete selected element. Identical to pressing Delete.



Move selected element. Identical to pressing X or Y. Opens a dialogue where new coordinate values can be entered.



Multiply selected element. Elements may be multiplied together with their displacement or rotation. Enter values for the number of multiples in the dialogue, then specify the direction vector.



Mirror: Reflect selected element. Click the icon, then draw the axis of reflection. The result is visible in a schematic drawing. Use this diagram to assist in setting the second point of the axis. Once the second point is selected, the program completes the reflection.



Join selected elements. It is possible to unify elements which have the same axes and face in the same direction. It is also possible to unify more than two elements in one step. For example, it is possible with this function to join together intermediate and eave purlins.\*



Click the Delete element area restrictions icon so that the roof shell will not influence the frame's shape. In this way the roof frame retains its original form, and can, for example, protrude from under the roof or ignore cut outs in the roof. These cut outs usually arise during automated

roof frame design.



Cut selected elements



Delete element cuttings

## 3.2 Joining elements

It is possible to make joints between elements. Select two or more elements, right click and select the type of link from the right click menu.

The following icons are used in joining:



**Select**



**Join ends**



**Attach to side**



**Attach besides**



**Step joint**



**Joints properties**



**Delete joint**

### 3.2.1 Attach ends

Wooden joints may be modeled with the built-in joint types. After selecting a joint, click the *Apply* button to preview the result. Other parameters can also be set in the dialogue. Existing links can be selected and the same joint be requested at the intersection point. These links can also be modified. The type of link may be changed or canceled by pressing Delete. When attaching ends, it is helpful to note that elements' endpoints can be joined at an intersection point. Select them and press Shift while holding the cursor over one endpoint. The other endpoints will link to that of the selected element. The directionality of the selected element determines which endpoint of the other elements will link to it. Looking from the intersection point all elements will face in the same direction. In this case the link does not form. We can call up the link after this and thus ensure that the endpoints come to one center point. Links can also be created between multiple elements, but only by joining ends.

After selecting the desired type of link, a dialogue appears in which you can enter values for it. The axis of the link determines the direction of the end cuts. Where appropriate the link creates its axis, which can be automatic, vertical or horizontal. The effect of the these parameters can be seen in the view windows.

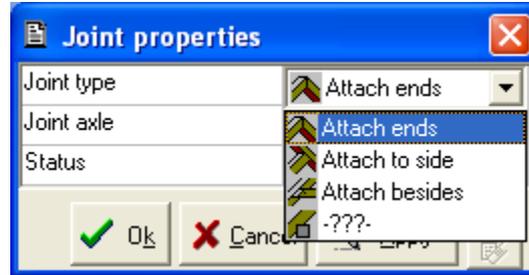
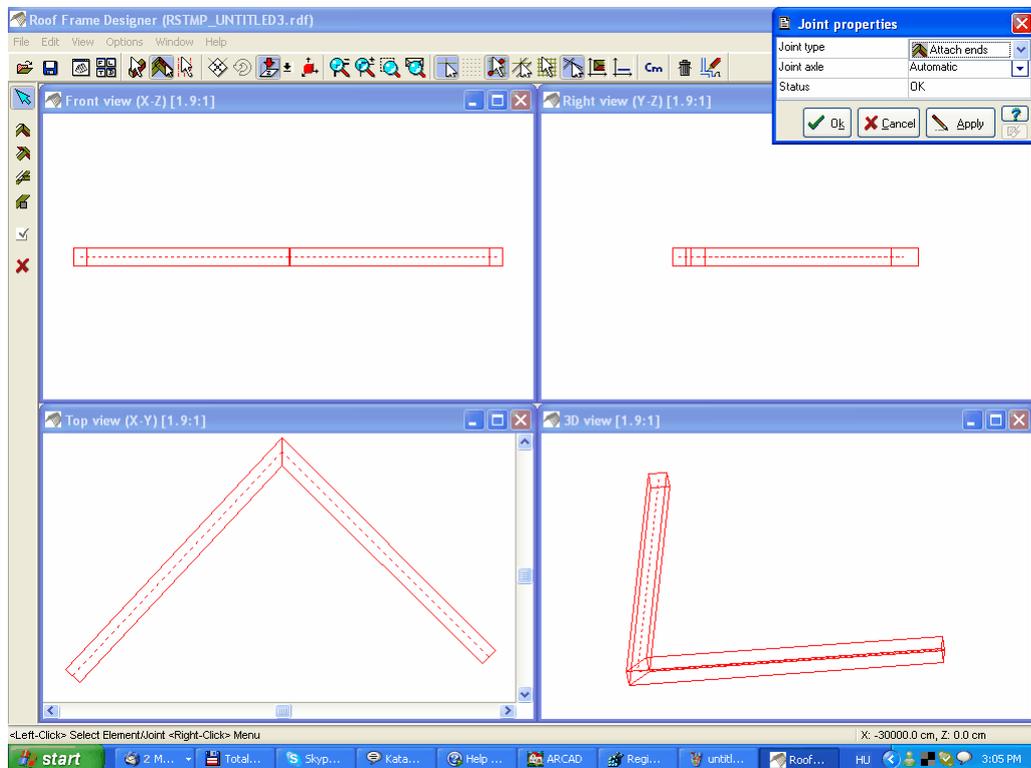


Fig. 15. Joint properties



### 3.2.2 Attach to side

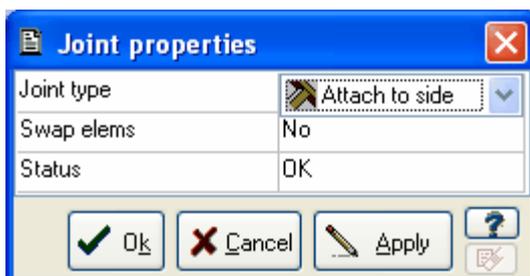


Fig. 16. Attach to side dialogue

It is possible to join two elements such that the form of only

one changes. Choose which element this will be by swapping the elements.

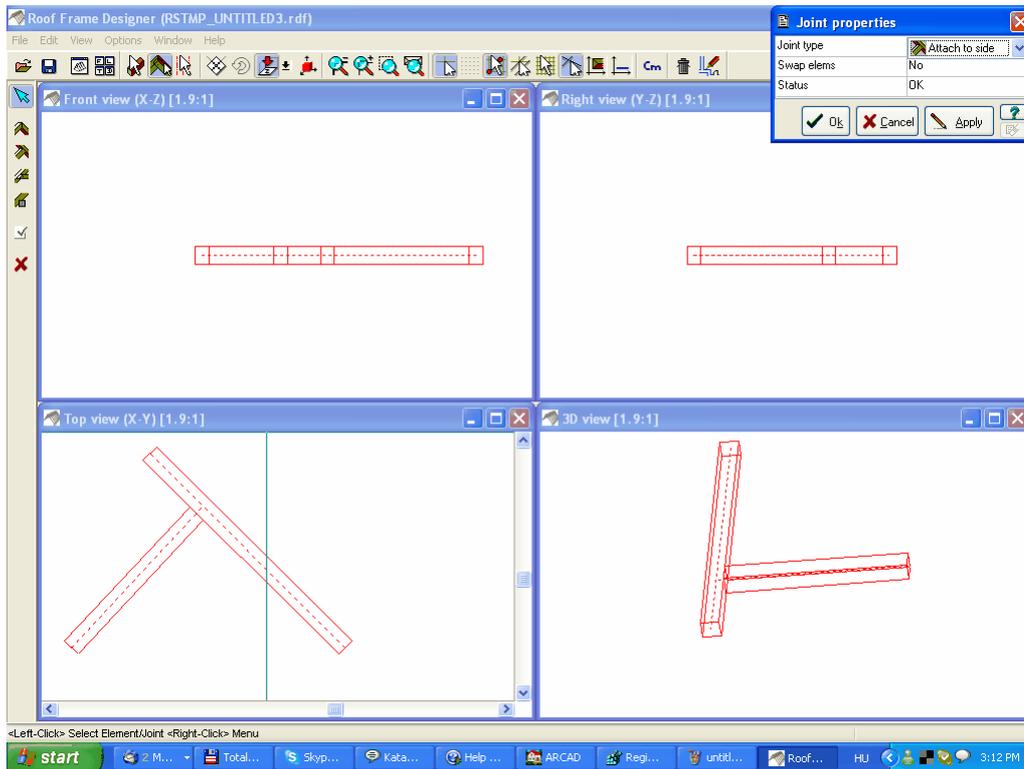


Fig. 17. Result of attaching to side

### 3.2.3 Attach besides

This is useful for example when designing tie beams. The two selected elements appear in the top view screen, and it is apparent that they are not in a plane. By layering the elements and taking into account the requested grooves\* the program cuts out the element and layers them one atop the other.

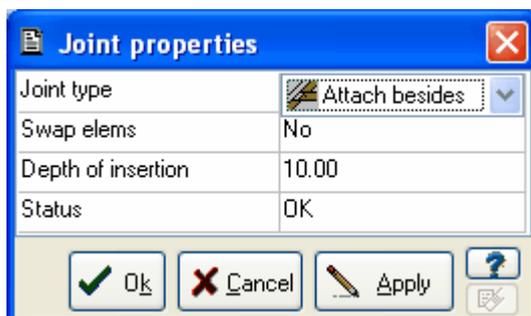


Fig. 18. Attach besides-the layering dialogue

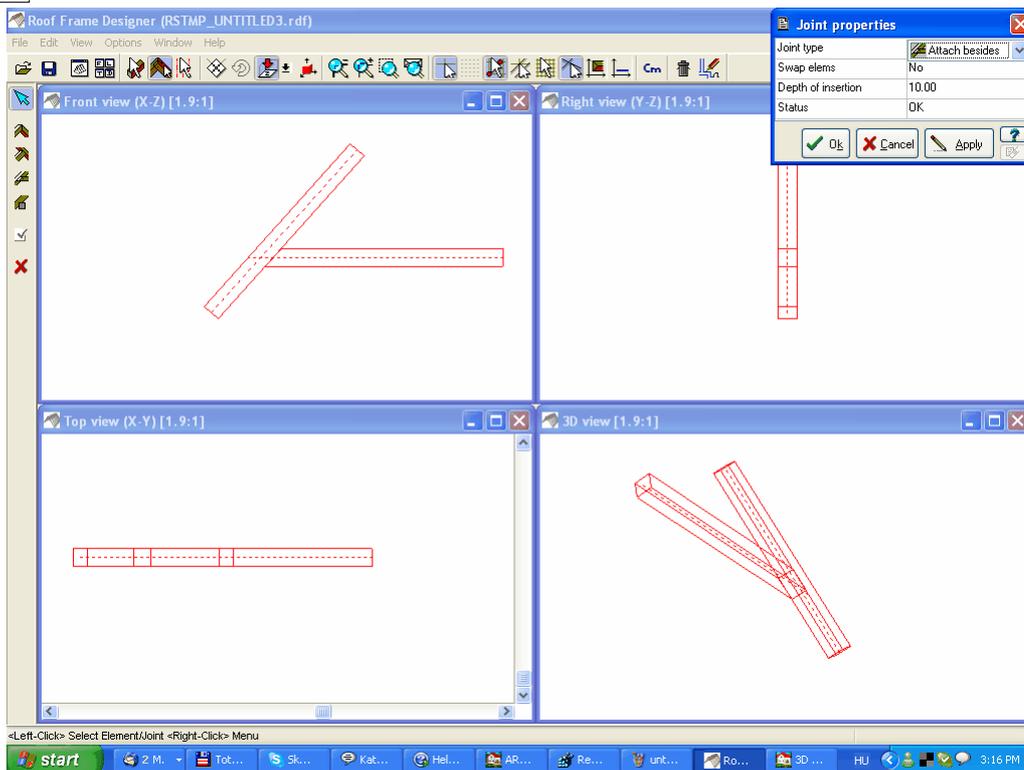


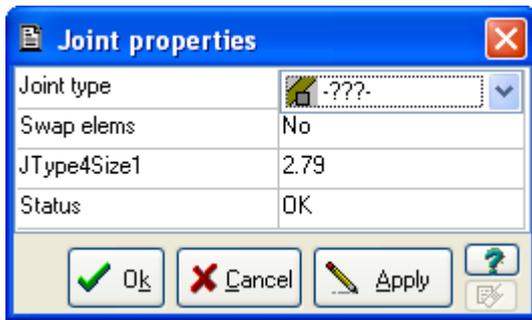
Fig. 19. Result of layering

If the program is unable to complete the joint you request, the OK button turns grey and the function does not complete. Preview editing results by clicking Apply. The length of the part to be layered can be entered in the Incision\* dialogue.

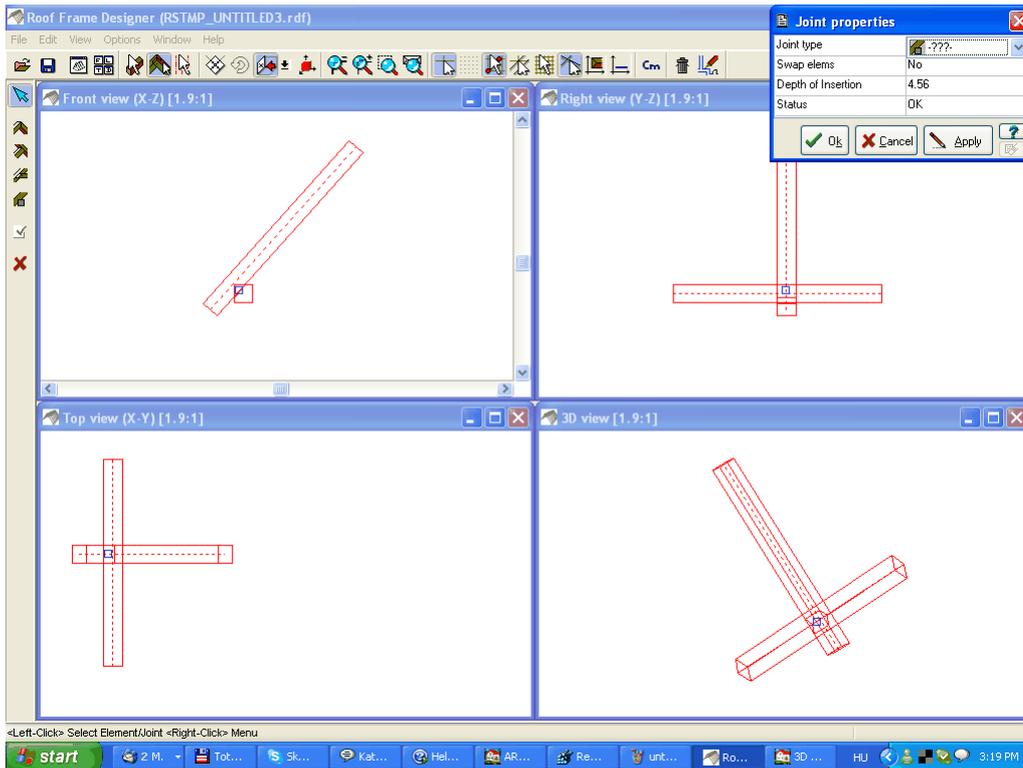
### 3.2.4 Step joint



A step joint can be used for example when joining rafters and purlins. When joining two elements you may also an incision value in the dialogue.



**Fig.20. Stepjointdialogue**



**Fig. 21. Step joints**

### 3.3 Work with frames

It is recommended that the roof frame be designed in conjunction with an existing roof shell, but a frame can also be designed independently of a shell. When designing with an existing roof shell, its contour lines are visible in the editing window and so it is immediately evident how the roof frame corresponds with the shell. You may use the default roof shells included with the program, which can be modified in all of their parameters. Choose from the following roof frame types:



### 3.3.1 Editing proceeds

After clicking on the icon in the upper icon row to begin designing a roof frame, select the location of the frame. Roof frame operations may only be carried out in the top view window. The frame may be designed underneath an existing roof or independently. If you are designing in conjunction with an existing roof, you must specify under which planes the frame is to be built. The selected planes will influence the result of the frame, as it will only appear under those planes. The program takes into account any cutouts that the roof shell might have. The cross section view of the planes also appears, on which the relation of the frame and roof planes appears. Select multiple planes by holding down the Shift key. After selecting the roof planes, draw the *ridge line*. We will call this the editing ridge line. This line determines the area for which the program will generate roof frame supports. If we also select roof planes, then the program takes this into account and only draws the supports below these.

The editing ridge line has a directionality which points from the first point to the second. In the direction of the arrow, the roof frame supports are on the right and left sides.

The following functions appear on the side scroll-down icons:



Select roof planes



Draw ridgeline



Create roof frames from selected elements



Modify last



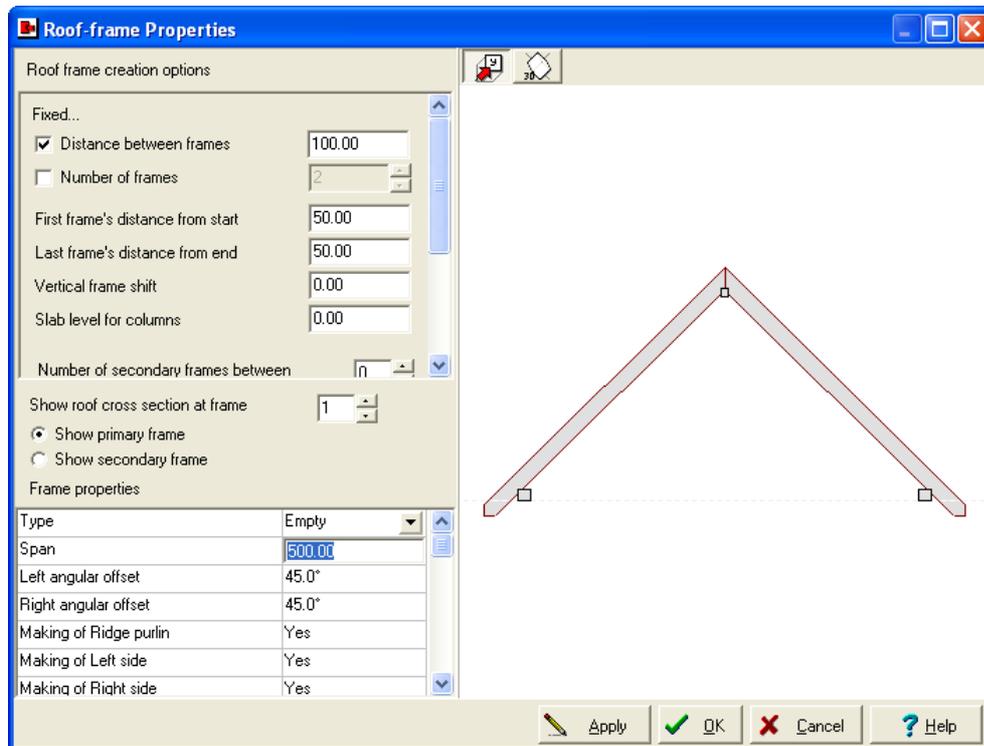
Edit frame groups



Fig. 22.

Roof frame design options using the right click menu

Roof frame supports may be either primary or secondary. After drawing the ridge board, a dialogue appears in which you can enter values for the main and accessory support properties: number, frequency, distance between and from the beginning and end points, etc.

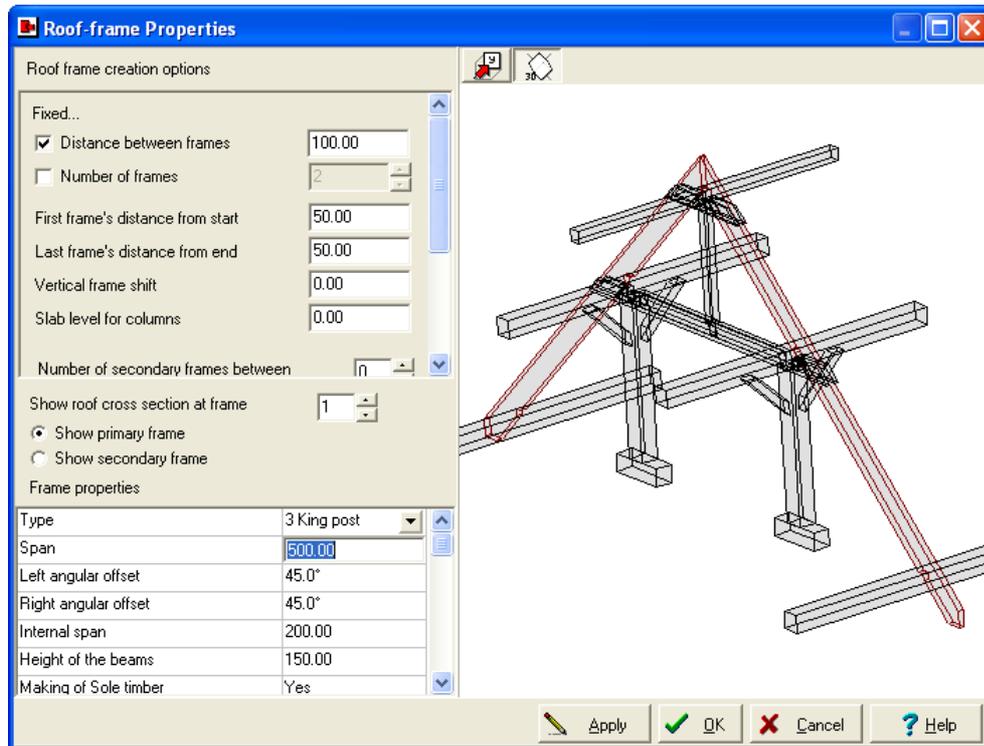


**Fig.23.Roofframepropertiesdialogue**

Enter values in the left hand field and their effect on individual elements can be seen in the right hand window. The right hand window may be in either front or axonometric view. Change the view by clicking the icon at the bottom left corner of the right hand window. If the frame is being designed for an existing building and roof shell, then the relation of the roof shell and supports can be seen in the frontal view. The outline of the building's walls are also visible, thus the wall and frame relation may be easily seen and modified. This makes it easier, for instance, to position the roof beams. It is also possible to go through all of the roof frame views by looking at cross sections made at the various supports. Here the relationship between the roof shell and the support can be seen for each support. Here the supports are not yet cut to fit the roof planes. The excess portion is visible, and will be cut, provided the roof planes are selected. The program generates the supports according to the entered values once the *Apply* button is pressed. The supports then appear in the four view windows. If these are

acceptable, click OK to confirm.

The dimensions of the dialogue may be changed, as well as its position. In this way the result may be seen in the four windows behind it. If you wish to change these parameters set after clicking *Apply*, click *Apply again* to generate a new version of the frame. The program indicates the generation's progress, that is, how many of the supports have been created.



**Fig.24. Roof frame properties dialogue for a three king post frame in axonometric view**

|                      |       |
|----------------------|-------|
| Set Basepoint        | Enter |
| Abort Frame Creation | Esc   |

Fig. 25. Right click menu in frame editing mode

Return to the last version of a roof frame by selecting *Modify last* from the right click menu.

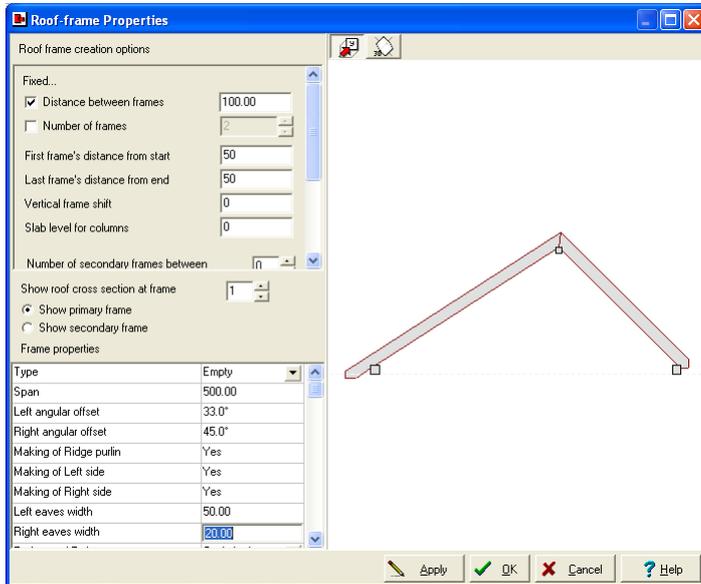
Next we will examine each type of roof frame in turn. In these examples we will not use roof planes.

Note that after a roof frame is generated you work on the elements and joints as a single unified piece. Thus, the whole structure may be selected, moved, deleted, or multiplied just as well as the individually created elements and joints.

### 3.3.2 Couple roof frame

The span and the angle of incline are the most important values for the roof frame supports. In the dialogue you may set the section width of the ridge and eaves purlins as well

as values for the end cuts joints. Specify whether the program should build the frame on both left and right sides, as well as the angle of incline. Here we enter values for a couple roof frame and examine at the results.



|                                   |       |    |         |
|-----------------------------------|-------|----|---------|
| <b>Length of ridge line:</b>      | 2 0 0 | cm |         |
| <b>Distance between supports:</b> | 100   | cm |         |
| <b>Number of supports:</b>        | 2     |    |         |
| <b>Span:</b>                      | 500   | cm |         |
| <b>Left angle of incline:</b>     | 33    |    | degrees |
| <b>Right Angle of incline:</b>    | 45    |    | degrees |
| <b>Width of left eaves:</b>       | 50    | cm |         |
| <b>Right of right eaves:</b>      | 20    | cm |         |

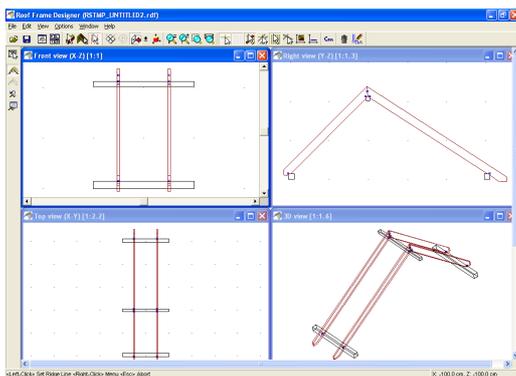


Fig. 26. Couple roof frame dialogue and the resulting frame

### 3.3.3 Close-couple roof frame

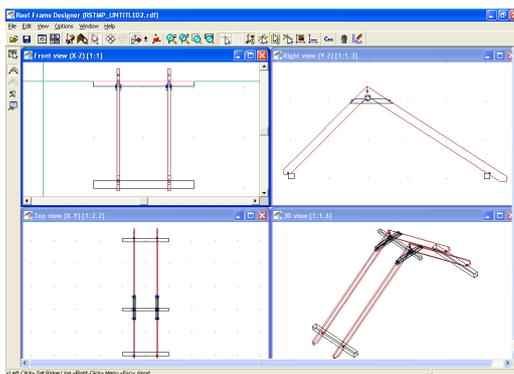
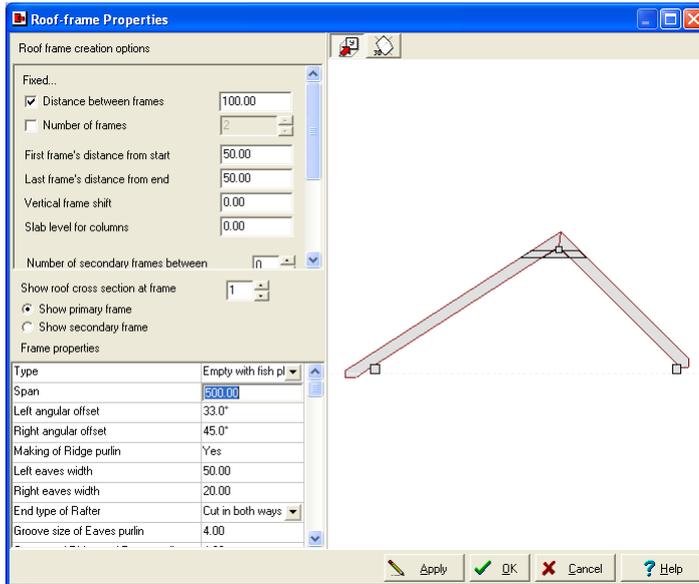


Fig. 27. Close-couple roof frame dialogue and the resulting roof frame

**Length of ridge line:** 200 cm  
**Distance between supports:** 100 cm  
**Number of supports:** 2  
**Span:** 500 cm  
**Left angle of incline:** 33 degrees  
**Right angle of incline:** 45 degrees  
**Width of left eaves:** 50 cm  
**Width of right eaves:** 20 cm

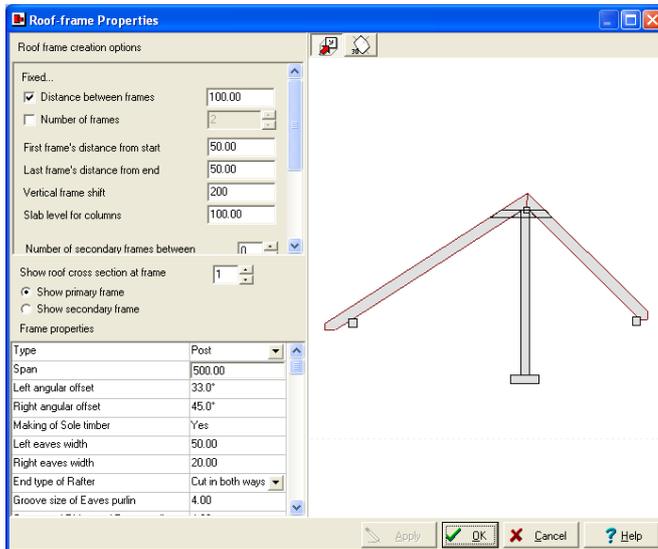
In the example the length of the rafters is 10 cm, and that of the tie beams 6 cm and 10 cm. These may be modified.

We can also specify in the dialogue whether to add a crest ridgepole. Step joint values for eave and ridge purlins and tie beams can also be entered here.

If you enter an unacceptable values the program the program create the element using the maximum possible values, or will signal the error and provide recommendations

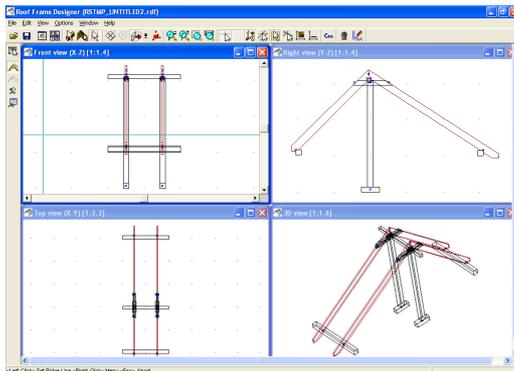
for changing the parameters.

### 3.3.4 Post roof



We use the parameters from the previous example. *The starting height of the king post, that is the level of the bottom of the king post, can also be set here.*

Fig. 28. King post roof dialogue and the resulting frame

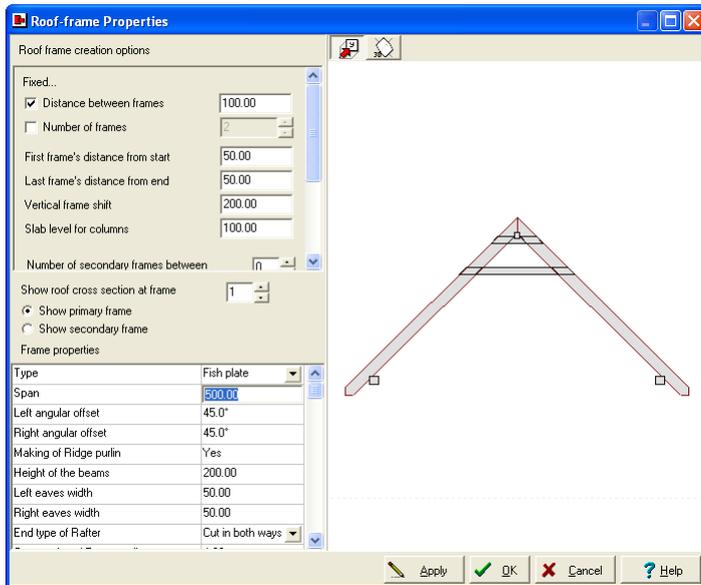


A papucsfa\* (slab levels of columns) may be set under the king post. Enter the section width and height of the (sole timber) papucsfa\* in the appropriate dialogue fields. The section dimensions of the king post\* may also be entered. Specify which endings will be applied to the rafters, as well as the crocheting dimensions.



supports occur before the first main support.

### 3.3.6 Roof frame with tie beams



*Tiebeam\*height:200cm*

The values for the top and bottom tie beam may be entered separately, as well as the amount of overlap between the tie beams and the rafters.

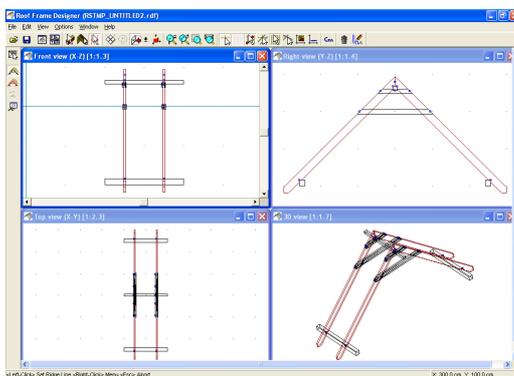


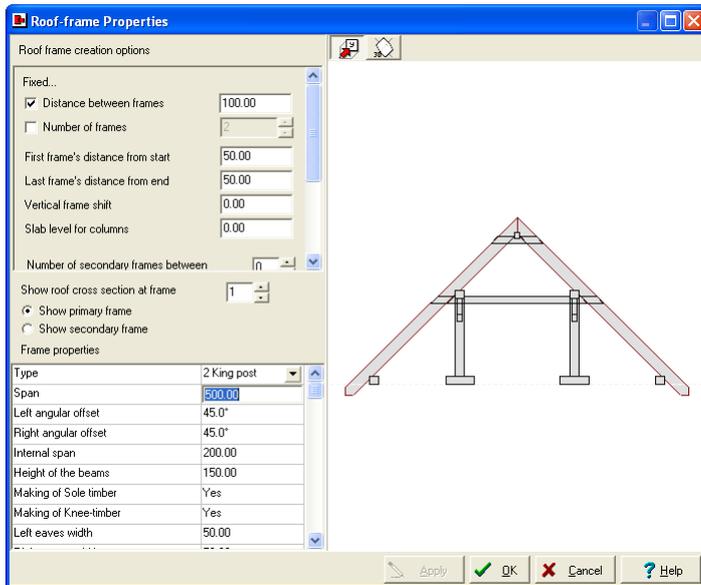
Fig. 30. Dialogue for a roof frame with tie beams and the resulting frame

The distance between supports and the number of supports can be entered here. Set the number of supports and request that the program calculate the distance between supports using these values, taking into account the ridge line. This works in reverse as well; given the distance between supports the program will calculate the number needed. The distance from the beginning and end points will also influence these values. The program will recalculate after changing any of these values. Underneath the value for number of supports we see the totals for main and accessory supports separately.

By pressing Apply we can preview the result of the frame design in the four view windows. Click OK to confirm the

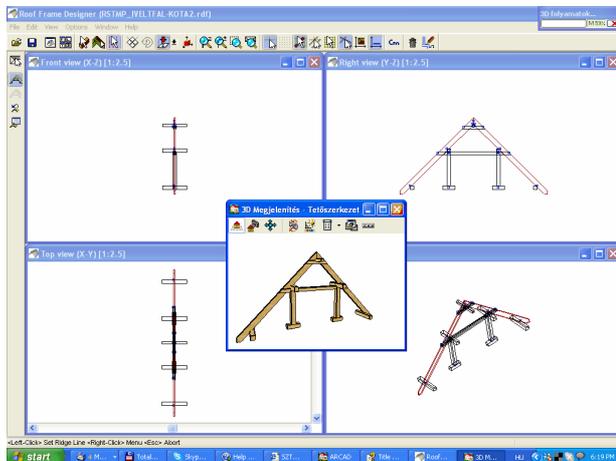
design.

### 3.3.7 Queen post roof



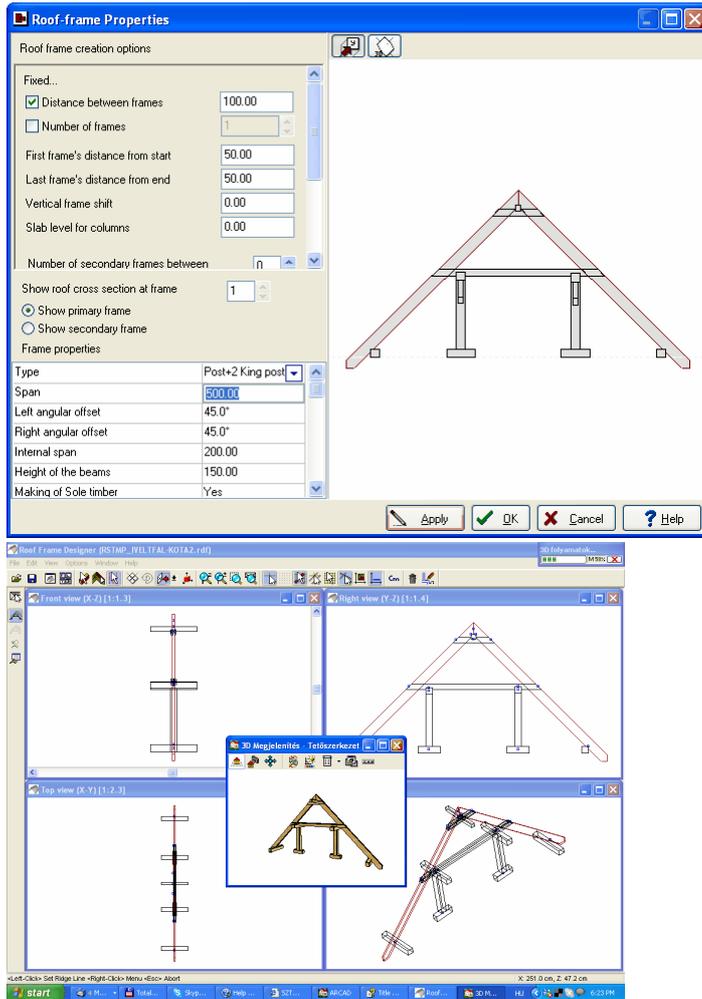
**Fig. 31. Queen post roof frame dialogue and the resulting frame**

*Set the internal span of the queen post, the length and section width of the trusses\*, as well as the intermediate purlin and column dimensions.\**



*It is also possible to set the starting height of the seated column, that is, the level of the bottom of the seated column.*

### 3.3.8 Post + 2 King post



### 3.3.9 Three king post roof frame

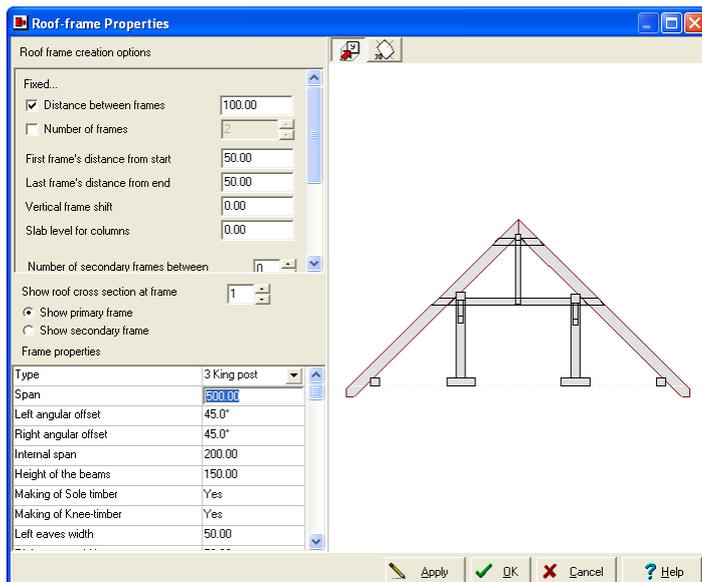
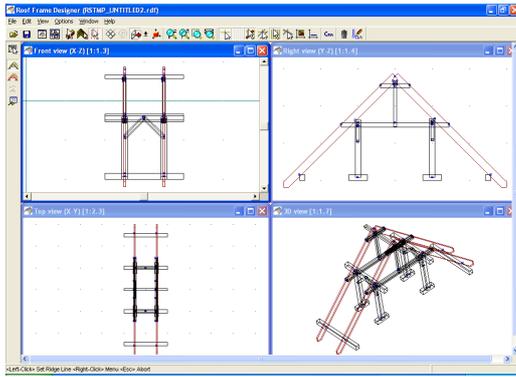


Fig. 33. Three king post roof frame dialogue and the finished frame



*Enter the starting height of the seated column, that is, the level of the bottom of the bottom of the seated column.*

Enter the internal span here; that is, the span of the bottom column. The length of the truss is the length of the truss as it is supported by the bottom columns. Elbow beams can be removed from the first and last supports by clicking *Remove trusses\* from first and last supports*.

### 3.3.10 Roof frame with custom supports

It is possible to create a roof frame using custom supports. It may be necessary to use custom supports when the supports included in the program are not adequate for your designs.

Create custom supports by selecting *Create element* and *Work with joints* in the roof frame designer. Design the supports to your specifications. We demonstrate the process here by selecting a support from the library and customizing it. First, we draw a ridge line approximately 50 cm long and design a suitable support. We can modify this element to our specifications and transform it into a custom element.

In the example we generated a support for a roof frame with two main supports\* and modified it in a number of ways. We treat this as a main support, to which we can add accessory supports if desired. We will ignore this optional step in the example.

Select the element groups created in this way (by pressing **Ctrl A** or drawing a frame around them with the cursor while holding down Ctrl). Then select your custom supports and after clicking an icon from the roof frame supports options, draw the ridge line. We must select two points for the ridge line. Multiplication takes place on this straight line, the data for which can be entered in the dialogue. In this dialogue we have the option to rotate the support by 180 degrees by pressing *rotate horizontally*. You can also specify whether the original element is to be deleted after the new one is generated. The original element may also be deleted

afterwards.

The program allows you to orient elements in any direction. Most often you will want to set them orthogonally. This means that you do not need to set them in the direction of the ridgeline. Editing is simpler if this is done by eye. The program automatically orients the element in the direction of the ridge line.

The example frame:

