Allplan 2013
Basics Tutorial

Basics Tutorial

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Contents

Before you start ...

This tutorial is designed to give you a quick and practical introduction to all the important tools for designing and modifying in Allplan 2013.

It contains several examples in the form of exercises. These are used to show how to design in 2D and how to get started in 3D modeling.

Requirements

This guide assumes that you are familiar with and have a working knowledge of Windows and Allplan 2013.
The basics are covered in the manual. In particular, you should know

- How to start and exit Allplan 2013
- How to create projects
- How to open and close drawing files and how to set drawing files to edit or reference mode
- How to control the on-screen display; in particular how to refresh your drawing and zoom in on details

You should work through the exercises in the given sequence as tools that are presented in more detail in the earlier exercises are only referred to by name in later exercises.

Feedback

We are always trying to improve the overall quality of our program documentation. Your comments and suggestions are important to us and we welcome feedback on the manuals and online help.

Please do not hesitate to contact us to express criticism or praise concerning the documentation. Feel free to contact us as follows:

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Sources of information

The Allplan documentation consists of the following:

- The help is the main source of information for learning about and working with Allplan.
  While you work with Allplan, you can get help on the current function by pressing the F1 key, or activate  **Help** on the **Default** toolbar and click the icon on which you require help.
- The **Manual** consists of two parts. The first part shows how to install Allplan. The second part is designed to provide an overview of basic concepts and terms in Allplan as well as introduce approaches for entering data in Allplan.
- The **Basics Tutorial** guides you step by step through the most important tools for designing and modifying elements in Allplan.
- The **Architecture Tutorial** guides you step by step through the process of designing a building. In addition, you learn how to analyze the building data using reports and to output the results to a plotter.
- The **Engineering Tutorial** guides you step by step through the process of creating key plans, general arrangement drawings and reinforcement drawings. In addition, you learn how to output the results to a plotter.

- **New Features in Allplan** provide information on what's new in the latest version.
- Each volume in the **Step-by-Step** series deals with a specific concept or series of tools/modules in Allplan in detail. The areas covered include data exchange, system administration, geodesy modules, presentation modules, 3D modeling etc. As a Serviceplus member you can download these guides as PDF files in the Learn - Documents area of Allplan Connect (http://www.allplan-connect.com).

Additional Help

Tips on efficient usage

The **?** menu includes **Tips for efficient usage**. This topic provides practical tips and tricks showing you how to use Allplan efficiently and how to carry out operations with ease.

User forum (for Serviceplus customers)

Allplan forum in Allplan Connect: users exchange information, valuable tips relating to everyday work and advice on specific tasks. Register now at
www.allplan-connect.com

FAQs on the Internet

You can find up-to-date FAQs on the Internet at the following address:
allplan-connect.com/faq

Feedback on the Help

If you have suggestions or questions on the help, or if you come across an error, send an e-mail to:
Dokumentation@nemetschek.de

Training, Coaching and Project Support

The type of training you are given is a decisive factor in the amount of time you actually spend working on your own projects: a professional introduction to the programs and advanced seminars for advanced users can save you up to 35% of your editing time!

A tailor-made training strategy is essential. Nemetschek's authorized seminar centers offer an extensive range of programs and are happy to work out a custom solution with you that will address your own needs and requirements:

- Our **sophisticated, comprehensive seminar program** is the quickest way for professional users to learn how to use the new system.
- **Special seminars** are designed for users who wish to extend and optimize their knowledge.
- **One-on-one seminars** are best when it comes to addressing your own particular methods of working.
- One-day **crash courses**, designed for office heads, convey the essentials in a compact format.
- We are also happy to hold seminars on your premises: These encompass not only Allplan issues but include analysis and optimization of processes and project organization.

For more detailed information on the current training program, please consult our online seminar guide, which can be found on our homepage (http://www.nemetschek-training.de).

You can also contact us for full details

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Unit 1: introduction

This unit briefly introduces the seven exercises in this tutorial.

You will create a separate project for these exercises. Then you will make basic settings which apply to all the exercises.

A short troubleshooting section is provided at the end to make sure you succeed.

Objectives

In exercises 1 to 6 you will learn how to use the following modules:

-  **Draft**,
-  **Text** and
-  **Dimension Lines**.

These three modules belong to the **Basic** family.

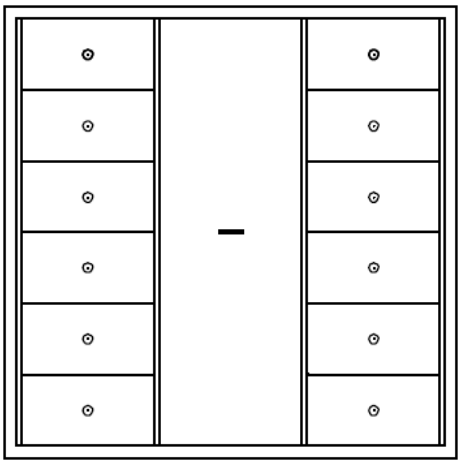
The last exercise gives you a quick and practical introduction to the

-  **3D Modeling**

module in the **Bonus Tools** family.

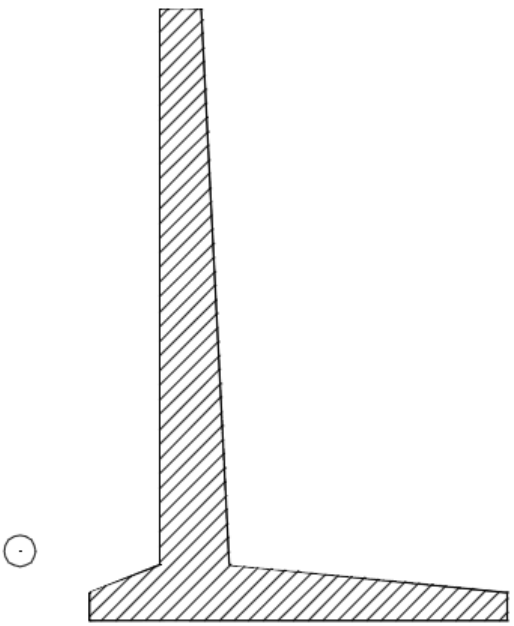
Exercise 1: Design and Modify File Cabinet with Drawers

- Precision drafting using **reference points**
- Using the tools in the Point Assistant (shortcut menu)
- Basic edit tools
- Modifying the offset between parallel lines
- Stretching entities
- Copying and rotating elements



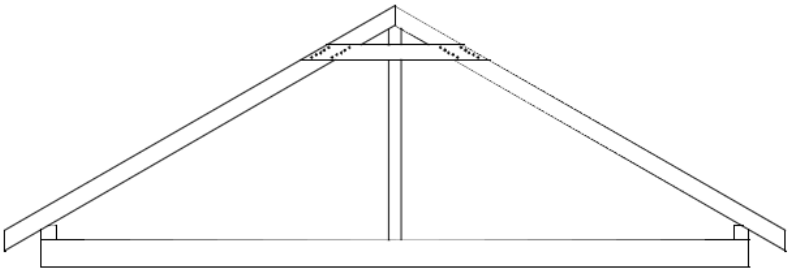
Exercise 2: Retaining Wall with Drainage

- Delta point
- Hatching and hatching definition
- Polyline entry tools



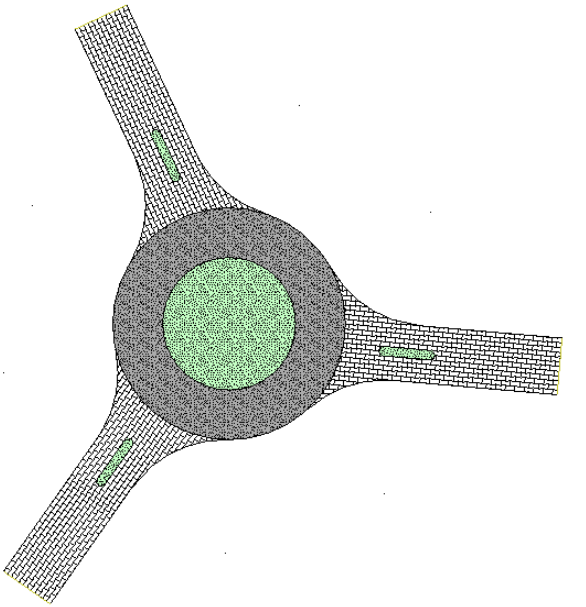
Exercise 3: Purlin Roof

- More tools for editing elements
- Creating labels with leaders



Exercise 4: Rotary

- Creating a circle
- Outline auto-detect
- Defining and using patterns



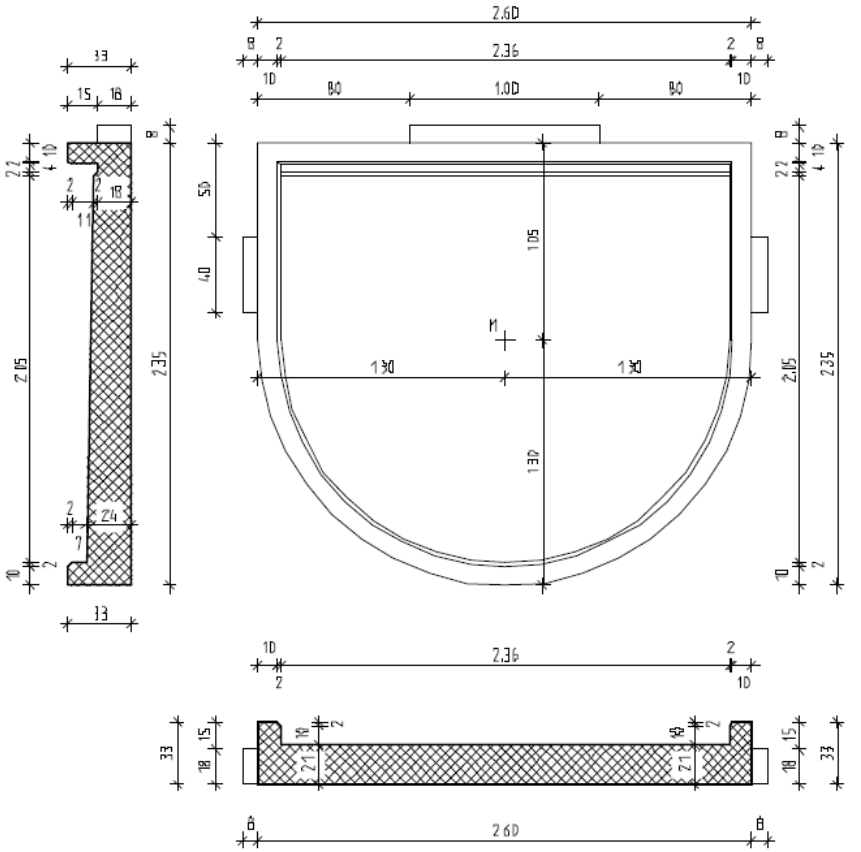
Exercise 5: Title block

- More tools for editing elements
- Creating and saving symbols
- Retrieving symbols from a library

Index	Changed	Date / Name
Drawing	Precast Balcony Unit, Type 12	
Project	New Condominium With Underground Parking	
Client	Client Street, Munich	Date xx.xx.200x
		Created by: Name
Architect	Architects Street, Munich	Checked by: Name
		Scale S 1:50/25
Engineer	Consulting Engineers Street, Munich	Number XXX

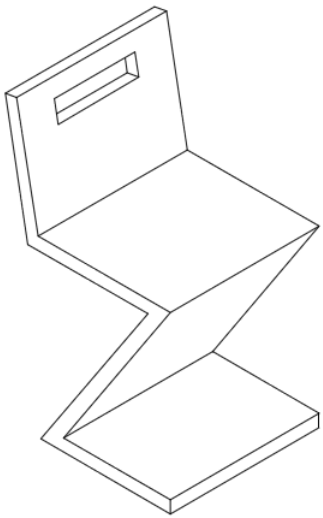
Exercise 6: precast balcony unit

- Creating and modifying dimension lines
- Defining and using hatching styles



Exercise 7: 'Rietveld' chair

- Introduction to 3D modeling
- Using a work plane



Creating a project

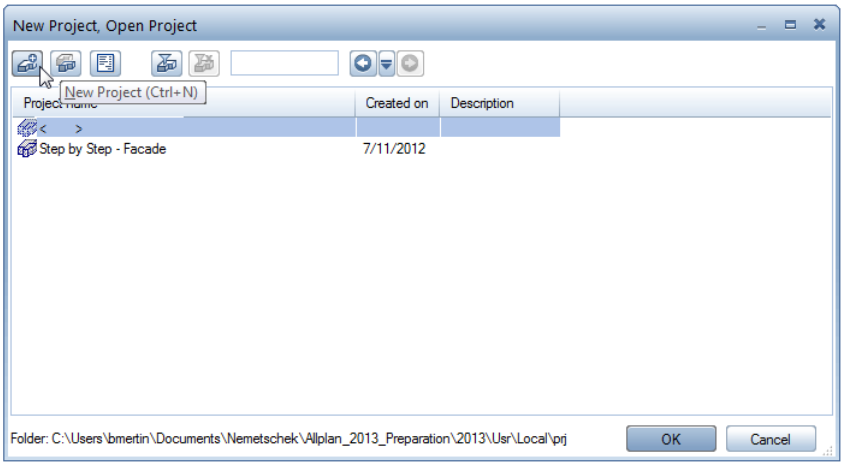
In Allplan 2013, you work with drawing files and NDW files. Drawing files are organized by **project**.

You will start by creating a project for the exercises in this tutorial.

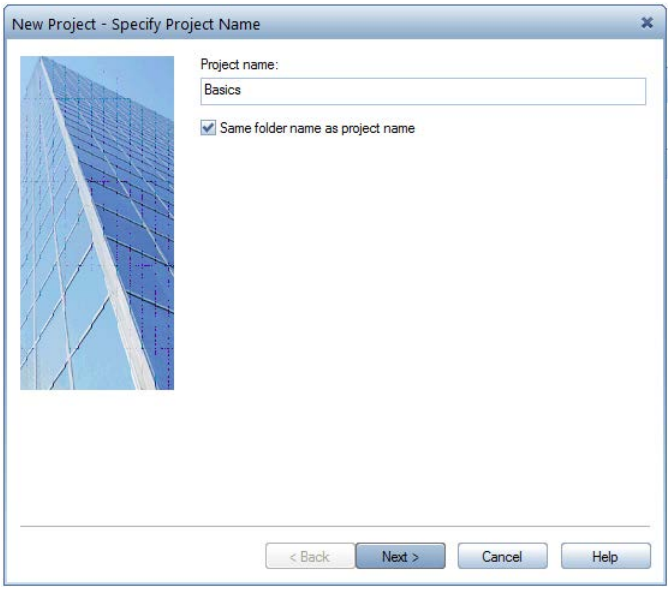
To create a project

1 On the **File** menu, click **New Project, Open Project**.

2 In the **Open Project** dialog box, click **New Project, Open Project...**.



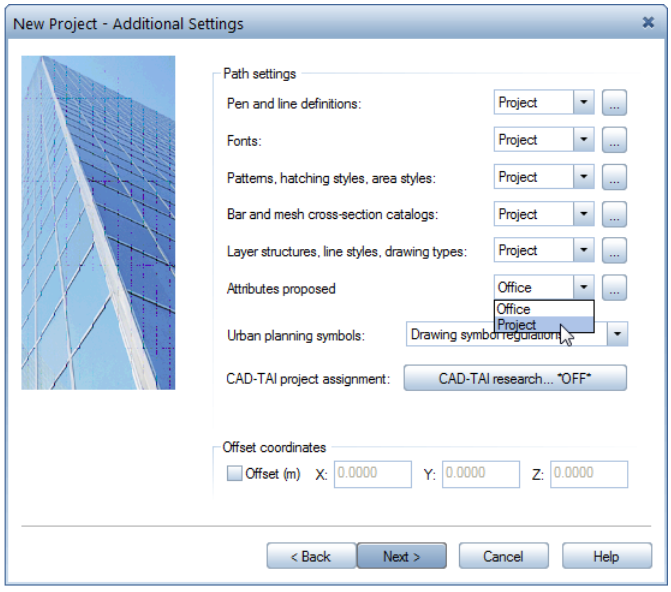
3 *New Project – Specify Project Name*
Type **Basics** for the project name and select the **Same folder name as project name** option.
Click **Next >**.



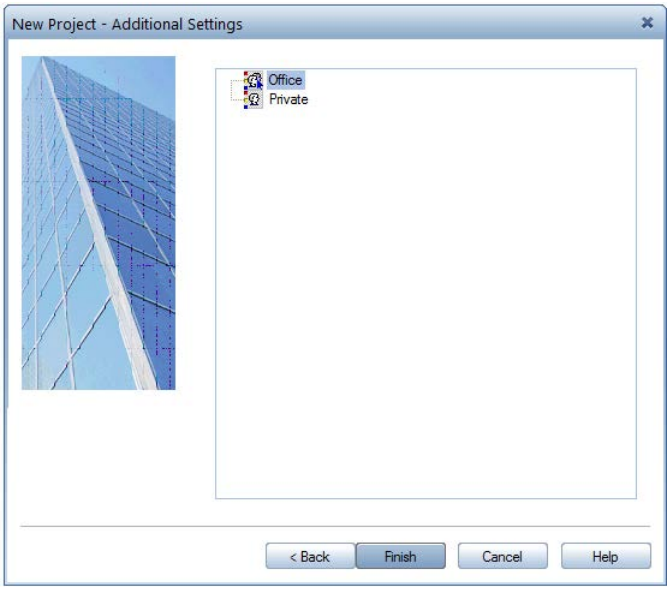
You will define new patterns and hatching styles as you go along. To make sure that you do not make any undesired modifications to the office standard, you will use project-specific settings.

4 Set all the **Path settings** to **Project** and click **Next >** to confirm.

Note:
Organizing projects is described in detail in Allplan's online help and architecture tutorial.



5 *New Project – Additional Settings*
Click **Finish** to confirm the last dialog box.



You are back in **Allplan 2013** in the **Basics** project.

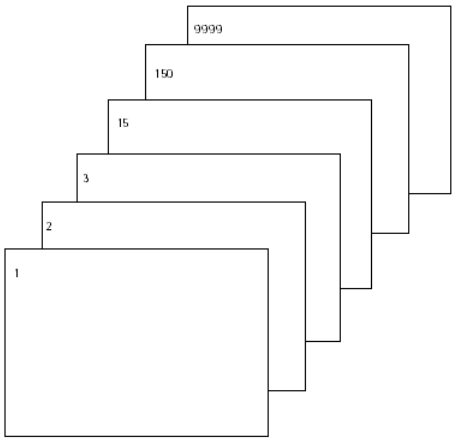
Path settings:
These define whether the pens, line types, hatching styles, fonts and material catalogs available in that project are based on the office standard or whether they are project-specific. In practice, the office standard is generally used.

Office:
Choose this option if you want different projects within the same office to use the same settings (for hatching, line types etc.). If you are working in a network, the office standard is the same on all computers and can only be changed by users with special privileges.

Project:
Choose this option if you want the settings, for instance for patterns and/or hatching styles, to apply to this project only (in which case they will probably be different to those used as the office standard).

Understanding drawing files

In Allplan, the actual design and data creation process happens in *drawing files*. These are the equivalent of the transparencies used in conventional building design. Drawing files can be used to give projects a structure. In IT terms, a drawing file is a conventional file stored on your hard disk. You can display and edit up to 80 drawing files at once - in other words, you can have several files open simultaneously. A project can contain up to 9999 drawing files. When working without layers, the individual building elements (such as walls, stairs, labeling, etc.) are drawn on different drawing files and superimposed like transparencies.



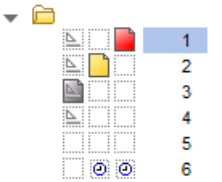
In order to edit the drawing files, they have to be activated (opened). You can do this using the **Open on a project-specific basis: drawing files from fileset/building structure** dialog box.

Drawing file status

With the drawing file status, you define the drawing file on which you draw and which drawing files are visible and/or can be modified.

Tip: You can also use the shortcut menu to change the drawing file status. Click an element in the workspace with the right mouse button and select **Change drawing file status** on the shortcut menu.

The following illustration shows the different drawing file statuses. An explanation is provided in the table below.



Number	Drawing file status	Remark
1	Active	The active drawing file is the one on which you draw. There must always be one active drawing file.
2	Open in edit mode	Elements in drawing files open in edit mode are visible and can be modified. Up to 80 drawing files can be open simultaneously (regardless of whether they are current, in edit and/or reference mode).
3	Open in reference mode	Elements in drawing files open in reference mode are visible, but cannot be modified. You can configure the program to use the same color for all elements in reference drawing files. To do this, select the **Options**, click **Desktop environment** and open the **Display** page. Empty drawing files cannot be opened in reference mode.
4	Inactive	Elements on inactive drawing files are not visible.
5	Empty	Empty drawing files have no data type icon.
6	Assigned temporarily	The drawing file is assigned temporarily to the fileset; this assignment is removed when you switch to a different fileset.

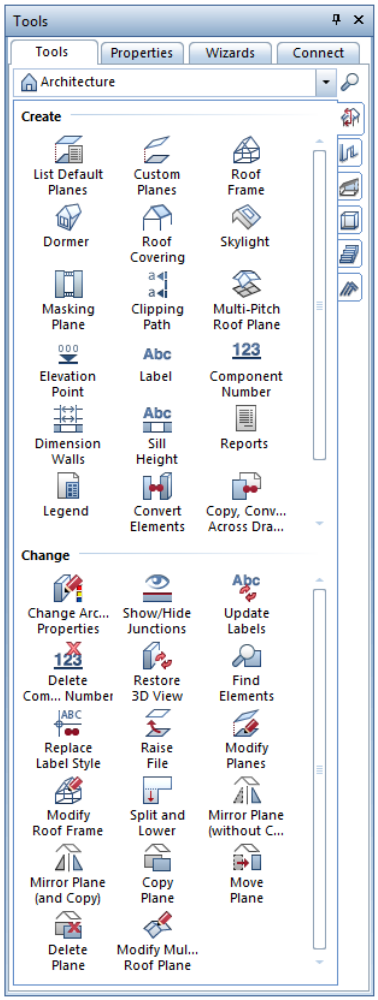
Basic Settings

Next, make settings that you will use in the exercises.

Palette configuration

In Allplan 2013 the palette configuration is set by default. This configuration displays the **Tools**, **Properties** and **Wizards** and **Connect** palettes on the left and the **Filter Assistant** and **Edit** toolbar on the right.

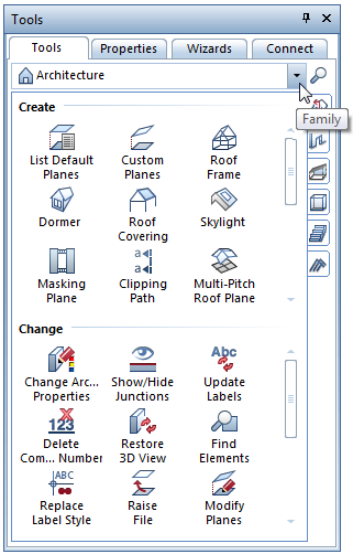
You can use the first three palettes to access the families, the modules and their tools, the properties of design entities and the wizards.



When the **Tools** tab is open at the top, the following options are available:

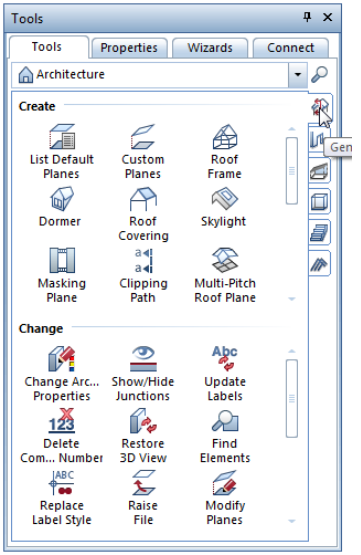
Drop-down menu at the top

Select a **family**:



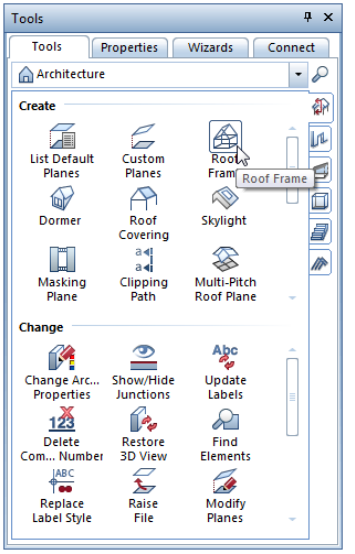
Tabs on the right

Select a **module**:



Available tools

Select a tool in the **Create** and **Change** areas:



When the **Properties** tab is open at the top, the following options are available:

Drop-down menu at the top

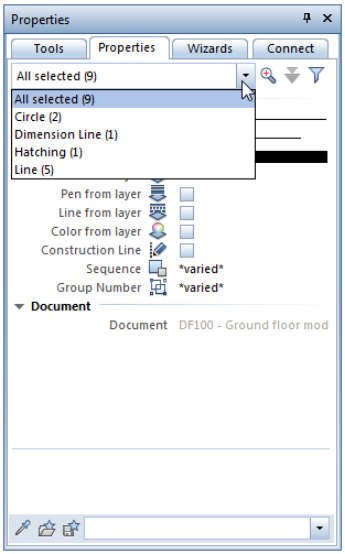
Select active elements

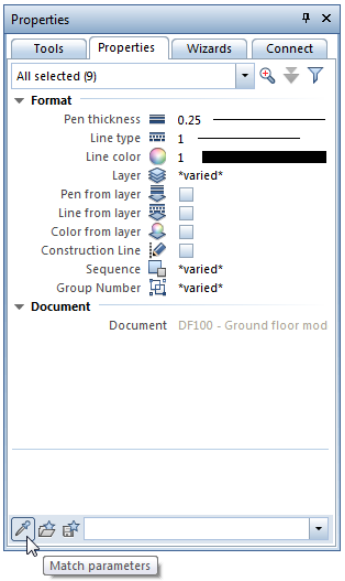
Tools at the top and bottom

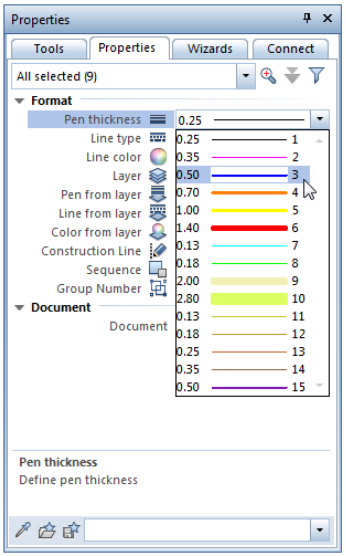
Filter Step by Step
Zoom in on selected objects:
Expand:
Match parameters
Load favorite
Save as a favorite

Element properties

Modify properties



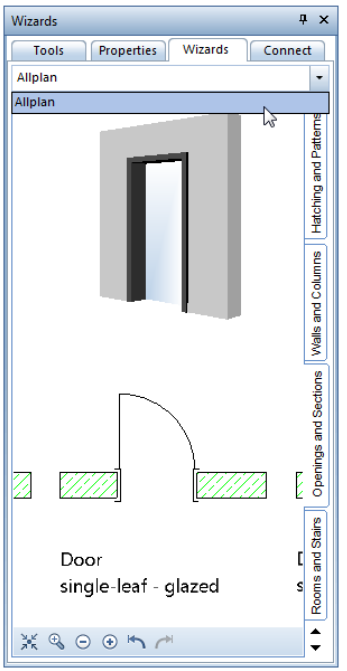




When the **Wizards** tab is open at the top, the following options are available:

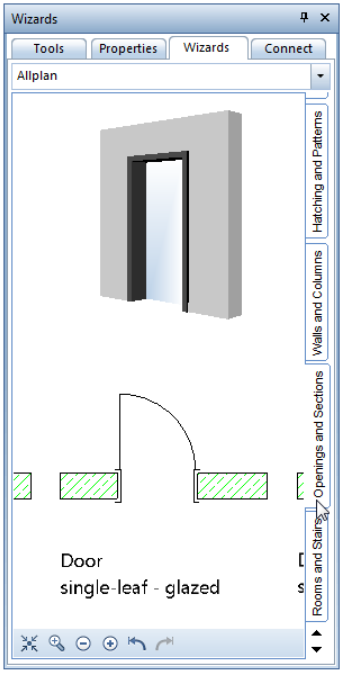
Drop-down menu at the top

Select a wizard group



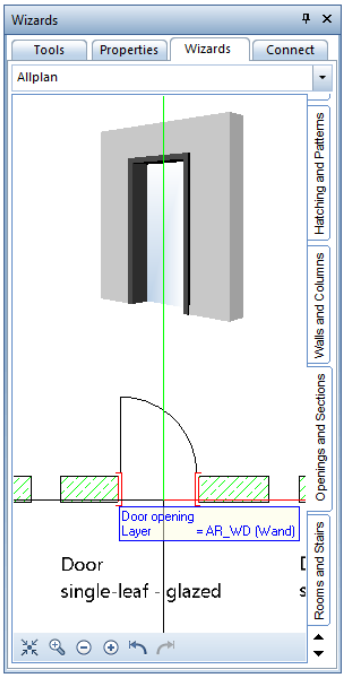
Tabs on the right

Select a wizard

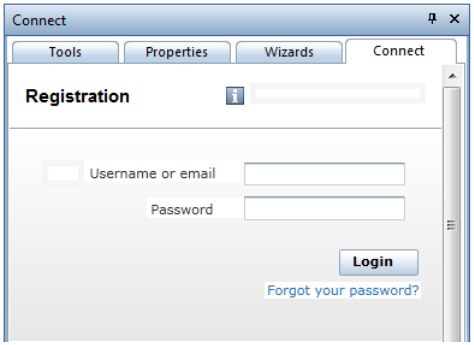


Available tools

Select a tool



Using the **Connect** palette, you can access content provided by Allplan Connect straight from Allplan. You can enter the user name and password directly in the palette or on the **Palettes** tab of the **Customize...** tool on the **Tools** menu.



Note:
You can customize the arrangement of the palettes for your needs using the **Palettes** tab of the **Customize...** tool (**Tools** menu). As an alternative, open the shortcut menu of a palette and select **Customize...**.

Settings in the Tools palette

You will use the tools in the **Draft** module for the first exercises. Activate the **Draft** module in the **Tools** palette.

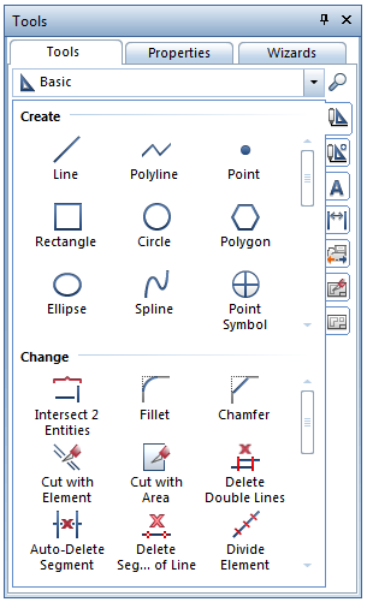
To adjust the settings in the Tools palette for the exercises that follow

1 Select the **Tools** tab in the palette.

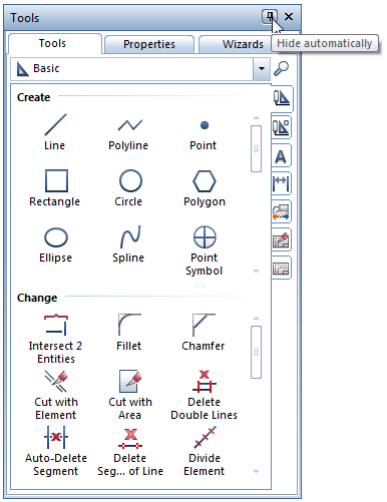
2 Select the **Basic** family on the drop-down menu.

3 Use the tabs on the right to select the **Draft** module.

The program presents the tools in the **Draft** module in the **Create** and **Change** areas:



Note: You can use **Hide automatically** to show ( ) and hide ( ) the palettes.



Track tracing

Track tracing facilitates the intuitive design process. As you are working with fixed measurements in the majority of the exercises that follow, it is a good idea to switch track tracing on and off as you need. Track tracing is on by default.

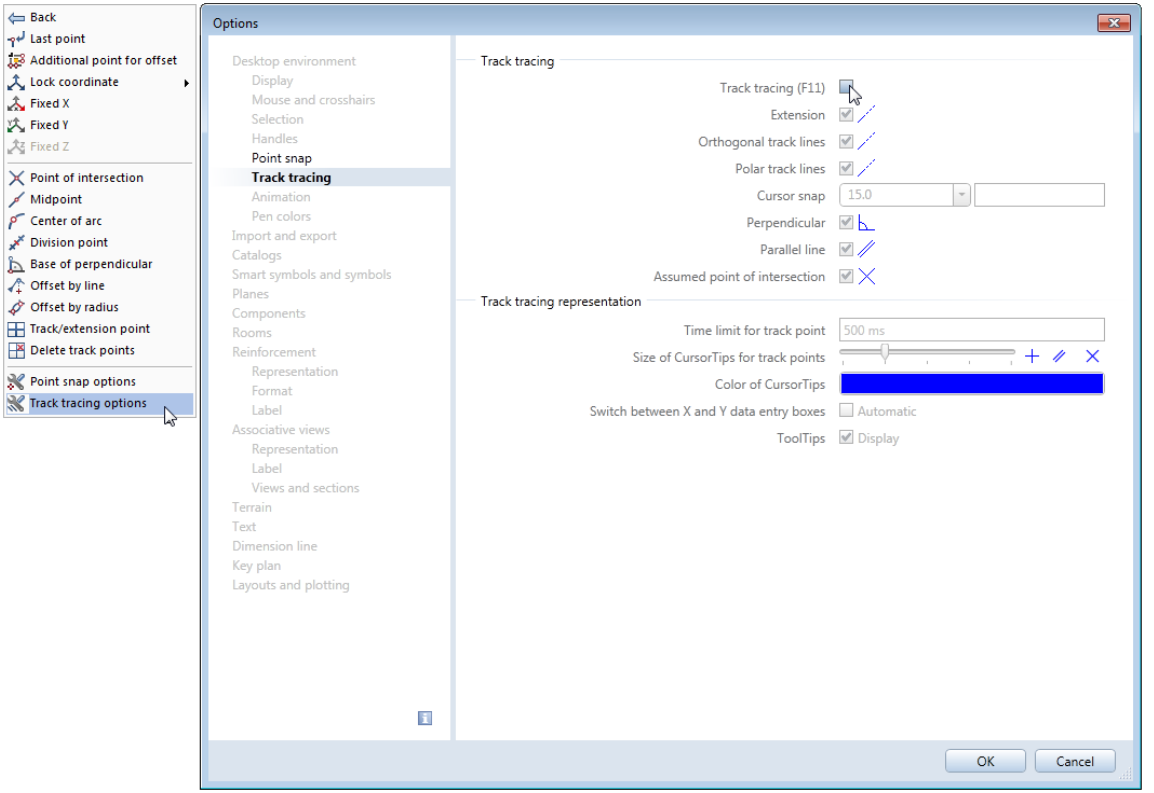
Tip: You can quickly switch track tracing on and off at any time while entering points by pressing the **F11** key or clicking **Track line** in the dialog line.

To switch track tracing on and off

1 Click **Line** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).

2 Click in the workspace with the right mouse button and select **Track tracing options** on the shortcut menu.

3 Switch **Track tracing** off.



4 Click **OK** to confirm the settings and press ESC to quit the tool.

5 Repeat these steps to switch track tracing on again.

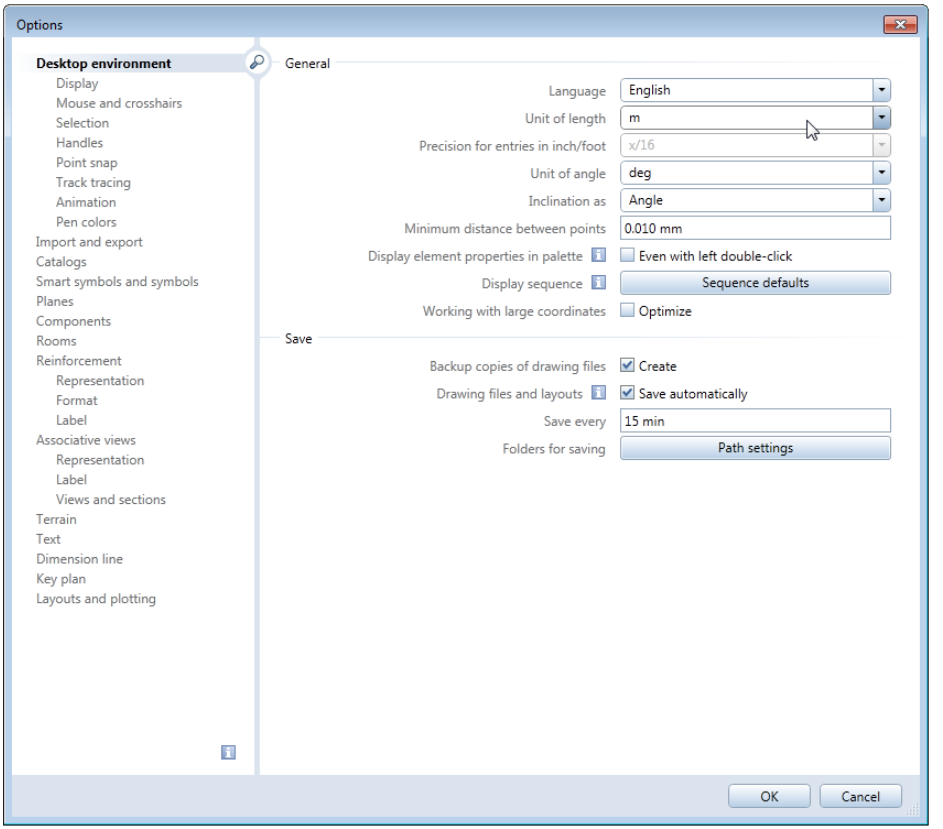
Options

You can set defaults for each of the modules in Allplan.
You will use the unit **m** for the following exercises.

To set options

1 Click **Options** (**Standard** toolbar) and select **Desktop environment** in the area on the left in the **Options** dialog box.

2 Check the **Unit of length** in the **General** area on the right. If it is not set to **m**, click the button and select **m**.



3 Click **OK** to confirm the settings.

Pen settings

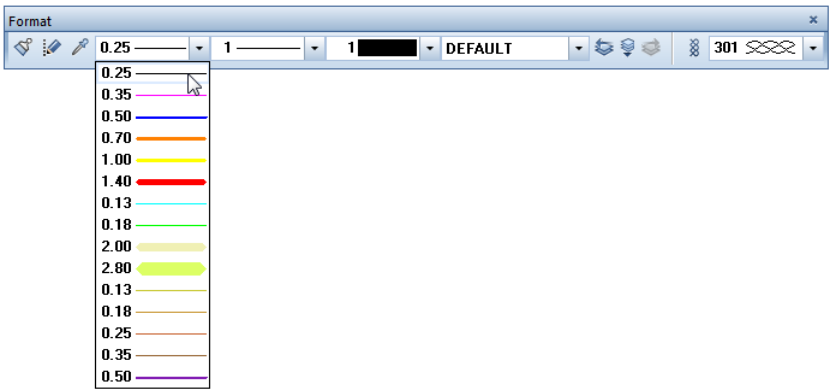
Before you start drawing, you need to define the line thickness (pen) and the line type on the **Format** toolbar. You can change these settings at any time while you are drawing or later.

Each element can be given one of Allplan's 256 line/element colors. However, the manner in which elements are displayed on screen depends on the setting of the **Color stands for pen** option in  **Show/Hide** (**Standard** toolbar):

- When the **Color stands for pen** option is active, the element is automatically displayed in the color that is associated with the current pen thickness (default).
- When the **Color stands for pen** option is not active, the element is displayed on screen using the line color you selected.

To set the pen and line type

1 Click **Select Pen Thickness** on the **Format** toolbar and set it to **0.25 mm**. The selected pen is displayed.



2 Click **Select Line type** and choose **Line type 1** (a continuous line).

3 Click **Select Line Color** and choose **Color 1** (black).
You will use these settings in the following exercises.

All the exercises in this guide are drawn with these basic settings even if this is not specified explicitly.

You can structure drawing files in two different ways:

- You can use the fileset structure or
- the building structure.

The two structures can be used in parallel manner. The building structure is particularly useful for applying a logical structure to a building.
As the exercises in this tutorial do not build on one another, a separate drawing file is used for each exercise. For this, you will use the fileset structure.

How to ...

Sometimes, things will not immediately work out as required. This list helps you succeed.

What if ...

- **... I have selected the wrong tool?**
  Press ESC and click the correct icon.
- **... I make a mistake as I go along?**
  Press ESC to quit (several times if necessary).
  Click **Undo**.
- **... I have inadvertently deleted the wrong elements?**
  If **Delete** is still active, press the right mouse button twice.
  If no tool is active, click **Undo**.
- **... I have unintentionally opened a dialog box or entered wrong values?**
  Click **Cancel**.

What if..

- **..the workspace is empty but you are sure the drawing file contains design data?**
  - Click **Refresh** (in the border of the viewport).
  - Click **Plan**.
- **... the result of a design operation is not displayed correctly?**
  Click **Regen** in the border of the viewport.
- **... the workspace is suddenly divided into a series of different viewports?**
  On the **Window** menu, click **1 Viewport**.
- **...specific kinds of elements such as text or hatching do not appear in the workspace?**
  Click **Show/Hide** (**Standard** toolbar) and check that the elements in question are selected.

Tip: Check whether the relevant layer is set so that it is visible.

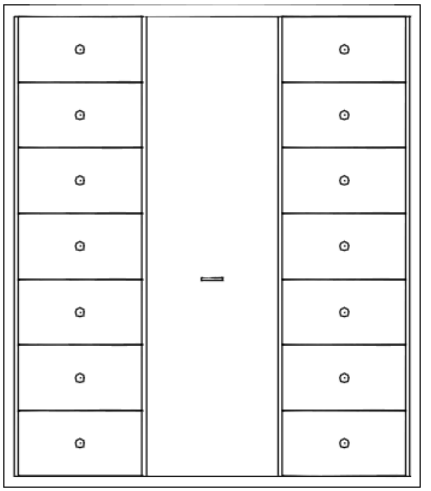
Unit 2: Designing and Modifying 2D Elements

This unit presents Allplan 2013's basic 2D tools. In particular, you will learn

- How to place points precisely
- How to work with track tracing
- How to modify existing elements
- How to apply hatching and patterns As you do so, you will familiarize yourself with the polyline entry tools, which are used by countless Allplan tools.
- How to modify and redefine hatching styles and patterns
- How to create labels with leaders
- How to create a title block and save it as a symbol
- How to dimension components

Exercise 1: File Cabinet with Drawers

In this exercise you will design a file cabinet with drawers. After this, you will modify the height of the file cabinet.



Use the **Draft** module in the **Basic** family to do this.

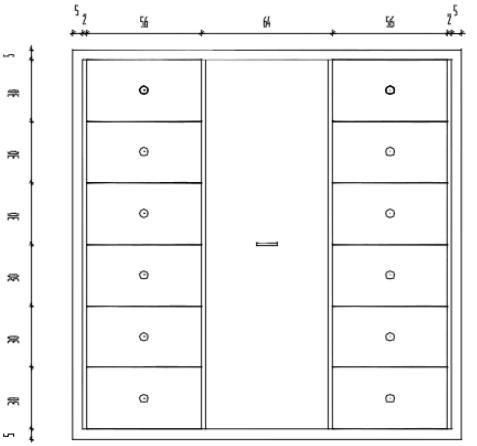
Task 1: Designing the file cabinet

The first exercise shows how to draw rectangles and how to copy and mirror elements. In addition, you will learn how to use the **Reference point**, **Point of intersection** and **Midpoint** functions for precision drafting.

Tools:

- **Point snap options**
- **Point snap and offset entry**
- **Offset Polyline**
- **Circle**
- **Midpoint**
- **Copy**
- **Mirror and Copy**
- **Delta point**

Objective:



Drawing the file cabinet as a rectangle

To draw the file cabinet as a rectangle

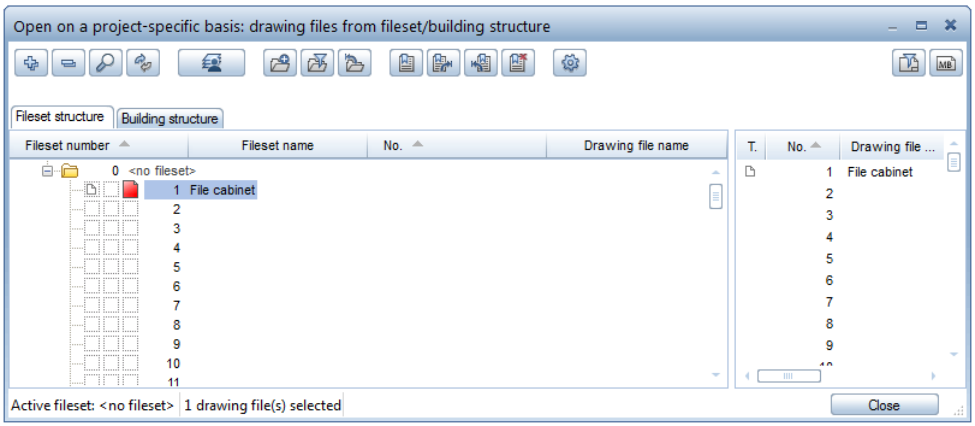
1 Click **Open on a Project-Specific Basis.**

2 Select the **Fileset structure** tab.

3 Click the drawing file number **1** and click a second time inside the selection or press F2.

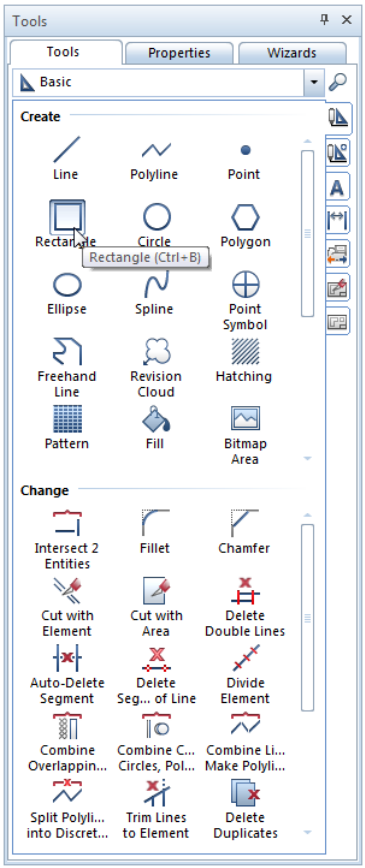
You can now enter a name for the drawing file.

4 Enter **File cabinet** and press ENTER to confirm.



5 Click **Close.**

6 Click **Rectangle** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).



7 Click **Based on diagonal line** in the input options.

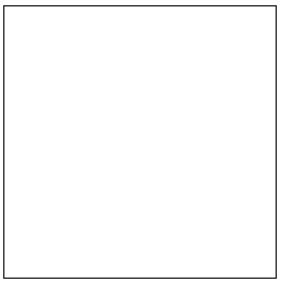
Note: Check that **Create rectangle as a polyline** is not active in the input options, as you will edit individual lines of the rectangle later.

8 Click in the workspace to place the first point of the rectangle.

9 The length of the rectangle in the x direction is 1.8 m. Enter dx=**1.8** in the dialog line. Press the TAB key to activate dy.

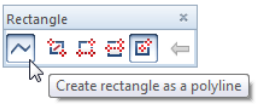
Tip: To switch between , and in the dialog line, use the TAB key or SHIFT+TAB.

10 The height of the rectangle in the y direction is also 1.8 m. Enter dy=**1.8** in the dialog line and press ENTER to confirm.
The file cabinet is displayed as a rectangle in the workspace.



11 Press ESC to quit the **Rectangle** tool.

Creating a rectangle as a polyline



You can use the **Create rectangle as a polyline** option in the input options to do the following:

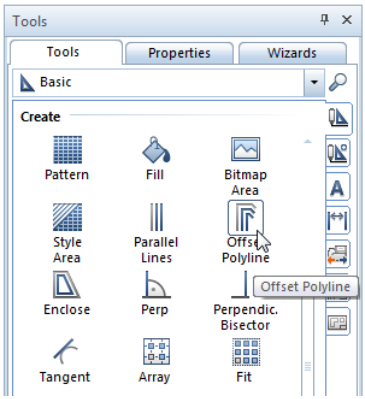
- If **Create rectangle as a polyline** is active, the rectangle is created as *one* connected element, which you can select with one mouse click.
- If is not active, the rectangle consists of individual lines that you can select separately by clicking or as an **entity group** by pressing the SHIFT key while clicking.

Drawing the file cabinet using offset polyline

The next step is to draw the frame of the file cabinet using the **Offset Polyline** tool. You will use **Point Snap** as an aid to precision drafting.

To draw the file cabinet using offset polyline

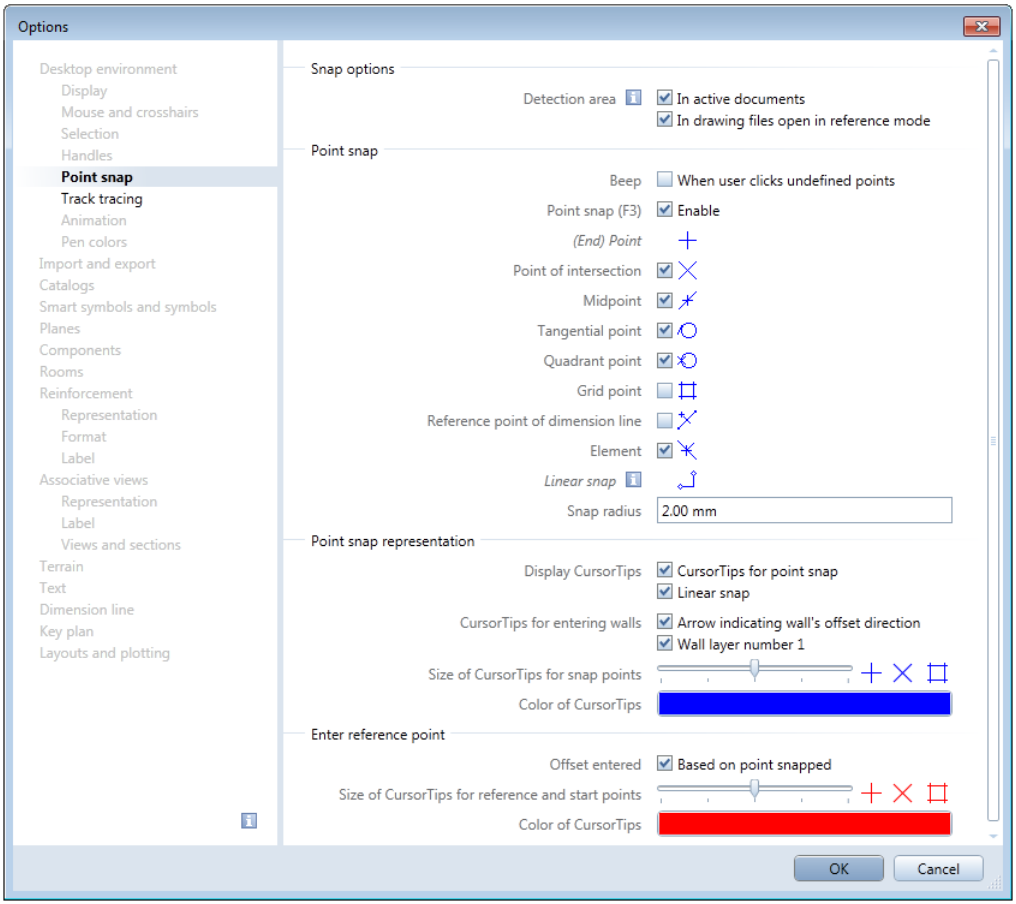
1 Click **Offset Polyline** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).



2 Enter the following values in the dialog line and press ENTER to confirm after each one.
Number of parallel offset lines: **1**
Offset: **0.05**

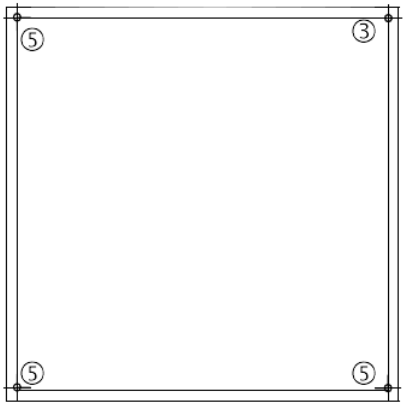
3 Click the top right corner of the rectangle.
Right is active in the input options.

4 Open the shortcut menu by clicking in the workspace with the right mouse button. Select **Point snap options** and select all the options on this page except **Grid point** and **Reference point of dimension line**.



As soon as you point to a point, the system will snap to this point. The point snapped is marked with a red X.

5 To draw the new rectangle outside the existing one, click the corners of the file cabinet *in a counter-clockwise direction*. To close the polyline, the last corner you click should coincide with the first one.



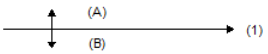
6 Press ESC to quit the **Offset Polyline** tool.

Direction in which the offset polyline is entered

When using **Offset Polyline**, pay attention to the connection between the setting in the input options and the direction in which you enter the polyline:

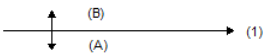
- When set to **right**, you need to enter the points *in a counter-clockwise direction* to draw the outer rectangle. Entering the points *in a clockwise direction* produces the inner rectangle.
- When set to **left**, it is the other way round.

When set to **right**:



(1) Direction
(A) Negative offset
(B) Positive offset

To the **left**:



(1) Direction
(A) Negative offset
(B) Positive offset

Designing drawers

Next, create a drawer using the **Rectangle** tool. Allplan provides a number of tools to help you place points with great precision. In the following section, you will design the drawer by snapping to points and entering offset values.

To design a drawer

1 Click **Rectangle** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).

Note: Check that **Create rectangle as a polyline** is *not selected* in the input options. Otherwise, the rectangle can only be addressed as a single entity. As you need to copy individual lines of the rectangle later, it is essential that the lines can be selected individually.

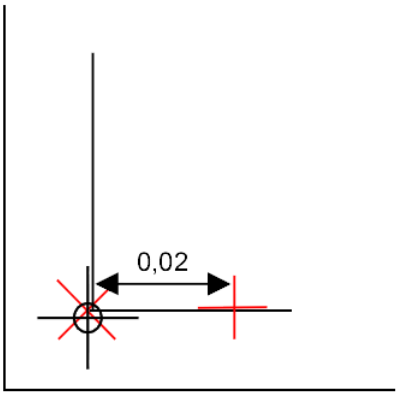
2 Check that **Delta point** is active in the dialog line.

3 To specify the rectangle's start point, point to the bottom left corner of the inner cabinet line.

The system snaps to this point, which is indicated by a blue CursorTip displayed with the crosshairs. A red X is now displayed on this corner, and the **X coordinate** and **Y coordinate** boxes are highlighted in yellow in the dialog line.

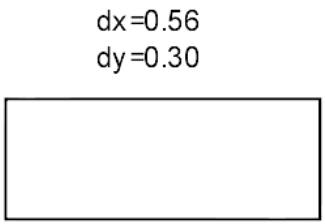
4 If necessary, press the TAB key to activate the **X coordinate** box and enter **0.02**.

A red point symbol (+) moves to the right.



5 Click the corner or press ENTER to confirm.
The first point of the drawer is now defined.

6 Enter the coordinates of the diagonally opposite point of the rectangle in the dialog line:
dx = **0.56**
dy = **0.30**
Press ENTER to confirm.



7 This completes the first drawer. Now you will design the other drawers based on this first one.

8 Press ESC to quit the **Rectangle** tool.

Placing points using point snap and offset entry

- Point to a point (do not click!):
The system snaps to this point, the data entry boxes in the dialog line are highlighted in yellow.
- Enter the relative dX and dY coordinates in the dialog line.
- Press ENTER to confirm: the point is defined.

Creating the knob

Next, create the knob of the drawer using the **Circle** tool. To position the knob exactly, you will use the **Midpoint** option.

To draw a knob

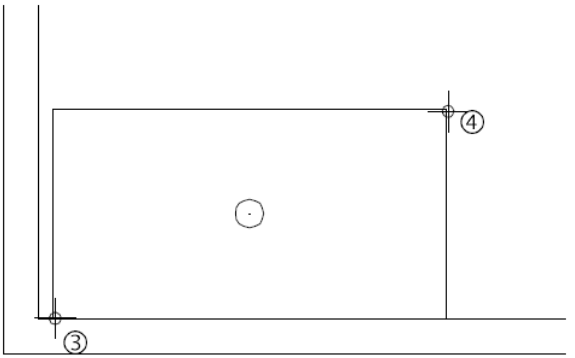
1 Click **Circle** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).

2 To define the first point, open the shortcut menu and click **Midpoint**.

3 First click the bottom left corner of the drawer.

4 Then click the top right corner of the drawer.
The center of the circle is defined.

5 Enter a radius of **0.02** in the dialog line and press ENTER to confirm.



6 Press ESC twice to quit the tool.

Copying the drawer

You can create the other drawers by copying the first one.

To copy the drawer

1 Click **Copy** (**Edit** toolbar).

Tip: Elements can be selected by enclosing them in a selection rectangle. The **Select elements based on direction** option is active by default: when you open the selection rectangle in the positive X direction, only the elements that are fully bounded by the selection window are selected; when you enter the selection rectangle in the negative X direction, all the elements that are fully or partially bounded by the selection window are selected.

2 Use the left mouse button to enclose the entire drawer in a selection rectangle.

The knob is also selected as it is within the selection rectangle.

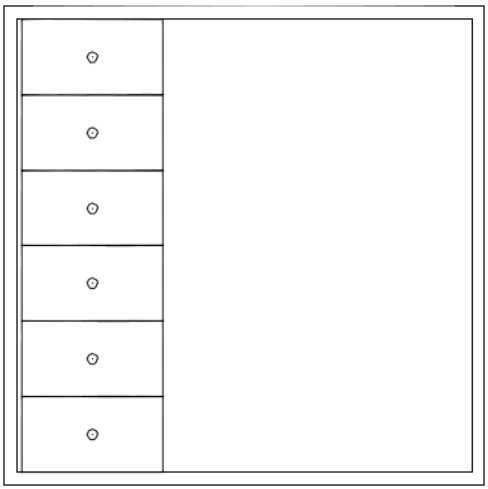
Note:
You can use the **Filter Assistant** to specify how and which elements are selected by the selection rectangle:

Selects the elements that are fully bounded by the selection rectangle.
Selects the elements that are fully or partially bounded by the selection rectangle.
Selects the elements that are partially bounded by the selection rectangle.

3 *From point:*
Click the bottom left corner of the drawer to define the starting point.

4 *Place point (to point) or enter the number of copies*
Enter **5** in the dialog line. You require five copies of the drawer. Press ENTER to confirm.

5 *To point:*
Click the top left corner of the drawer to define the drop-in point. The other drawers are created.



6 Press ESC to quit the **Copy** tool.

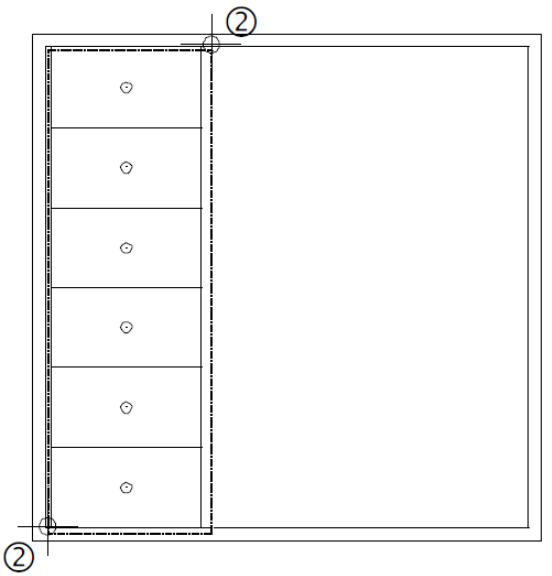
Mirroring drawers

In the next step, you will mirror the drawers to the right using the **Mirror and Copy** tool. You will use the center axis of the file cabinet as the mirror axis.

To mirror the drawers to the right

1 Click **Mirror and Copy** (**Edit** toolbar).

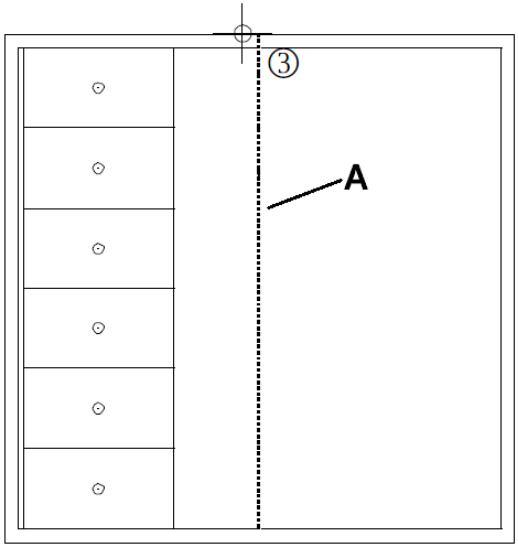
2 Use the left mouse button to enclose the drawers in a selection rectangle.



3 Define the center axis of the file cabinet as the mirror axis. Move the crosshairs to the top line of the file cabinet, open the shortcut menu and click **Midpoint**.

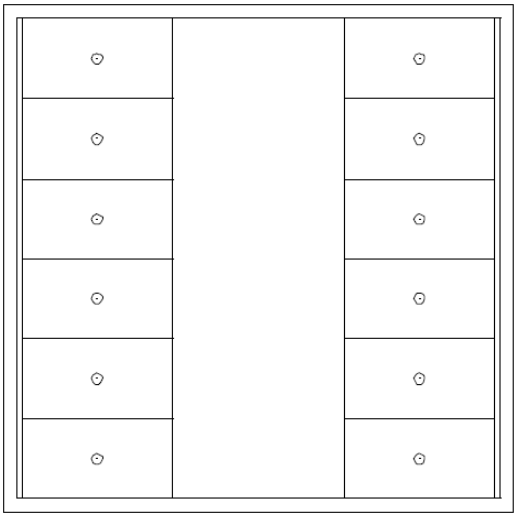
Allplan snaps to the midpoint. This point defines the first point of the mirror axis (see illustration below).

4 To define the second point of the mirror axis, move the crosshairs to the bottom line of the file cabinet and, on the shortcut menu, select **Midpoint** again.



A = mirror axis

The drawers are copied to the right.



5 Press ESC to quit the **Mirror and Copy** tool.

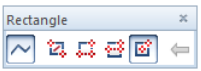
Creating a knob for the door in the middle

Finally, you will draw a knob for the door in the middle. To do this, you will use the **Midpoint** and **Based on center** options.

To create a knob for the door in the middle

1 Click **Rectangle** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).

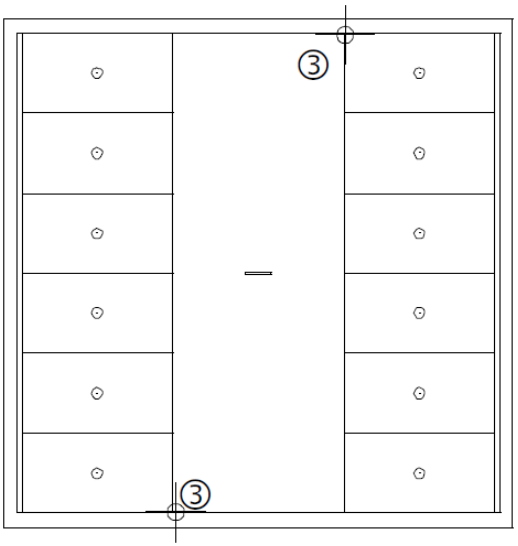
2 Click **Based on center** in the input options.



3 Open the shortcut menu and choose **Midpoint**. Then click two diagonally opposite corners of the door in the middle. This defines the center of the rectangle.

4 Enter **0.1** for the length and press ENTER to confirm.

5 Enter **0.01** for the width and press ENTER to confirm.



6 Press ESC to quit the tool.

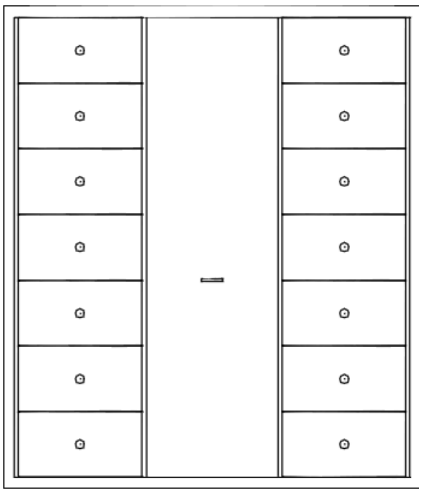
Task 2: Modify File Cabinet

Based on the file cabinet designed beforehand, you will now create a new cabinet with a height of 2.1 m and seven drawers. Start by copying the design to a new drawing file. Then you will modify the design. In this section you will find out about the two most important modification tools: **Parallel Lines** and **Stretch Entities**.

Tools:

- **Copy/Move Elements between Deocuments**
- **Stretch Entities**
- **Brackets**
- **Parallel Lines**

Objective:



Copying drawing files

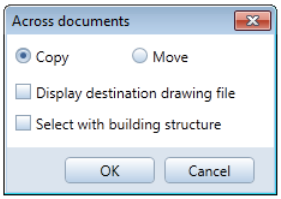
Begin by copying the file cabinet you created in the last exercise to a new drawing file.

To copy the drawing file with the file cabinet

➲ Only drawing file **1 File cabinet** should be open.

1 On the **File** menu, click **Copy, Move Elements between Documents...**.

2 Select **Copy**, clear the **Select with building structure** check box and click **OK**.

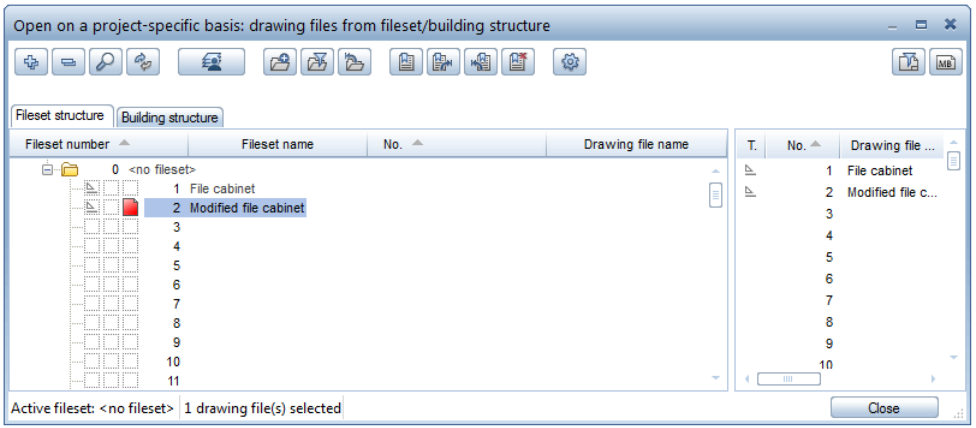


3 Select an empty drawing file and click **OK** to confirm.
The system prompts you to select the elements you want to copy to the new drawing file.

4 Double click with the right mouse button in the workspace to address all the elements in the drawing file or click **All** in the input options.
This copies the file cabinet to the new drawing file.

5 Click **Open on a Project-Specific Basis** and select the drawing file to which you have copied the file cabinet.

6 Enter a name for drawing file 2, e.g. **Modified file cabinet**.



7 Make drawing file 2 current and close drawing file 1 and close the dialog box.

8 Click **Refresh** to display the file cabinet in its entirety on screen.

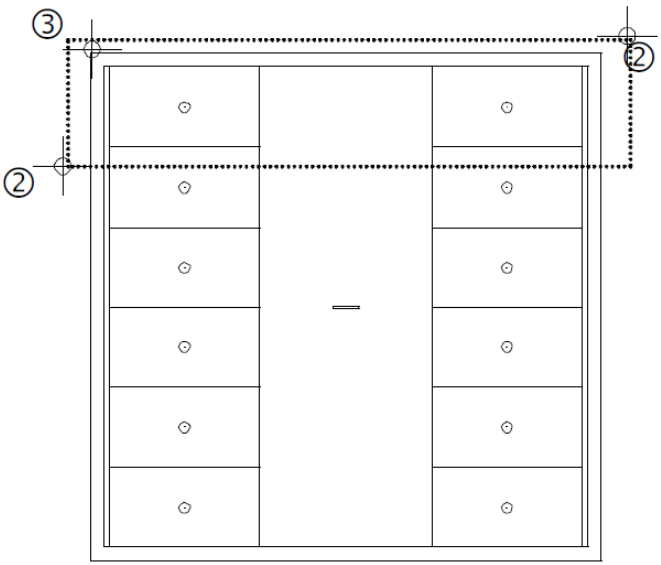
Stretching entities

The next step involves modifying the two top corners of the file cabinet. This way, the file cabinet is given a new height of 2.1 m. In addition, you will add two drawers using the **Copy** tool. This time you will not work with the selection rectangle. Rather, you will use the **brackets** to select the elements.

To stretch entities

1 Click **Stretch Entities** (**Edit** toolbar).

2 Select all the points on the entity you want to stretch. Enclose the two top drawers in a selection rectangle in order to select together.
The system prompts you to specify where the selected elements are to be moved.



3 *From point:*
Click the top left corner of the file cabinet.

Tip: You can also enter the values in the dialog line without clicking a start point:
dx = 0
dy = 0.30

4 *To point:*
The height of the file cabinet is to be 2.1 m; in other words, you need to lengthen it by 0.3 m in the y direction. Click **Delta point** in the dialog line and enter dy= **0.30**.

Press ENTER to confirm.

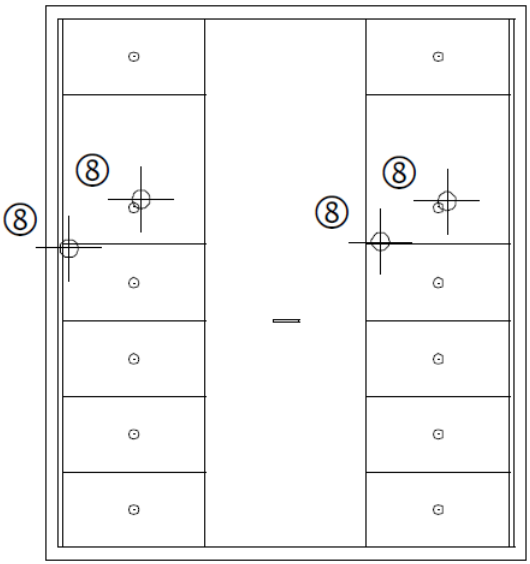
5 Press ESC to quit **Stretch Entities**.

6 Click in the workspace with the right mouse button and select **Copy**.

7 Click **Brackets (Filter Assistant)** or click in the workspace with the right mouse button to open the brackets.

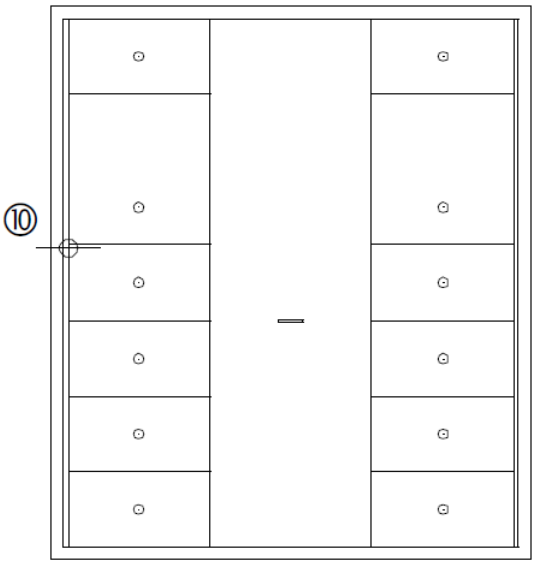
8 Click all the elements that make up the two incomplete drawers (two lines and circles for each drawer) one after the other.

All the elements you clicked are selected and displayed in the selection color.



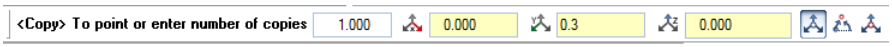
9 Click **Brackets (Filter Assistant)** or click in the workspace with the right mouse button to close the brackets.

10 *From point:*
Click the bottom left corner of the incomplete drawer on the left.

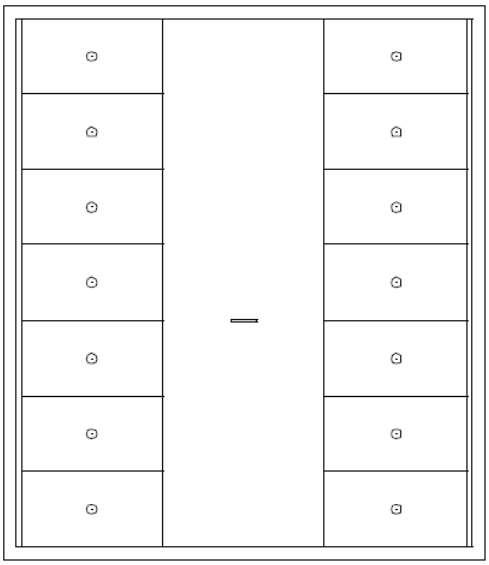


11 *Place point (to point) or enter the number of copies*
Enter **1**. Press ENTER to confirm.

12 *To point*
Click **Delta point (dialog line)** and enter **0.3** in the y direction.



13 Press ENTER to confirm.



14 Press ESC to quit the **Copy** tool.

Using the brackets to select and modify several elements and regions together

- Open the brackets with **Brackets** (**Filter Assistant** or click in the workspace with the right mouse button).
- Click individual elements or use selection rectangles to select the relevant elements.
- Elements that you select inadvertently can be unselected by clicking again.
- Click **Brackets** again to close the brackets.

Adding a frame

To finish, you can now enhance the file cabinet by adding a frame to the door in the middle. To do this, use the **Parallel Lines** tool.

To add a frame

1 Click **Parallel Lines** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).
The system prompts you to select an element.
Click the inner cabinet edge on the left-hand side.

2 *Point through which element is to pass / enter offset:*
Enter **0.6** in the dialog line and press ENTER to confirm.

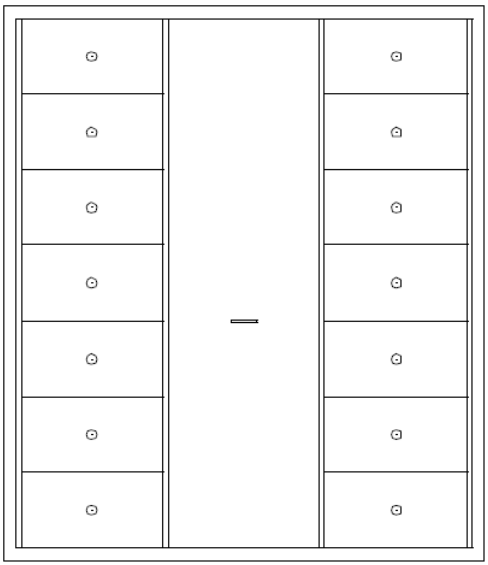
3 *Which side?*
Click in the workspace to the right of the line.

4 *Number:*
Enter **1** and press ENTER to confirm.

5 The **Parallel Lines** tool is still active. The distance to the next line is calculated based on the new line you just created.

6 Enter **0.6** in the dialog line and press ENTER to confirm.

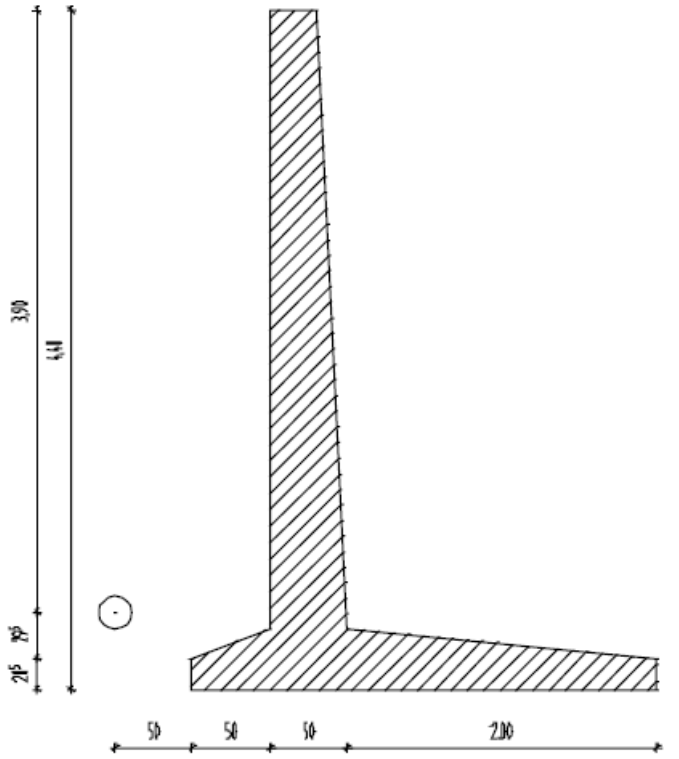
7 *Number:*
Enter **1** and press ENTER to confirm.



8 Press ESC to quit the tool.

Exercise 2: Retaining Wall with Drainage

In the following exercise, you will design a cross-section of a retaining wall with drainage.



Use the **Draft** module in the **Basic** family to do this.

Task 1: Designing a retaining wall with drainage

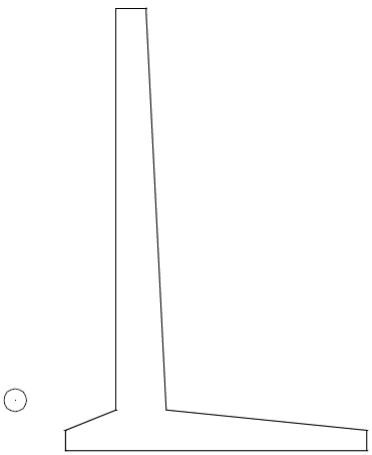
In this section, you will learn how to use delta points to create lines that are not parallel to the x and y axes. Delta points allow you to place a point at a specific distance from an existing point.

To do this, use **Delta point** in the dialog line.

Tools:

- **Line**
- **Delta point**
- **Circle**
- **Track line**

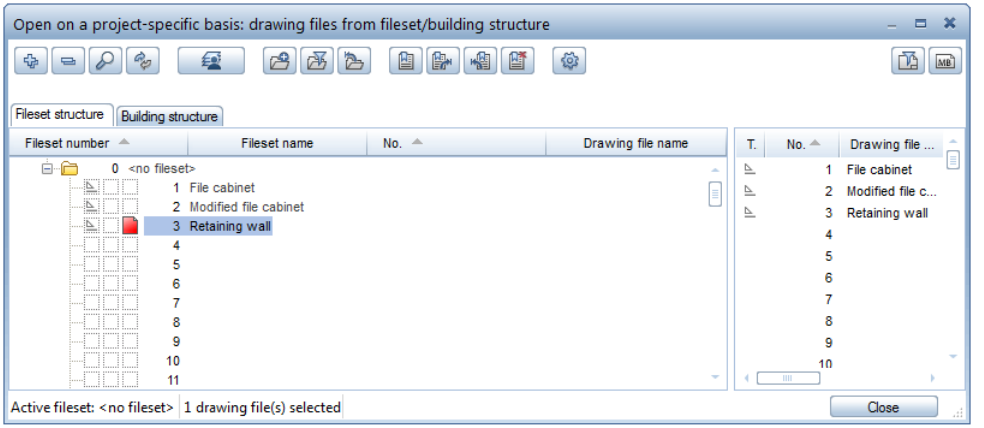
Objective:



Retaining wall of angular shape

To draw a retaining wall of angular shape

1 Click **Open on a Project-Specific Basis**, select the **Fileset** structure tab and open an empty drawing file. Name it **Retaining wall** and close all the other drawing files.

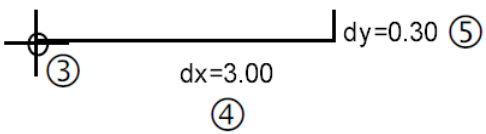


2 Click **Line** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).

3 The **Line** dialog box opens. Select **Polyline** and click where you want the line to start.

4 *<Line> To point*
Enter dx = **3.00** in the dialog line and press ENTER to confirm.

5 *<Line> To point*
Enter dy = **0.30** in the dialog line and press ENTER to confirm.



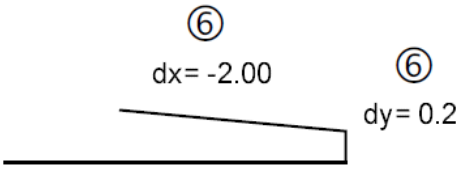
The next point is not at right angles to the previous point. However, you know the offset values in the x and y directions. Use **Delta point** to place this point.

Tip: Check that **Element** is active in the **Point snap options**. To check this, open the shortcut menu with the right mouse button.
Click **Point snap options**.

6 **Delta point** is active in the dialog line.
Enter the following values:
dx = **-2.00**
dy = **0.20**

Tip: Pressing the TAB key takes you to the next data entry box in the dialog line. Press ENTER to accept the values.

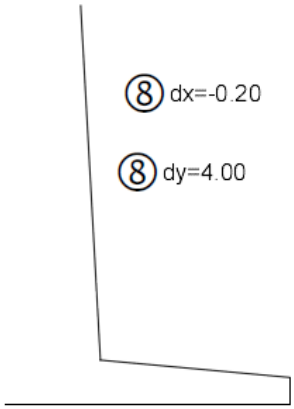
7 Press ENTER to confirm.



Use **Delta point** again to place the next point.

8 Enter the following values in the dialog line:
dx = **-0.2**
dy = **4.0**

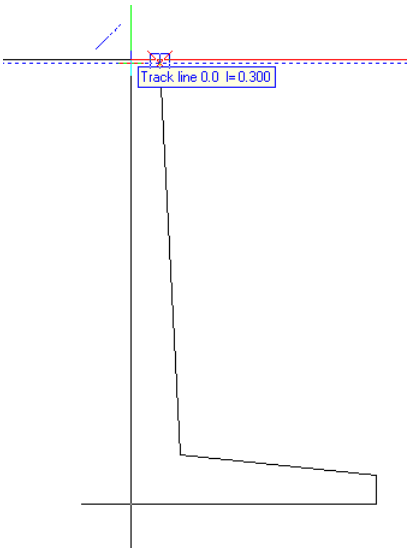
9 Press ENTER to confirm.



10 You can enter the next two lines in two ways:
As these two lines are at right angles to the previous point, you can create them by entering values directly in the dialog line or using the track lines.

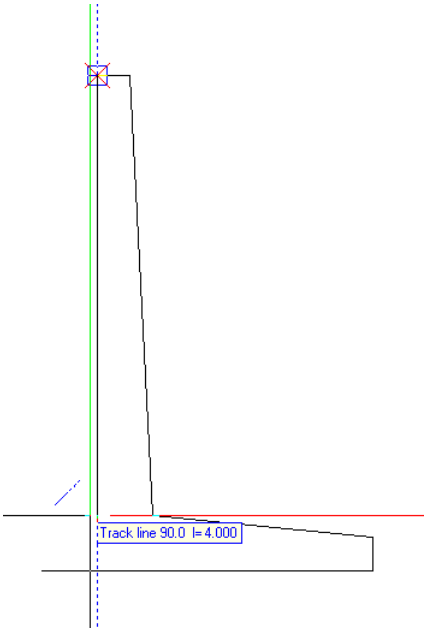
First option:
Draw the horizontal line by entering the length in the x direction in the dialog line: = **-0.30** - ENTER.
Draw the vertical line by entering the length in the y direction in the dialog line: = **-4.00** - ENTER.

Second option:
Activate track tracing by clicking **Track line** in the dialog line.
Point to the end of the line you created last. Now move the crosshairs slowly to the left. The track line 0.0 appears.



As soon as Allplan displays l = 0.300 for the offset, click this point or enter 0.3 m for the **Offset to reference point** in the dialog line. Then press ENTER to confirm.

To draw the second line using track tracing, slowly move the crosshairs vertically downwards. The track line 90.0 appears.

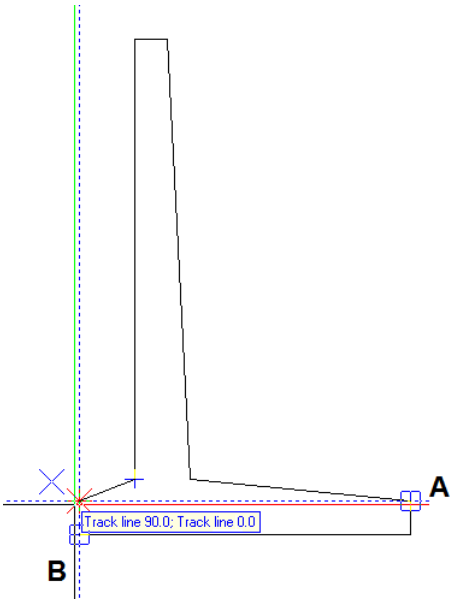


As soon as Allplan displays l = 4.000 for the offset, click this point or enter 4 m for the **Offset to reference point** in the dialog line. Then press ENTER to confirm.

11 You can also use track tracing to place the next point.
Point to point A. Wait at least 500 milliseconds. The program creates a track point based on the point snapped.

12 Now point to point B (= first point of the design). Wait there, too, until the program has created track points based on points A and B - this is indicated by a blue square.

13 Starting at point **B**, move the crosshairs vertically upwards as far as the point where the track lines 90.0 and 0.0 intersect.
Click it.



See also:
Track tracing is described in detail in Allplan's online help.

14 Finish creating the retaining wall by clicking the start point of the first line (point **B**).

15 Switch track tracing off by deactivating **Track line** in the dialog line.

16 Press ESC to quit the **Line** tool.

Drainage

To design the drainage

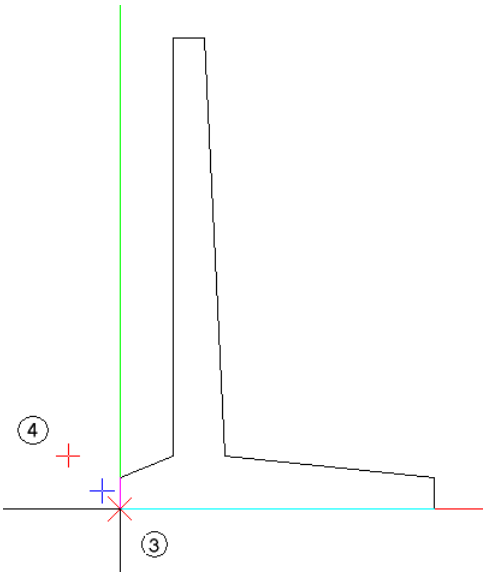
1 Click **Circle** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).

2 The **Circle** Context toolbar opens. Click **Circle based on center** and **Enter full circle**.

3 Point to the bottom left corner of the retaining wall. This point is identified with a red X.

4 **Delta point** is active in the dialog line. Enter the following values:
dx = **-0.5**
dy = **0.5**

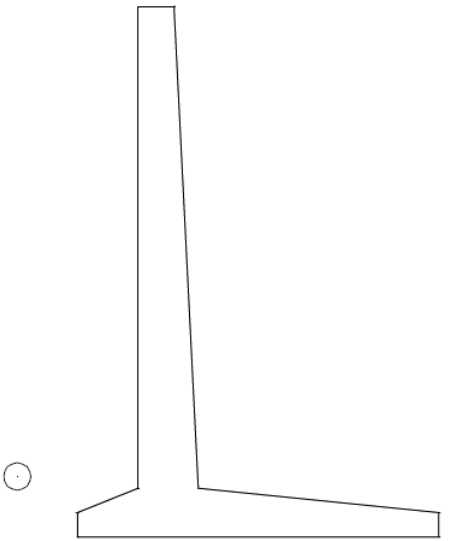
Press ENTER to confirm.



This defines the center of the circle.

5 Enter a radius of **0.1** in the dialog line and press ENTER to confirm.

6 Press ESC to quit the tool.



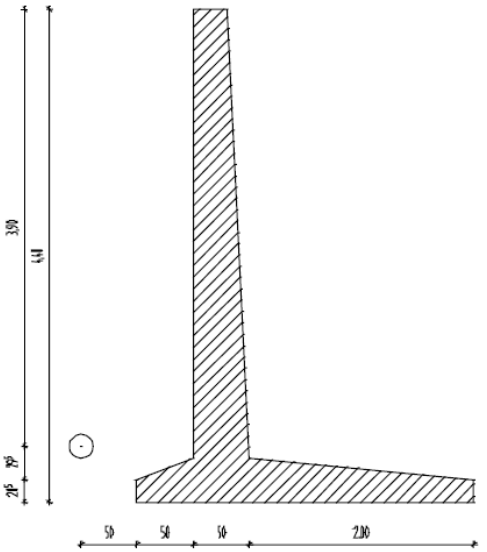
Task 2: Hatching

Now you will apply hatching to the retaining wall. You will also learn about the basic rules for entering polylines. The general polyline input is used by almost all the functions where the system expects you to define polylines or polygonal-bounded areas (e.g. hatching, pattern, fill).

Tools:

- **Hatching**
- **Filter by Element Type**
- **Outline auto-detect**
- **Modify Format Properties**
- **Hatching defaults**

Objective:

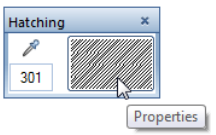


Applying hatching to the retaining wall

To apply hatching to the retaining wall

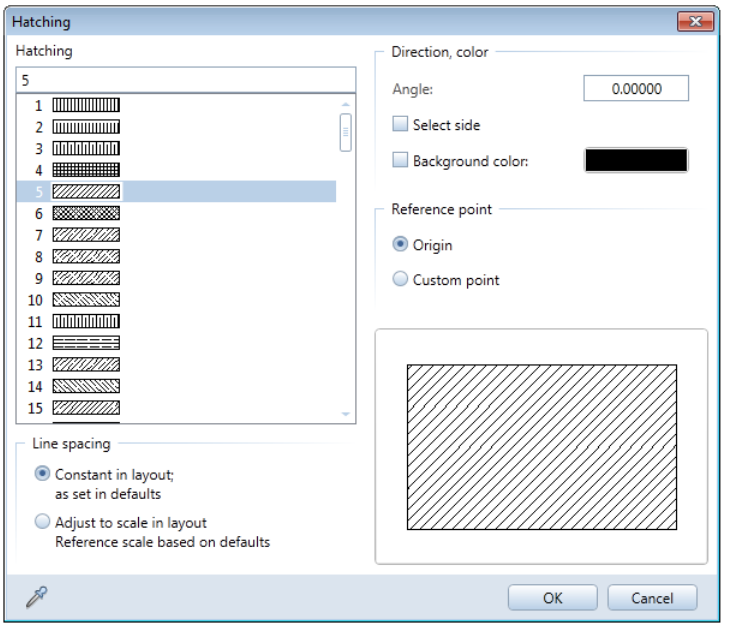
1 Click **Hatching** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).

2 On the **Hatching** Context toolbar, click **Properties**.



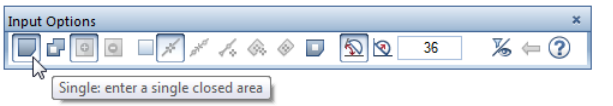
3 Select hatching style **5** and set the parameters as shown below:

- **Line spacing** area:
  Constant in layout, as set in defaults
- **Reference point** area:
  Origin



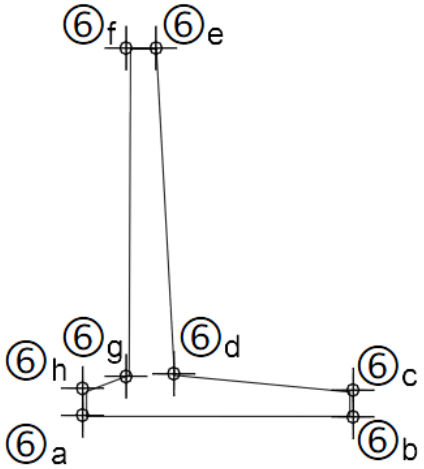
4 Click **OK** to confirm the settings.

5 Click **Single** in the input options.



Tip: When you click **Multi** in the input options, you can enter as many areas as you want.
After you have pressed ESC to finish entering the polyline, hatching is applied to these areas in a single step.

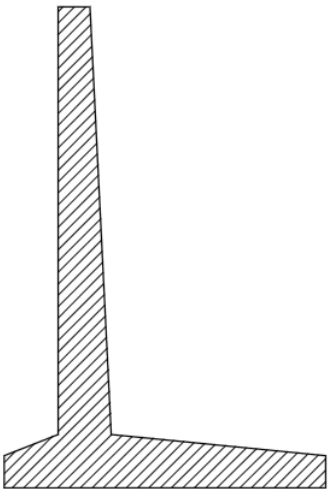
6 To define the area for hatching, click the corners of the retaining wall one after the other.



7 To close the polyline, press ESC after you have clicked the last point or click the first point again.

The selected hatching style is applied to the retaining wall.

8 To display the result correctly on screen, click **Refresh**.



9 Press ESC to quit the **Hatching** tool.

Copying the outline of the retaining wall

In addition to the option of clicking each corner of a polyline (as described above), there are several other ways of entering polygonal-bounded areas. Using the retaining wall as an example, these options are introduced in the exercise that follows.

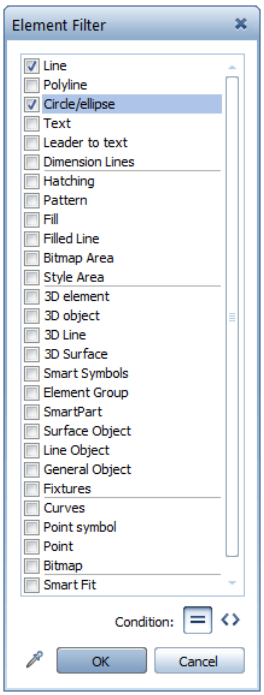
You will start by copying the wall so that several copies are available for practice. To make sure that the hatching is not included in the copies, you will apply a filter.

To copy the outline of the retaining wall

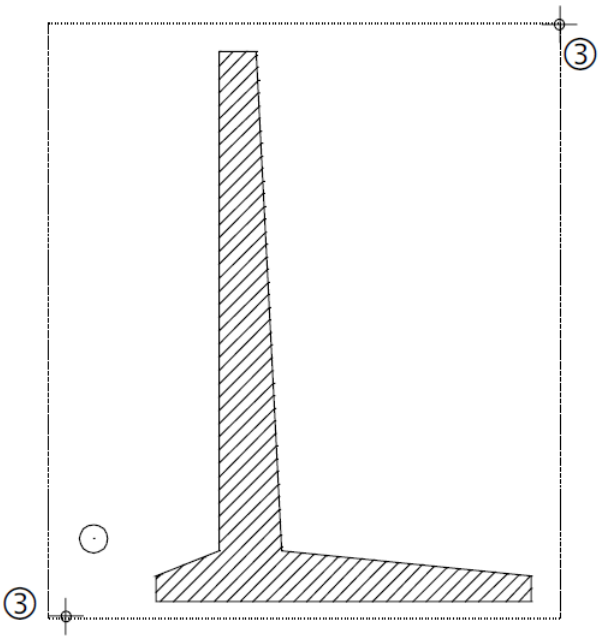
1 Click in the workspace with the right mouse button and select **Copy** on the shortcut menu.
To copy the lines of the wall without the hatching, you can apply a filter.

2 *<Copy> Select the element(s) you want to copy*
In the **Filter Assistant**, click **Filter by Element Type**, select **Line** and **Circle/ellipse** and click **OK** to confirm.

Tip: You can also use the properties of the outline as a filter. Click **Match parameters from final graphics** and then the outline.



3 *<Copy> Select the element(s) you want to copy < =Line =Circle/ellipse >*
Use the left mouse button to enclose the retaining wall in a selection rectangle.
This way, you can ensure that the program only selects lines and circles, regardless of the other elements within the selection rectangle. The polylines are displayed in the selection color.



As you have selected the **Line** and **Circle/ellipse** filters, only the outlines of the retaining wall and the drainage are displayed in the selection color.

4 *<Copy> From point*
Specify the starting point for the copy and place the retaining wall anywhere in the workspace. The position is irrelevant. However, make sure that the two retaining walls do not overlap.

5 Press ESC to quit the **Copy** tool.

6 Click **Refresh** to display the two walls in their entirety on screen.

Applying hatching using outline auto-detect

The next step is to apply hatching to the copy of the retaining wall. To do this, you will use a tool that automatically detects closed, delimited areas.

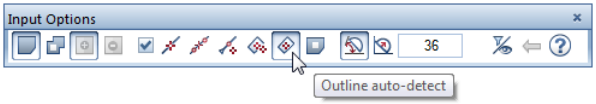
To apply hatching using the outline auto-detect feature

1 Click **Hatching** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).

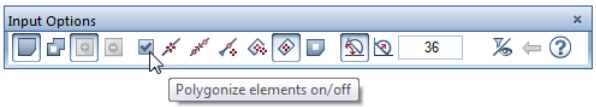
2 **Hatching style 5** is still set.
If it isn't, click **Properties** and select hatching style **5**. Click **OK** to confirm.

3 Click **Single** in the **Input Options**.

4 Select **Outline auto-detect** in the **Input Options**.

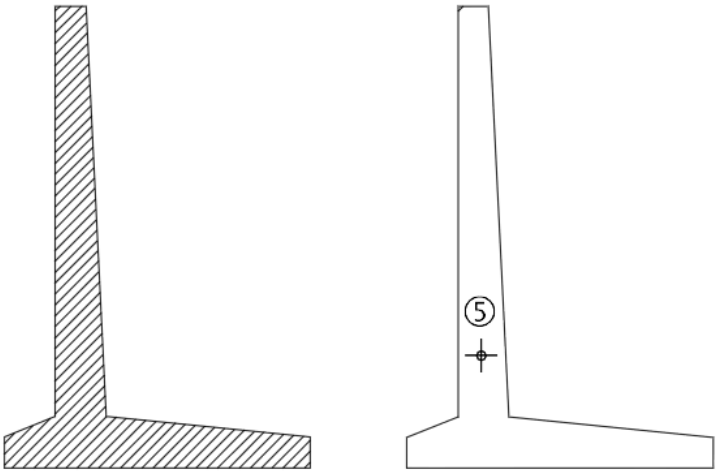


Note: You can only select **Outline auto-detect** when **Polygonize elements** is active.



5 Click a point within the retaining wall.

The entire outline is detected automatically and polygonized. As you have selected **Single** in the input options, the hatching is applied immediately.



6 Press ESC to quit the **Hatching** tool.

7 To display the result correctly on screen, click **Refresh**.

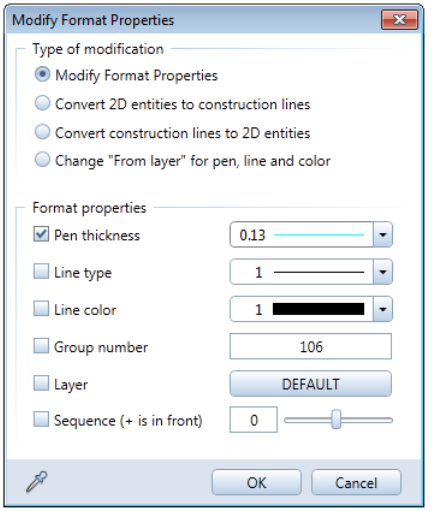
Modifying hatching

Next, modify the pen with which the hatching is drawn.

To modify the hatching pen

1 Click **Modify Format Properties** (**Edit** toolbar).

2 To change the pen, check the **Pen thickness** box and select pen number **7**.



The system prompts you to select the elements you want to draw with the new pen. You should apply a filter to ensure that only the hatching is modified.

Tip: The filters can be combined as desired.

3 In the **Filter Assistant**, click **Filter by Element Type** and select **Hatching**. Click **OK** to confirm.

4 Select the two retaining walls by enclosing them in a selection rectangle using the left mouse button.
Only the hatching is selected and displayed in the selection color.

5 Press ESC to quit **Modify Format Properties**.

Hatching defaults

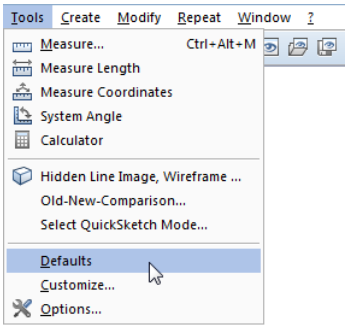
Allplan 2013 comes with a wide range of ready-made hatching styles. You can also define your own hatching styles or modify existing hatching styles.

If you have worked your way through the exercises step by step, you set the paths for patterns and hatching styles to **Project** when you created the project for this tutorial. In other words, any changes you make to defaults (e.g. hatching, pattern) only affect the current project.

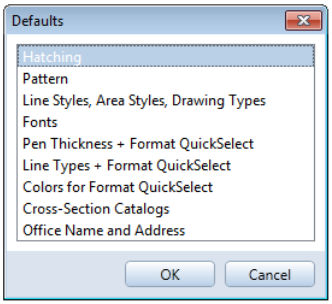
If the path is set to **Office**, however, you run the risk of modifying the office standard. This means that any changes you make will affect all projects based on the office standard.

To define and modify hatching styles

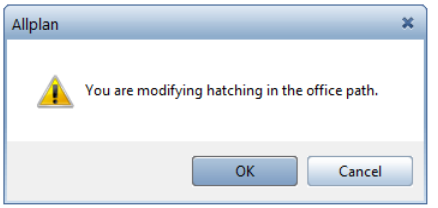
1 On the **Tools** menu, click **Defaults**.



2 On the Context toolbar, click **Hatching**.

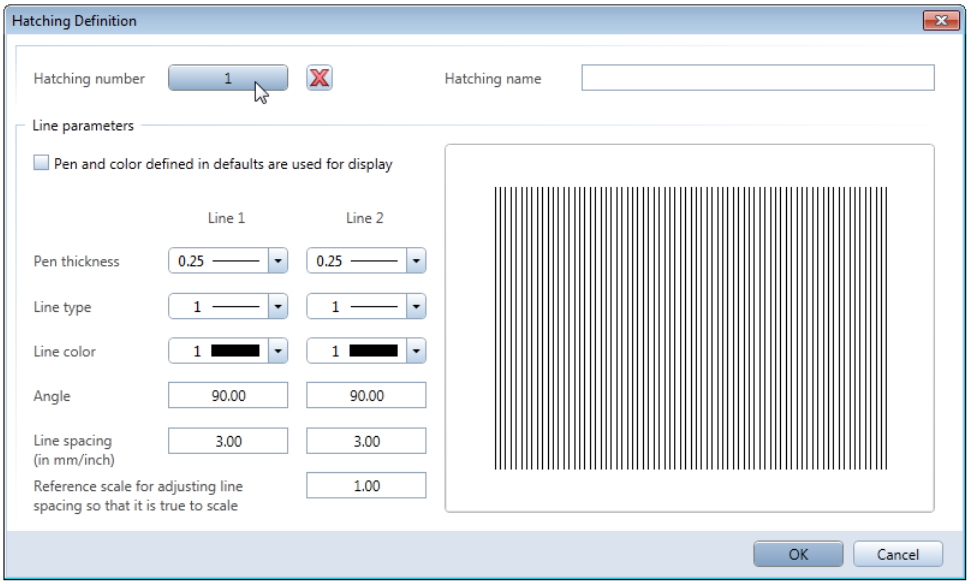


Note: If the **You are modifying the hatching in the office path** message is displayed, the settings you are about to make will modify the patterns and hatching styles in the **office** path.

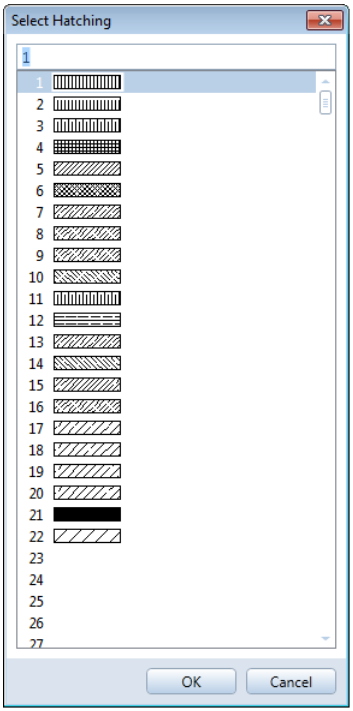


In this case, click **Cancel** and set the path to **Project**, which is described in the following section.

3 Click the button beside **Hatching number** in the top part of the **Hatching Definition** dialog box.



4 Select a hatching number in order to modify it or select an unassigned number to define a new hatching style.



5 Make settings in the **Hatching Definition** dialog box.

6 You can use the **Pen and color defined in defaults are used for display** option to specify whether the pen set on the **Format** toolbar or the pen defined in this dialog box is to be used.

The following section shows how to switch the path settings for patterns and hatching styles to project. You only need to do this when you see the **You are modifying the hatching in the office path** message after you have selected the hatching defaults.

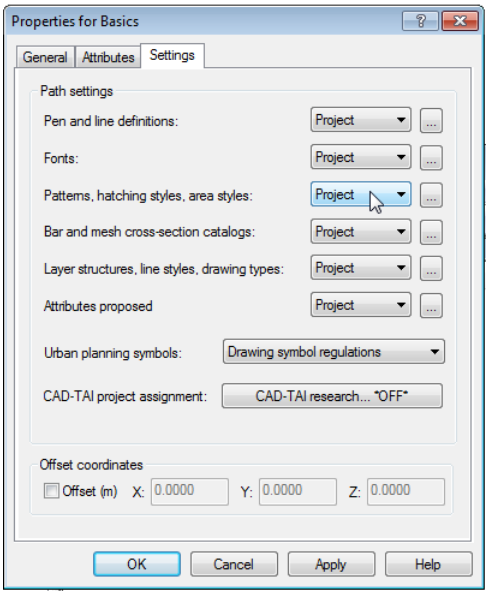
To switch the path settings for patterns and hatching styles to project

Tip: You can also access the path settings by clicking **New Project, Open Project** on the **File** menu. Open the shortcut menu of the **Basics** project and click **Properties....**

1 On the **File** menu, click **ProjectPilot - Admin....**

2 Open the **Projects** folder. Click the **Basics** project with the right mouse button and select **Properties**.

3 Select the **Settings** tab and set the path for **Patterns, hatching styles, area styles** to **Project**.



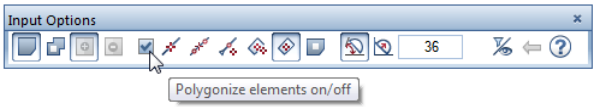
4 Click **OK** to confirm.
A copy of the office standard is created in the selected project.

5 In **ProjectPilot**, click **Exit** on the **File** menu to close ProjectPilot.

Polyline entry tools

When working with Allplan 2013, you will find that the polyline entry tools considerably facilitate the process of identifying points and elements. They are used by countless Allplan tools where you need to define polylines or polygonal-bounded areas (e.g. fills, patterns, slabs, roof outlines ...).

The polyline entry tools are integrated in the **Input Options** and open automatically when you select a tool for which they are available.



To activate the polyline entry tools, all you need to do is select the check box in the input options.

Input options for entering polylines, overview

Whenever you select a tool that uses polyline entry tools (e.g. pattern, hatching, room), the **Input Options** appear. You can use these options to specify how the polyline entry tools behave when you generate polylines based on existing elements and how architectural lines are to be handled.

Entering areas

Single

Use this to create **single**, discrete areas.

Multi

Use this to create areas composed of several polygons. Hatching, patterns or fills are given the same group number; rooms are handled as a single entity. This way, you can make a series of separate rooms which the system will treat as a single unit in subsequent evaluations and analyses of the information in the building model.

Plus, Minus

If you selected **Multi**, you can use **Plus** and **Minus** in the input options to specify whether each new polygon is to be added to or subtracted from the overall area.

Polygonizing existing elements

Polygonize elements on/off

When the check box is not selected, elements are ignored when you click them; only points are detected.

When the check box is selected, the elements you click are polygonized. You can use the options next to this check box to specify the type of polygonization.

Polygonize entire element

This uses the entire element that you clicked. The starting point defines the direction of polygonization. If the last point in the polyline coincides with the start or end point of the element, the direction does not need to be specified.
Use this option when the outline consists of entire elements.

Define area of element to polygonize

With this option, the program prompts you for the area with every element you click (from point, to point).
Use this option when the outline consists of segments.

Enter reference point

With this option, the program prompts you for the reference point with every element you click. This option uses a point on the element you clicked with a defined offset to the reference point.
Click to define a new reference point and then enter the offset to the reference point.
Use this option when you want to specify the outline based on existing elements (when you enter a dormer, for example).

Find closed polylines

When **Find closed polylines** is switched on, areas bounded by lines and polylines are combined to a polygon. The inner or outer boundaries are used depending on whether the temporary point is inside or outside the outline.

By activating **Element filter**, you can configure the program to ignore architectural lines when detecting areas.

Outline auto-detect

You can use **Outline auto-detect** to automatically detect the outlines of closed polygons. Closed areas delimited by design entities of any kind can be used as an outline polygon simply by clicking anywhere within the area. Allplan automatically detects and polygonizes the entire outline. The boundary elements can have points in common, they can intersect and they can touch. This automation feature can be turned on/off as required.

Note: The **Minimum distance between points** setting in the **Options** on the **Desktop environment** page also applies to the **Outline auto-detect** tool. To make sure that outlines with small gaps are detected, you can increase the minimum distance between points temporarily.

Island detection

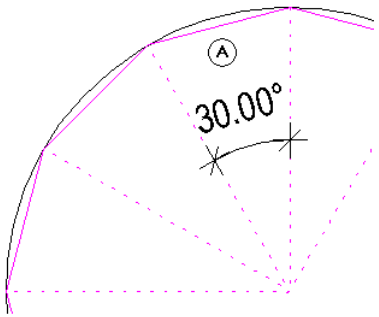
When **Island detection** is switched on, closed outlines within an area are detected and cut out automatically. You can only use this option in combination with **Find closed polylines** and **Outline auto-detect**.

Number of segments / Rise

Number of segments

The polygonization value is interpreted as the number of segments.

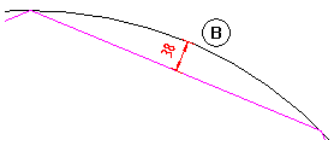
The value for **Number of segments** defines the number of segments used to approximate a curve. In the case of a circle, for example, a value of **120** means that a full circle is approximated by a 120-sided polygon. The higher the degree of accuracy you require or the larger the radius, the higher the number of segments should be used to approximate a circle. You can enter a value between 8 and 360.



(A) Segments in circle = 12; this will produce an angle of 30°

Rise

The polygonization value is interpreted as the rise. The value you enter for **Rise** defines the maximum rise of the secant relative to the arc (in mm). As a result, the curve is polygonized so that the maximum offset of the polyline's segment to the curve is less than or equal to the value your specified. This setting produces more accurate results than the number of segments.



(B) Rise (38mm or less)

Element filter

Element filter
Ignore lines of architectural elements in plan
Ignore 2D surface elements (hatching, patterns, fills, bitmap areas, smart fit placements)
when using automatic outline detection

When you select the **Element filter**, lines of architectural elements and 2D surface elements are ignored when you use **Outline auto-detect** or **Find closed polylines**. Use this option to automatically apply surface elements like hatching, patterns etc. to adjacent outlines that are separated by arcs, splines or curves.

Background information: curves are polygonized based on the number of segments specified.
When a second (third...) area is entered, **Outline auto-detect** may take a long time and/or produce incorrect results because Allplan detects both the outline of the surface (2D line) and the boundary line of the polyline of the first area.

Back, Help

Back
This undoes the last point entered while you are entering a polyline.

Help for entering polylines
This displays help for the **polyline entry tools provided in the input options.**

Additional tools in the dialog line

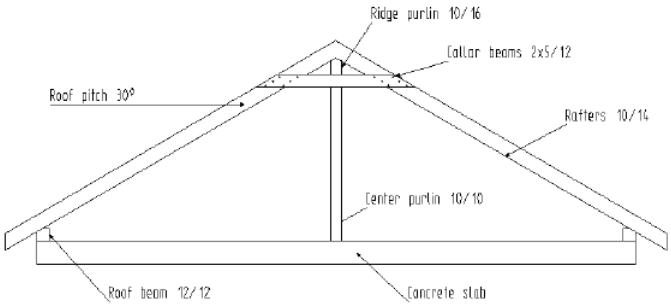
The dialog line offers the following drawing aids for entering points:

Icon	Function	Use
	**Enter at right angles**	The line can only be drawn at right angles to the current system angle.
	**Enter using cursor snap**	The line can only be drawn at specific angles.
	**Cursor snap angle**	Define the cursor snap angle here. The current angle is displayed.

Note: When entering a polyline, it can happen that you inadvertently click a point. You can use **Back** in the input options to undo every point entered in reverse order.

Exercise 3: purlin roof

In this exercise you will design a purlin roof. In addition, you will label the roof and apply leaders.



You will use the tools in the **Draft** and **Text** modules in the **Basic** family.

Task 1: designing a purlin roof

You will familiarize yourself with the **Intersect 2 Entities**, **Polar Coordinates** and **Division Point** tools.

Tools that were covered earlier in previous exercises (e.g. rectangle, parallel lines, brackets) are not described in detail in this exercise.

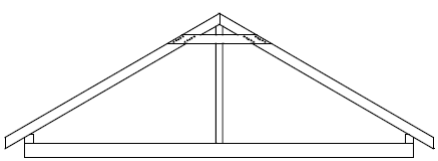
Tools:

Intersect 2 Entities

Division Point

Track Line

Objective:



Slab and rafters

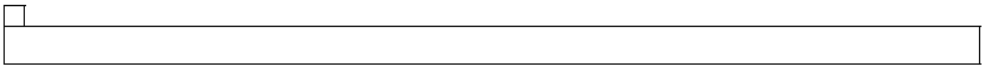
The first part of this exercise involves designing the slab, the roof beams and the rafters. You will draw the slab as a rectangle and create the rafters as lines and parallel lines. First, you will design the rafter on the left-hand side and then copy it to the right-hand side.

To draw the slab and the rafters

1 Click **Open on a Project-Specific Basis**, select the **Fileset** structure tab and open an empty drawing file. Name it **Purlin roof** and close all the other drawing files.

2 Click **Rectangle** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area) and draw the concrete slab as a rectangle.
X coordinate = **5.74** (length), Y coordinate = **0.22** (width)

3 The **Rectangle** tool is still active. Click the top left corner of the concrete slab and create a roof beam:
= **0.12** and = **0.12**

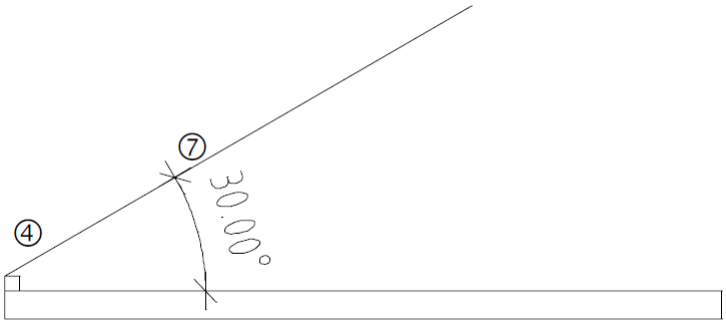


4 Click **Line** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).
Click **Individual lines** on the **Line** Context toolbar and specify where you want the line to start by clicking the top left corner of the beam (see below).
You will create the roof overhang later.

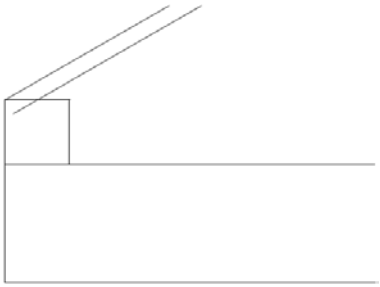
5 The roof pitch is 30°.
To draw a line at this angle, click **Enter using cursor snap**.

6 Enter **30** to define the angle.
Now, you can only draw the line at an angle of 30° (and in steps incremented by 30°).

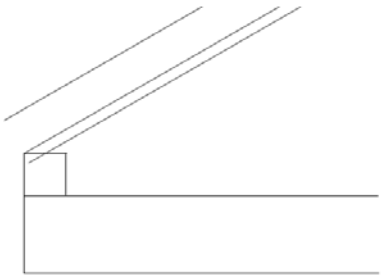
7 Draw the line as shown below and place its end point by clicking with the left mouse button. For the time being, the length of the line is not important. If necessary, you will delete redundant segments later.



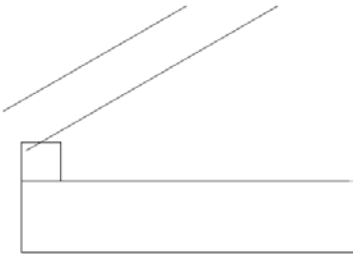
8 The rafter is to rest on the roof beam. Click **Parallel Lines** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area) and create the bottom edge of the rafter. Enter **0.03** for the offset.



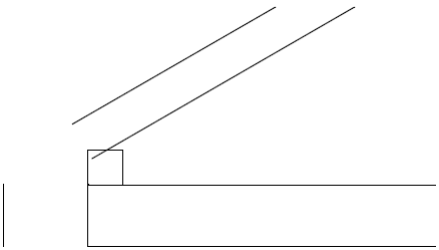
9 The **Parallel Lines** tool is still active. To create the top edge of the rafter, enter **-0.14** for the offset (opposite direction!) and press ESC to quit the tool.



10 Click the line in the middle with the right mouse button and select **Delete** on the shortcut menu to remove the reference line.



11 The next step is to create the vertical end of the rafter. Click **Parallel Lines** again. To define the reference element, click the left edge of the slab and enter **0.30** for the offset (= roof overhang).

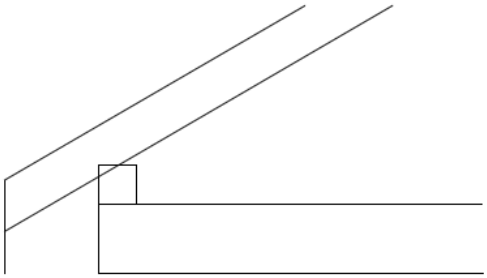


Now lengthen the top and bottom edges of the rafter as far as the point where they intersect the vertical edge. To do this, use the **Intersect 2 Entities** tool.

12 Using the right mouse button, click the top edge of the rafter and on the shortcut menu, select **Intersect 2 Entities**.

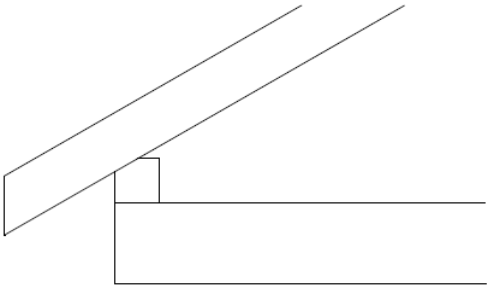
13 To define the second element, click the vertical edge of the rafter.

14 Click the bottom edge of the rafter and then the vertical edge.



Now the lines are intersected. Next, you will delete the redundant line segments.

15 Using the right mouse button, click one of the lines you want to delete and on the shortcut menu, select **Auto-Delete Segment**. Click the protruding line segments.



The rafter on the left is now finished. The next step is to mirror it across a vertical line which passes through the middle of the roof beam. The result is the rafter on the right.

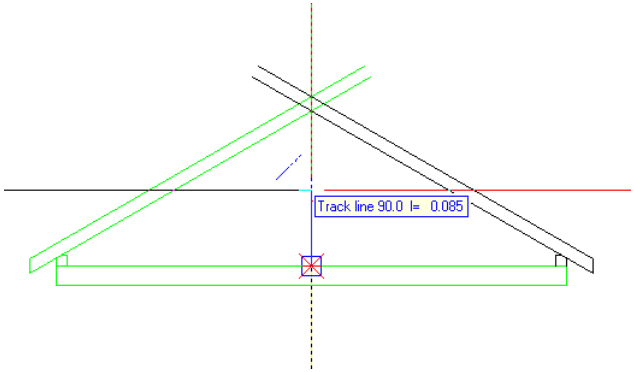
16 Click in the workspace with the right mouse button and select **Mirror and Copy** on the shortcut menu.

17 *Select the element(s) you want to mirror:* use the brackets to activate the three lines of the rafter on the left and the roof beam. Click **Brackets** (Filter assistant) or in the workspace with the right mouse button.

18 Now it is a good idea to select track tracing as it facilitates the process of entering the mirror axis.
Press the F11 key to activate track tracing.

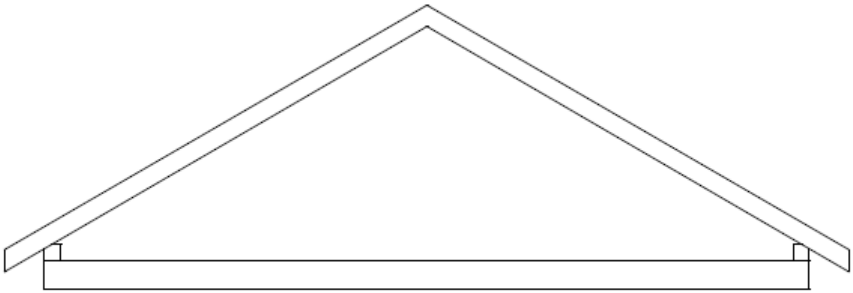
19 *Place point 1 for mirror axis:* the first point of the mirror axis is the center of the beam. Select **Midpoint** on the shortcut menu and click the top edge of the beam.
A red cross indicates the center of the beam. Click it.

2nd point of mirror axis: using track tracing, you can display the track line that is perpendicular to the first point of the mirror axis (= midpoint of the top edge of the beam). Move the crosshairs roughly at a 90-degree angle above or below the first point of the mirror axis. The 90-degree track line appears. Click this line wherever you want.
This creates a vertical mirror axis and the selected elements are mirrored and copied.



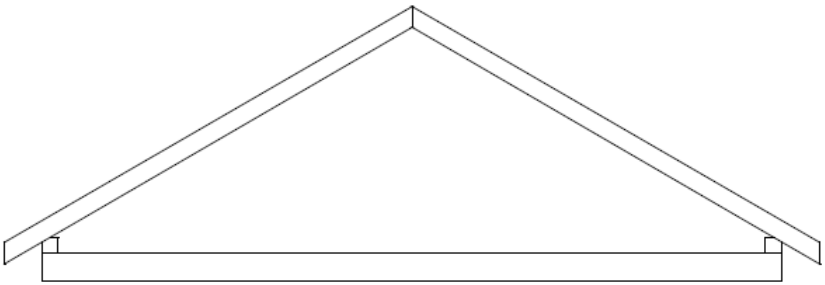
20 To delete the protruding line segments, click **Auto-Delete Segment** in the **Tools** palette (**Basic** family - **Draft** module - **Change** area).

21 Click the protruding line segments. The result might look like this:



22 To draw the line between the two rafters, click **Line** and select **Individual lines**.

23 Draw a vertical line as shown below.



24 Press ESC to quit the **Line** tool.

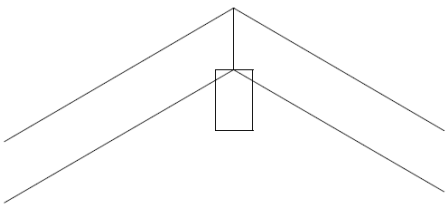
Ridge purlin and collar beam

In the next exercise, you will draw the ridge purlin, the center purlin and the collar beam. First draw the ridge purlin as a rectangle. Then create the collar beam and the center purlin by intersecting two elements and drawing a parallel line.

To draw the ridge purlin and collar beam

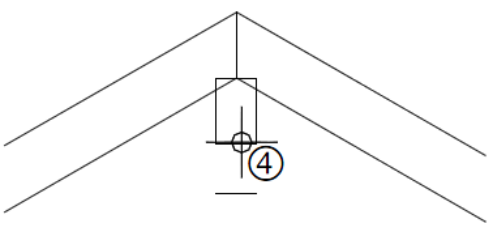
1 Click **Rectangle** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area) and select **Based on center line** on the Rectangle Context toolbar.

2 *Start point:* click the bottom point where the two rafters intersect.
End point: click **Delta point** in the dialog line and enter the following value for the **y** direction: **-0.16**.
Point or half the width: enter half the width of the ridge purlin: **0.05**.



3 Use the elements of the ridge purlin to create the center purlin and the collar beam.

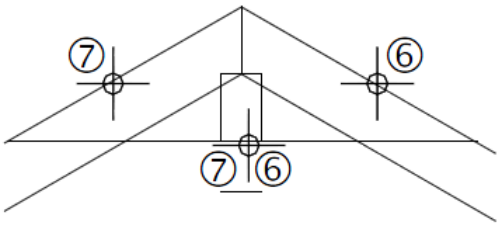
4 Draw the bottom edge of the collar beam based on the bottom edge of the ridge purlin. Click **Parallel Lines** and enter **0.12** for the offset.



5 Click **Intersect 2 Entities**.

6 First click the bottom edge of the ridge purlin and then the outer edge of the rafter on the right.

7 **Intersect 2 Entities** is still active. Now make the bottom edge of the ridge purlin intersect the outer edge of the rafter on the left.

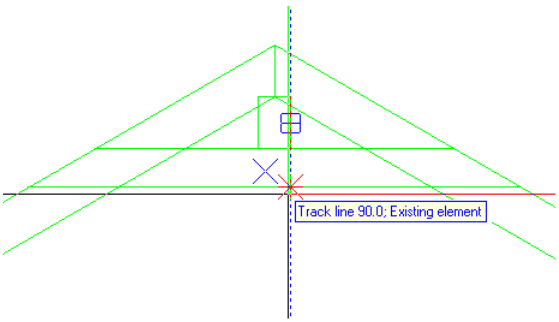


8 Using the same approach, make the bottom edge of the collar beam intersect the outer edges of the two rafters.

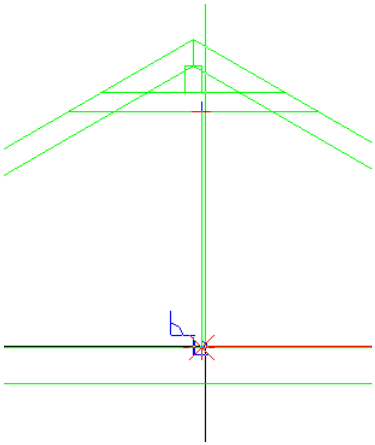
9 Use track tracing to join the two vertical edges of the ridge purlin with the top edge of the slab.
Select the **Line** tool and click **Individual lines**.

10 Point to the vertical, right-hand edge of the ridge purlin and then move the crosshairs in a vertical direction.

The 90-degree track line appears. Move the crosshairs along this track line until Allplan displays the point of intersection with the collar beam. Click this point.

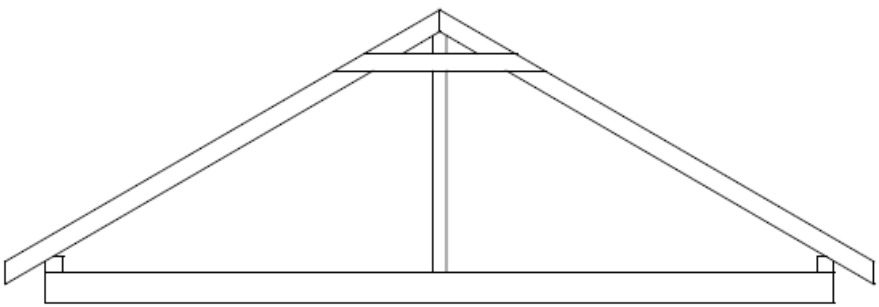


11 Follow the track line as far as the point of intersection with the top edge of the slab and click this point.



12 Repeat steps 10 and 11 for the left edge of the ridge purlin.

13 Use **Auto-Delete Segment** to delete the redundant line segments.
The design should now look like this:



14 Press ESC to quit the **Auto-Delete Segment** tool.

Construction lines

You will use six nails to fasten each rafter to the collar beam. First, create a grid consisting of lines in construction line format. To do this, use the **Division point** function provided on the shortcut menu when a tool is active (e.g. **Line**). This grid will help you place the nails later. You can use the **Division point** function to address division points of lines or other design entities. The nails will be placed on the points where the gridlines intersect.

Tip: The color and line type of the construction lines are based on the settings you have made in the **Options - Desktop environment - Display** page.

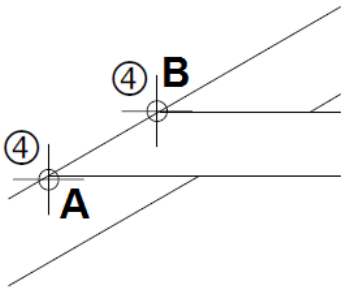
To draw horizontal construction lines

1 Draw the grid lines as construction lines.
To switch to construction line mode, click **Construction Line on/off** (**Format** toolbar).

2 Click **Line** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).
Click **Individual lines** on the **Line** Context toolbar.

3 To specify where the line is to start, click **Division point** on the shortcut menu.

4 Click the endpoints of the line to be divided.



A = start point
B = end point

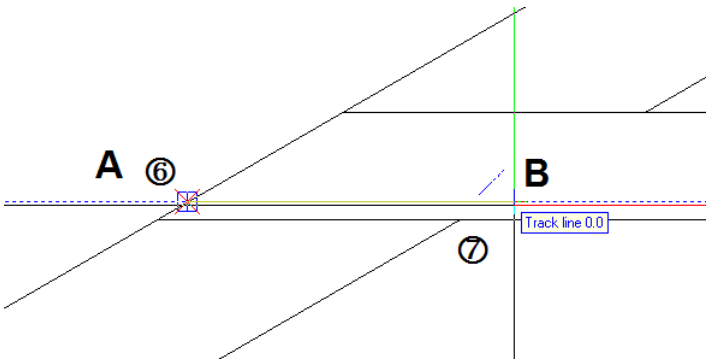
5 *Click division point:* enter the number of divisions in the dialog line: n= **6**.

Allplan temporarily displays the division points on screen.

6 To specify the division point where the line is to begin, enter its number (1) in the dialog line and press ENTER to confirm.
Allplan starts to count at point A (= the start point of the line you divided).
You can also define the division point by clicking it.

Tip: You can also address division points located on the extension of the division line by entering -1, -2, etc..

7 *To point:* as the line is horizontal, you can use the track line 0.0 to specify the end of the line.
The length of the line is not important. However, make sure that it projects beyond the right edge of the rafter.



A = division point 1
B = track line 0.0

8 Press ESC to quit the **Line** tool.

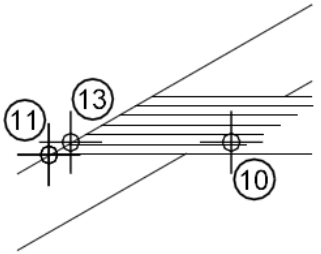
9 Now create four equidistant copies of the construction line.

10 Click the construction line with the right mouse button and select **Copy** on the shortcut menu.

11 *From point:* click the point where the outer edge of the rafter and the bottom edge of the collar beam intersect (see below).

12 *Place point (to point) or enter the number of copies:* enter the number of copies: **4**.

13 *To point:* click the point where the outer edge of the rafter and the construction line intersect (see below).



14 Press ESC to quit the **Copy** tool.

Now use **Division point** again to draw the sloping construction lines. To specify the direction of the construction line, use **Polar coordinates**.

To draw sloping construction lines

➲ **Construction Line** mode is still active.

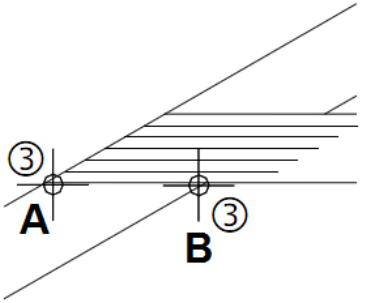
1 Click **Line** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).

2 Click **Individual lines** on the **Line** Context toolbar.

3 Specify where the sloping construction line is to start:

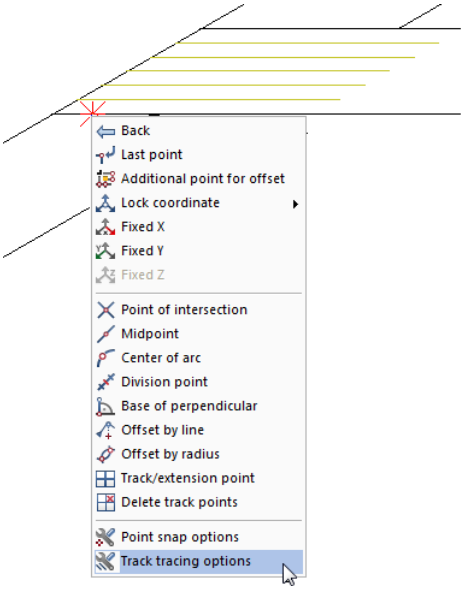
- a) Click **Division point** (shortcut menu).
- b) Click the end points of the line (see below).
- c) Enter **5** for the number of divisions.
- d) Click division point 1.

This defines the start point of the sloping construction line.

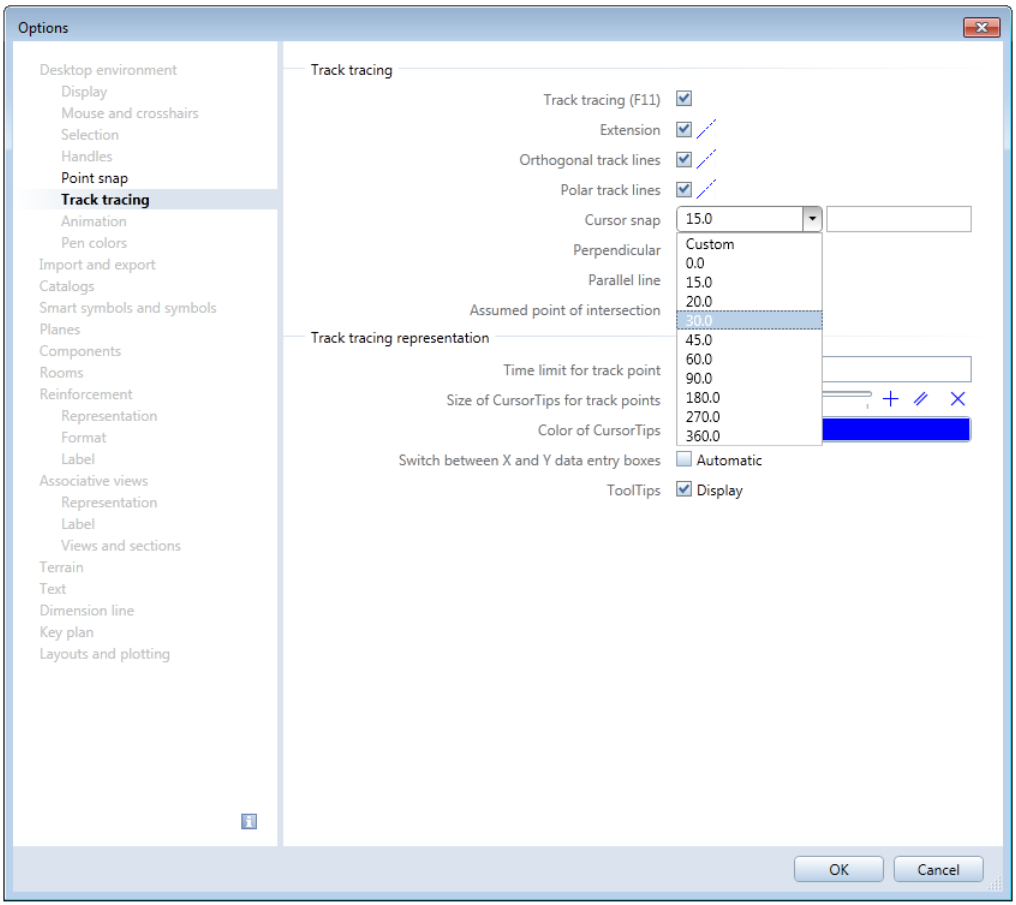


A = start point
B = end point

4 The construction line needs to be parallel to the rafter. Open the shortcut menu with the right mouse button and select **Track tracing options**.

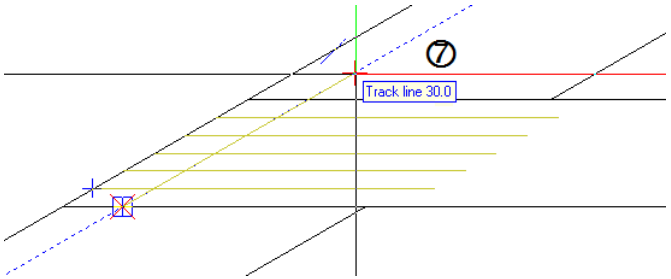


5 The **Options** dialog box opens. Set the **Cursor snap** angle to **30°**.



6 Click **OK** to close the **Options** dialog box.

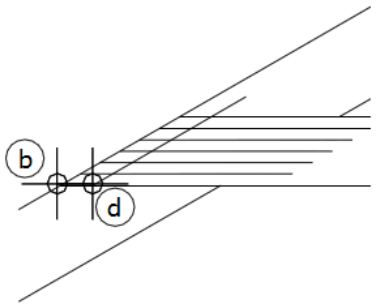
7 Move the crosshairs along the track line **30.0**. Use the mouse to specify the length of the construction line.
The exact length is not important. However, make sure that the line projects beyond the horizontal line at the top.



8 Press ESC to quit the **Line** tool.

9 Create three copies of the construction line and place them to the right:

- a) Click the construction line with the right mouse button and select **Copy** on the shortcut menu.
- b) *From point*: click the point where the outer edge of the rafter and the bottom edge of the collar beam intersect (see below).
- c) *Place point (to point) or enter the number of copies:* enter the number of copies: **3**.
- d) *To point:* click the point where the outer edge of the rafter and the sloping construction line intersect (see below).



Now you have created the temporary grid which helps you place the nails.

10 Press ESC to quit the **Copy** tool.

11 Click **Construction Line on/off** (**Format** toolbar) to disable construction line mode.

Nails

Now you will place the nails based on the temporary grid consisting of construction lines. First draw a nail as a circle. Then copy this circle to the points where the construction lines intersect. Finally, mirror and copy the complete design onto the opposite side.

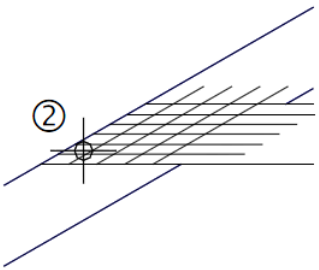
To place nails

Tip: Before placing the copies of the circle, check that you have activated the **Point of intersection** option in the **Point snap** area of the **Point snap options** (shortcut menu). Allplan does not emit an acoustic signal when you place the copies of the circle.

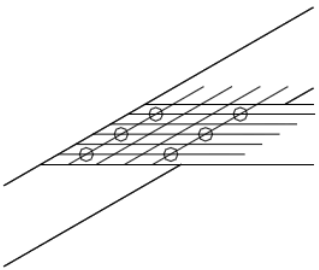
1 To draw a nail as a circle, click **Circle** in the **Tools** palette (**Basic** family, **Draft** module, **Create** area).
The **Circle** dialog box opens. Select **Circle based on center** and **Enter full circle**.

2 To define the center of the circle, click the point where the horizontal construction line at the bottom and the vertical construction line on the left intersect.

3 Enter the radius in the dialog line: **0.01**



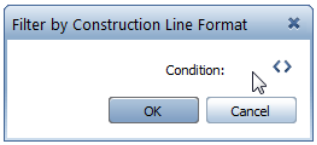
4 To create the other nails, click **Copy** and select the circle.
From point: select the center of the circle as the reference point.
To point: copy the circle to the points where the construction lines intersect (as shown below).



5 Delete the temporary grid consisting of construction lines so that you can see better. To do this, you will use an element filter. Click in the workspace with the right mouse button and select **Delete** on the shortcut menu.

6 Click **Filter by Construction Line Format** on the **Filter Assistant** toolbar.

7 Select the condition (=) in the dialog box and click **OK** to confirm.



8 Use the left mouse button to enclose the temporary grid in a selection rectangle.
As you have applied a filter, only the construction lines are deleted (and not the nails).

9 Press ESC to quit the **Delete** tool.

To finish, you will mirror the nails onto the rafter on the right.

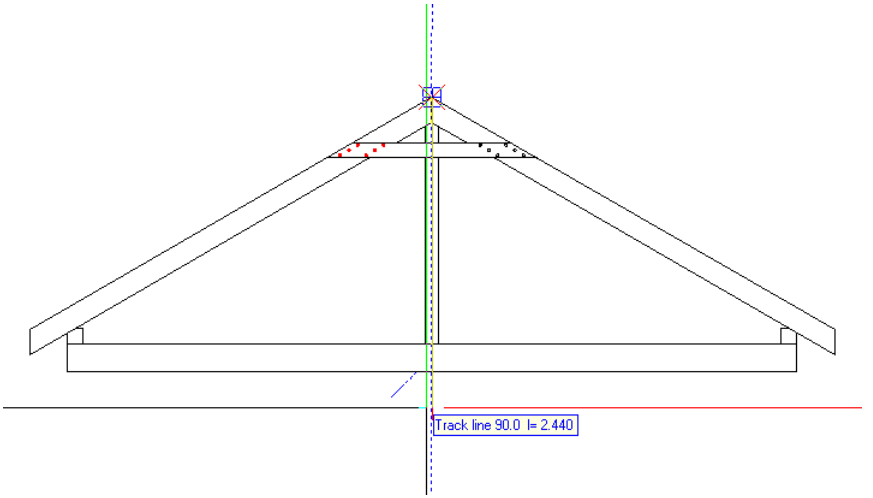
To mirror the nails

1 Click **Mirror and Copy** (**Edit** toolbar).

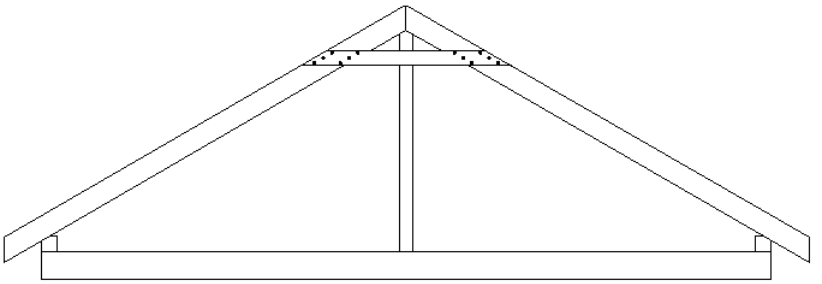
2 Use the left mouse button to enclose all the nails in a selection rectangle.

3 To obtain a mirror axis that is exactly vertical:

- a) Click the gable peak.
- b) Move the crosshairs vertically downwards so that the track line 90.0 appears.
- c) Use the left mouse button to click in the workspace below the design.



The design should now look like this:



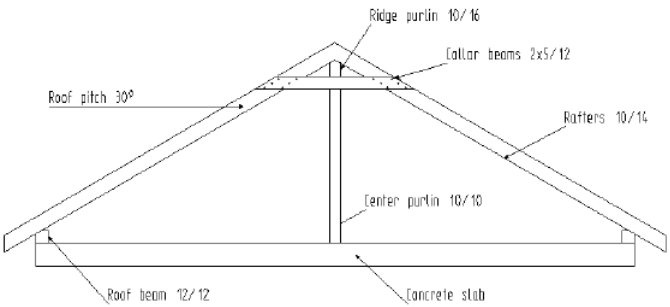
Task 2: Labeling the purlin roof

Now you will label the purlin roof.

Tools:

Horizontal Text

Objective:

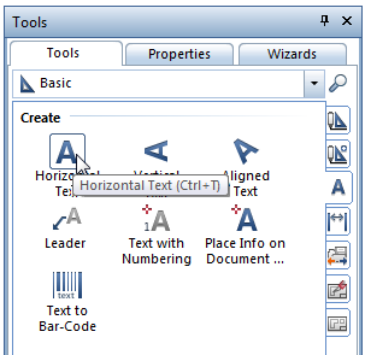


Labeling

To label the purlin roof

1 Select the **Text** module in the **Tools** palette (**Basic** family).

2 Click **Horizontal Text** (**Create** area) and specify where the text is to start by clicking in the workspace (see below). You can enter text and set parameters for it in the dialog box which appears.



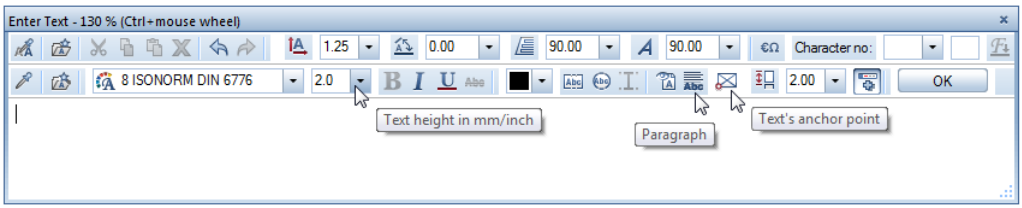
See also: detailed information on entering and editing text is provided in Allplan's online help.

3 You do not need the track tracing feature to create labels. Disable it by pressing the F11 key.

4 Set the text height to **2.0** mm: click in the **Text height** box and enter **2.0**. The text width changes dynamically with the aspect ratio set.

5 Open the **Load Font** pulldown menu and select front number **8 Isonorm DIN 6776**.

6 To specify where the text is to start, click to set the **Text's Anchor Point** to bottom left and disable the **Paragraph Text** option.

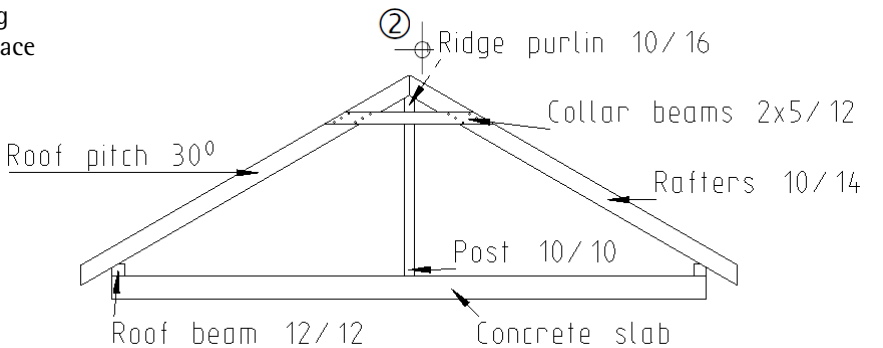


Tip: To place text, you can also press CTRL+ENTER instead of clicking **OK**.

Tip: You can change the drop-in point by clicking anywhere in the workspace until you place the text.

7 Type **Ridge purlin 10/16** for the text and click **OK** to confirm.

The text is placed in the workspace.
The **Horizontal Text** tool is still active.

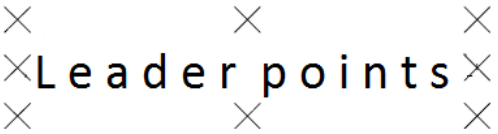


8 Click in the workspace to specify where the next line of text is to start and label the drawing as shown at the beginning of this exercise.

9 When you have entered all the labels, press ESC to finish entering text and to quit the **Horizontal Text** tool.

Creating leaders

Leaders connect text with design entities. Leaders are always placed at a defined offset to the text and Allplan creates them as lines using the pen you have currently selected. You can also apply symbols to the start points and/or end points of these lines.
A leader always starts at a defined point of the text. Every text has eight points from which the leader can originate:



When you move text, the leader "sticks" to the starting point you have defined.

To create leaders

Tip: If you have accidentally created a leader at the wrong position, you can easily correct this: click **Back** on the **Text leader** Context toolbar and place the leader again.

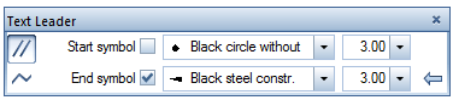
➲ The **Text** module is still open.

1 To attach a leader, click **Leader (Create** area).

2 On the **Text leader** Context toolbar, click **Individual lines**.

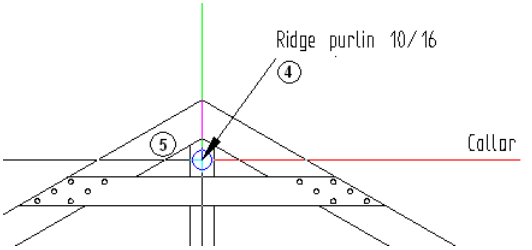
3 Select the **End symbol** option and choose **Black steel construction arrow without boundaries** on the dropdown menu.

4 The **Symbol height** is set to **3.00** mm. Leave this setting as it is.

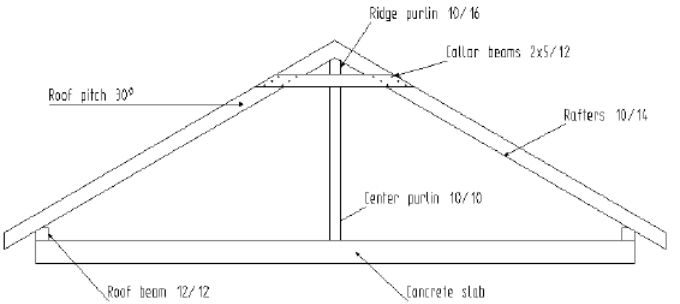


5 *Leader to text:* click the text to which you want to attach a leader. Make sure that you click the point where you want the leader to begin (at bottom left).
The text is displayed in the selection color.

6 *To point:* click where the leader is to end.



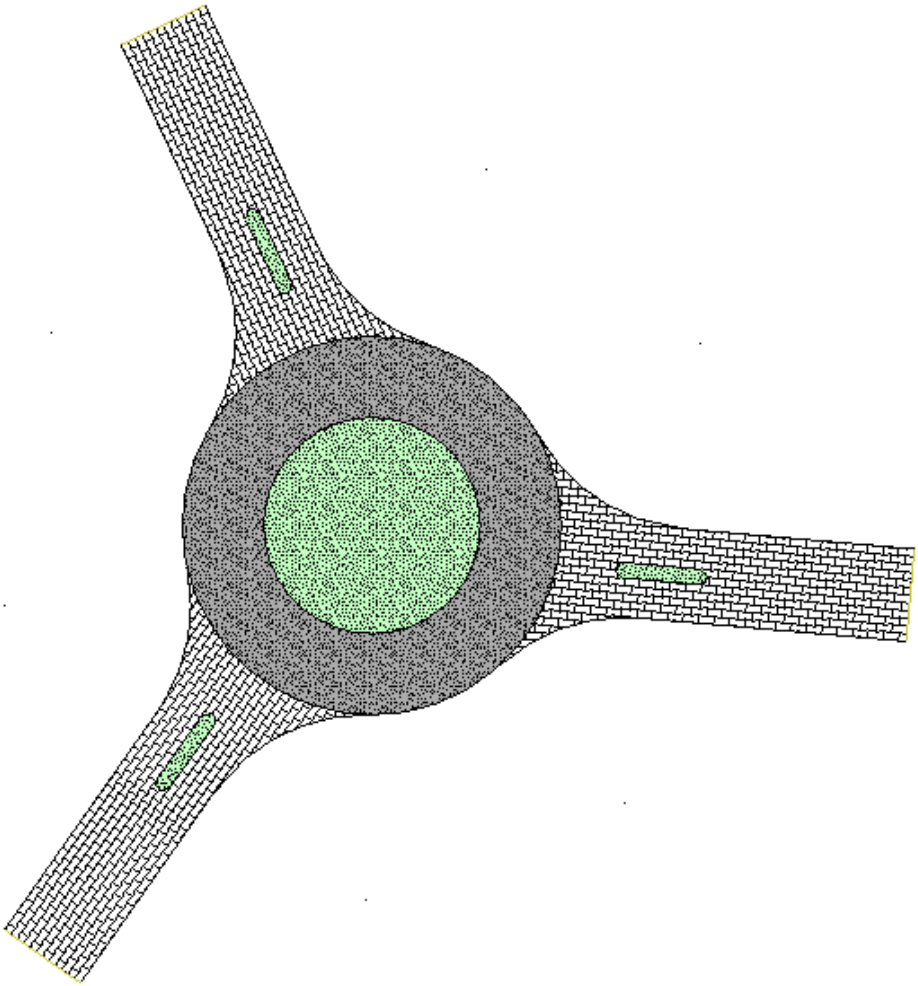
The **Leader** tool is still active. To add a leader to the next line of text, repeat steps 4 and 5. Create more leaders as shown below.



7 Press ESC to quit the **Leader** tool.

Exercise 4: Rotary with three roads

In this exercise you will design a rotary with three roads leading up to it.



You will use the tools in the **Draft** module in the **Basic** family.

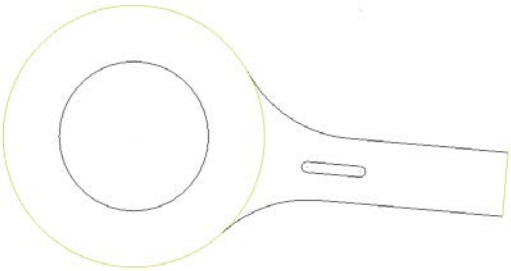
Task 1: Designing a rotary with one road

In the first part of this exercise you will design a rotary with one road leading up to it. There is a traffic island in the middle of the road. You will start by drawing a rough outline consisting of a circle, lines and parallel lines. You will learn about the **Circle** and **Fillet** tools. The the final outline will be created using the **Fillet** tool

Tools:

- **Circle**
- **Parallel Lines**
- **Polar coordinates**
- **Auto-Delete Segment**
- **Fillet**

Objective:



Rotary with one road

In the first part of this exercise you will design the rotary and one of the three roads leading up to it.

To draw the rotary

1 Click **Open on a Project-Specific Basis**, select the **Fileset** structure tab and open an empty drawing file. Name it **Rotary** and close all the other drawing files.

2 Click **Circle** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).

3 The **Circle** Context toolbar opens. Click **Circle based on center** and **Enter full circle**.

4 Click in the workspace to define the center of the circle.

5 To specify the **Radius**, enter **12.25** m in the dialog line.

6 Press ENTER to confirm.

7 Switch to the **Parallel Lines** tool.

8 Click the circle.

9 Enter **5.25** m for the **Offset** and press ENTER to confirm.

10 Click within the circle to specify the side on which the parallel line is to be created.

11 Enter **1** for the **Number** and press ENTER to confirm.

This will result in a lane width of 5.25 m in the rotary.

Next, draw the first road as a line. As it is to be created at a given angle, you will use **polar coordinates**.

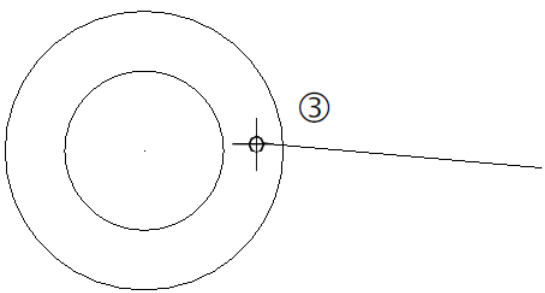
To design the first road

1 Click **Line** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area) to draw the top edge of the road opening.

2 Click **Individual lines** on the **Line** Context toolbar.

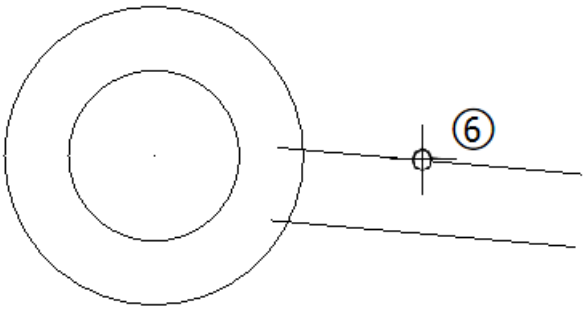
3 Click within the rotary to specify where you want the line to start (as shown below).

4 To draw the road at a given angle, click **Polar coordinates** in the dialog line.
<Line> To point
The angle between the opening and the path is 5°. Positive angles are measured in a counter-clockwise direction. Enter **355**.
Press the TAB key and enter **25** for the *length*.
Press ENTER to confirm.



5 Click **Parallel Lines** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area) to draw the bottom edge of the road. The **Line** tool closes automatically.

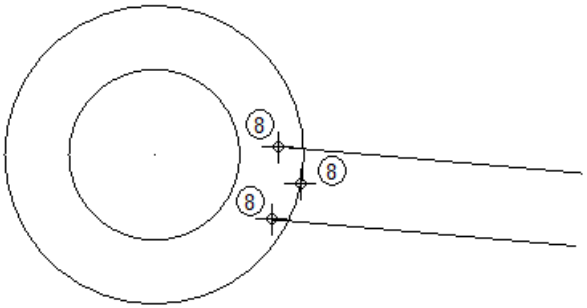
6 Click the line you just created. Enter the following values in the dialog line:
Offset: **6.00**
Which side? Click below the line.
Number: **1**



7 Now you can delete the redundant line segments protruding into the rotary.
Click a line you want to delete with the right mouse button.

Tip: You can also select the **Auto-Delete Segment** tool in the **Tools** palette (**Basic** family - **Draft** module - **Change** area).

8 Choose **Auto-Delete Segment** on the shortcut menu and click the line segments you want to delete.
Allplan deletes the lines as far as the point where they intersect the rotary.



9 Press ESC to quit the **Auto-Delete Segment** tool.

Traffic island for road

Now you will design the traffic island, which consists of lines parallel to the road you just created. You will then use lines to connect the parallel lines.

To design the traffic island

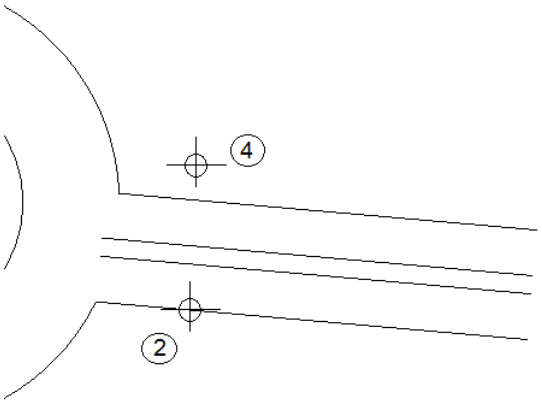
1 Click **Parallel Lines** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).

2 Click the bottom line of the road to use it as the reference element for the traffic island (see illustration below).

3 Enter **2.50** for the offset to create the bottom edge of the traffic island.

4 Click above the reference element to indicate the side and enter the *Number* in the dialog line: **1**.
This creates the first parallel line; the **Parallel Lines** tool is still active.

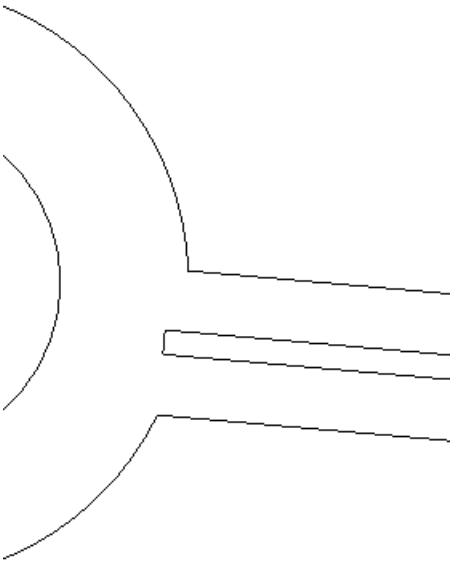
5 The system prompts you to enter an offset in the dialog line. The value you enter is based on the parallel line you just created. Enter the offset between the bottom and top of the traffic island: **1.00**



6 Click **Line** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area). The **Parallel Lines** tool closes automatically. Check whether **Individual lines** is selected in the **Line** dialog box.

7 Choose **Delta Point** in the dialog line.

8 Join the end points of the two parallel lines (see below) and press ESC to quit the tool.



Now you will use this line as the reference line.

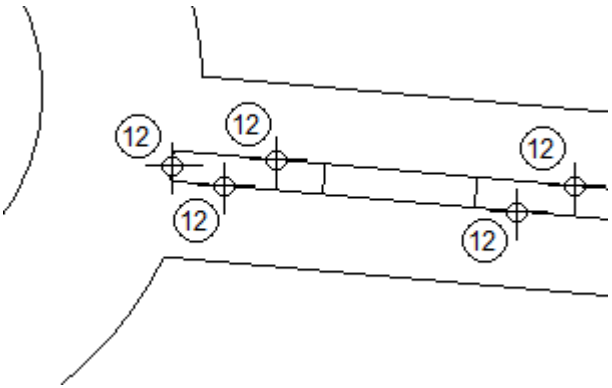
9 Click **Parallel Lines** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).

10 Click the line you just created to use it as the reference element. The system prompts you to make entries in the dialog line. Enter the following values:

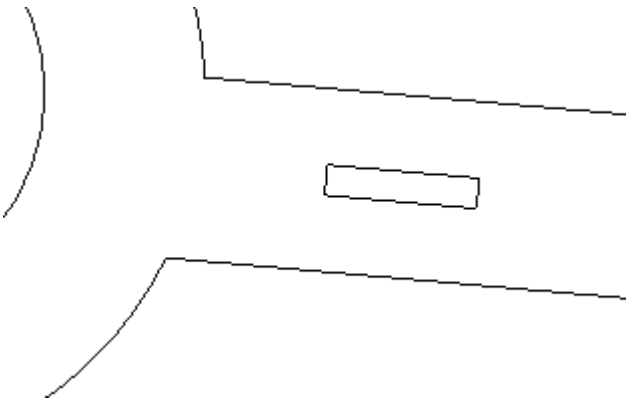
- *Offset:* **5.00**, *Which side?* **To the right**, *Number:* **2**
- Press ESC to quit the tool.

11 Using the right mouse button, click a line of which you want to delete redundant segments.

12 Choose **Auto-Delete Segments** on the shortcut menu and click the line segments you want to delete (see below). This tool automatically deletes segments of elements between two points of intersection.



13 Press ESC to quit the **Auto-Delete Segment** tool. The result might look like this:



Filleting the road and traffic island

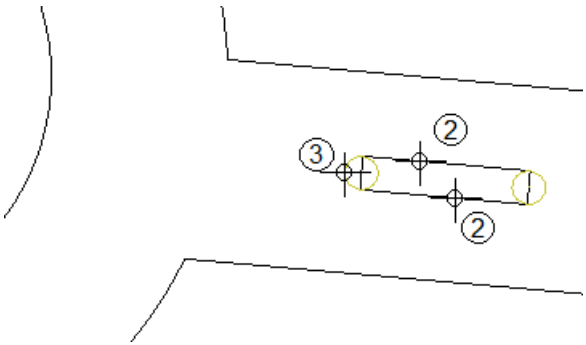
In the next exercise you will create the final outline of the road and the traffic island. To do this, you will use the **Fillet** tool, which allows you to apply a fillet to corners and to join lines, which do not touch, with arcs. After you have clicked the two elements, Allplan will present auxiliary circles for you to choose from.

To fillet the road and traffic island

1 Click **Fillet** in the **Tools** palette (**Basic** family - **Draft** module - **Change** area).

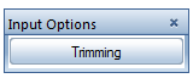
2 You will start with the traffic island. Click its top and bottom lines.
The fillet radius is set to **0.5**. Press ENTER to confirm it.
Two auxiliary circles appear on screen.

3 Click the circle you want to use for the fillet.



4 Repeat steps 2 and 3 for the opposite side of the traffic island. If you can't see the result, click to refresh the view.

5 **Fillet** is still active. **Trimming** is displayed in the input options. When this button is activated (default setting), the elements are shortened or lengthened automatically. If it isn't active, click to select it.

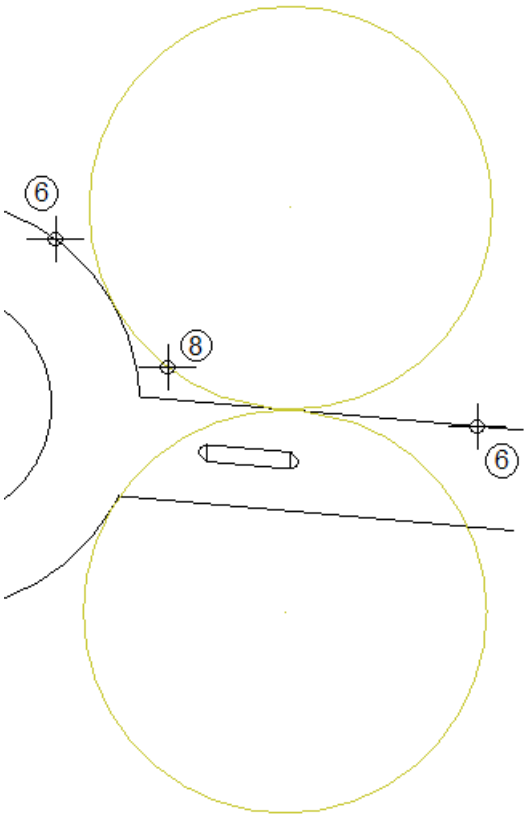


The traffic island is created. Now you will apply a fillet to the road leading up to the rotary.

6 Click the top edge of the road and the adjoining outer arc to create the fillet at the top (see below).

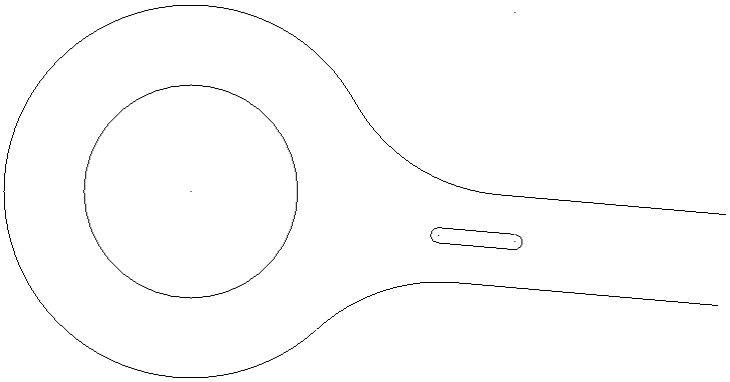
7 Enter the radius: **12.00**

8 Click the circle you want to use for the fillet.



9 Click the bottom edge of the road and the adjoining outer arc to create the fillet at the bottom (see below). Repeat steps 7 and 8.

10 If necessary, use **Auto-Delete Segments** to delete redundant segments. The following should now be displayed on your screen:



11 Press ESC to quit the **Auto-Delete Segment** tool.

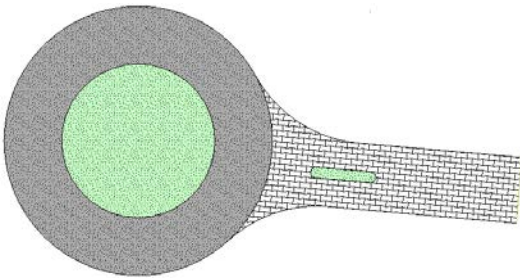
Task 2: pattern

In this task, you will apply a pattern to the road leading up to the rotary. You will learn about the **Pattern** and **Pattern definition** tools.

Tools:

- **Pattern**
- **Pattern definition**
- **Outline auto-detect**
- **Island detection**
- **Select Pattern**
- **Pattern Width**
- **Pattern Height**
- **Modify Format Properties**
- **Convert Surface Element**

Objective:

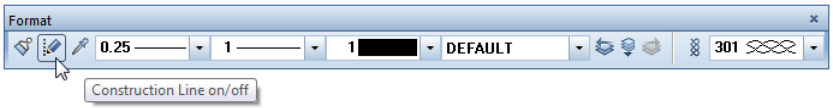


Creating closed outlines

The first step involves creating closed outlines. This is necessary for applying patterns to the rotary and the road using the **Outline auto-detect** tool.

To create a closed outline for the road

1 You will use construction lines to create the closed outline. Select the **Construction Line** tool on the **Format** toolbar.



Note: Construction lines are like erasable pencil lines on conventional drawings. When you select construction line mode, new elements are drawn using the construction line color and line type set in the **Options - Desktop environment - Display** page - **Drawing file and NDW window** area. Elements drawn as construction lines are excluded from printouts.

2 Click **Circle** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).

3 The **Circle** Context toolbar opens. Click **Circle based on center** and **Enter full circle**.

4 Click the existing center of the inner circle.

5 To specify the **Radius**, enter **12.25** m in the dialog line.

6 Press ENTER to confirm.

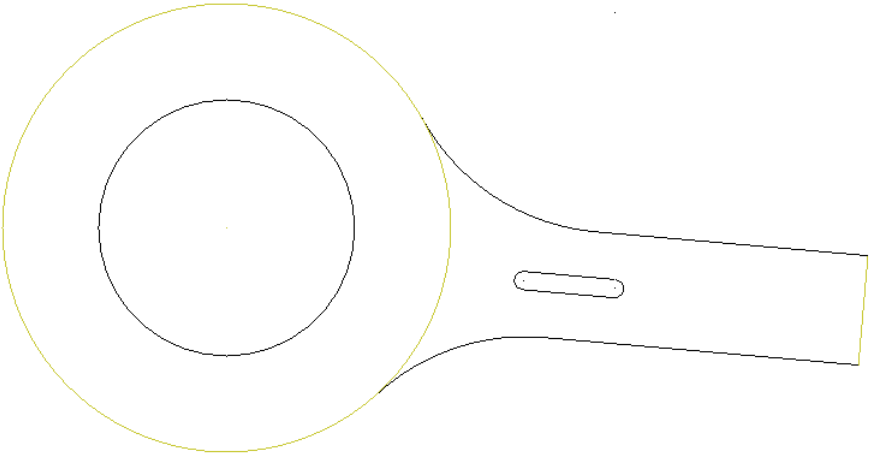
7 Switch to the **Line** tool (**Basic** family - **Draft** module - **Create** area) to join the right-hand ends of the two lines representing the boundaries of the road. The **Circle** tool closes automatically. Check whether **Individual lines** is activated in the **Line** dialog box.

8 Choose **Delta Point** in the dialog line.

9 Join the end points of the two parallel lines (see below) and press ESC to quit the tool.

10 Deactivate construction line mode.

Your drawing should now look like this:



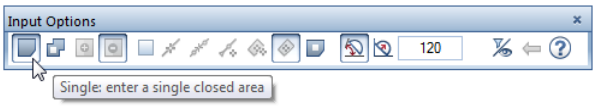
Applying a pattern to the road

Next, you will apply a pattern to the road leading up to the rotary. You will use the outline auto-detect tool to define the area which is to be given a pattern. The traffic island is to be left out.

To apply a pattern to the road

1 Click **Pattern** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).

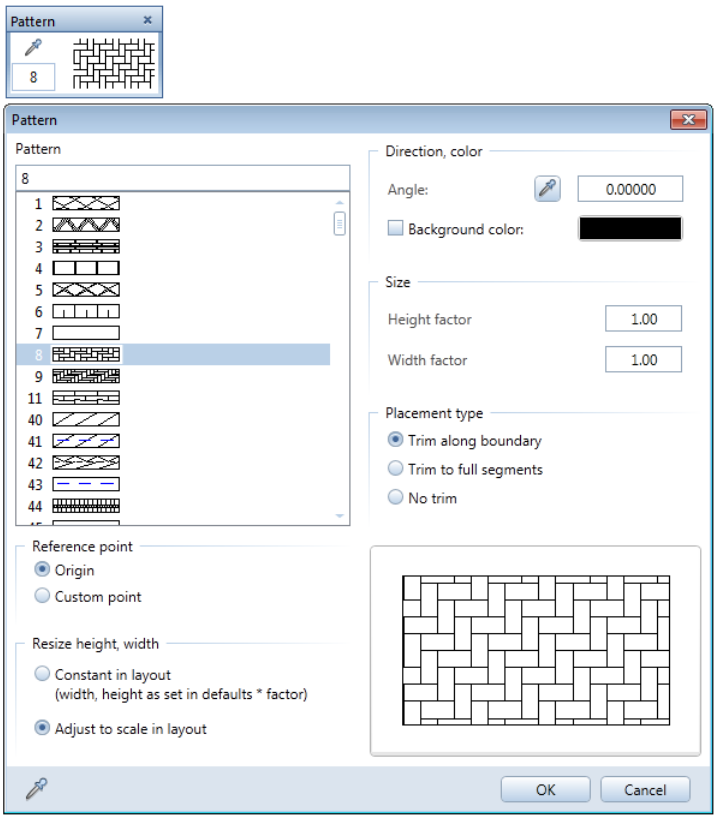
2 Click **Single** in the **Input Options**.



3 On the **Pattern** Context toolbar, click **Properties**.

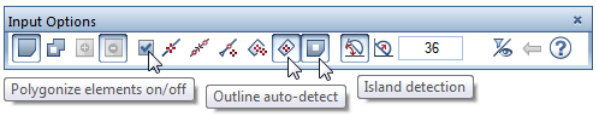
4 Select pattern **8** and set the following parameters:

- **Reference point** area:
  Origin
- **Resize height, width** area:
  Adjust to scale in layout
- **Size** area:
  Height factor and width factor: 1.00
- **Placement type** area:
  Trim along boundary

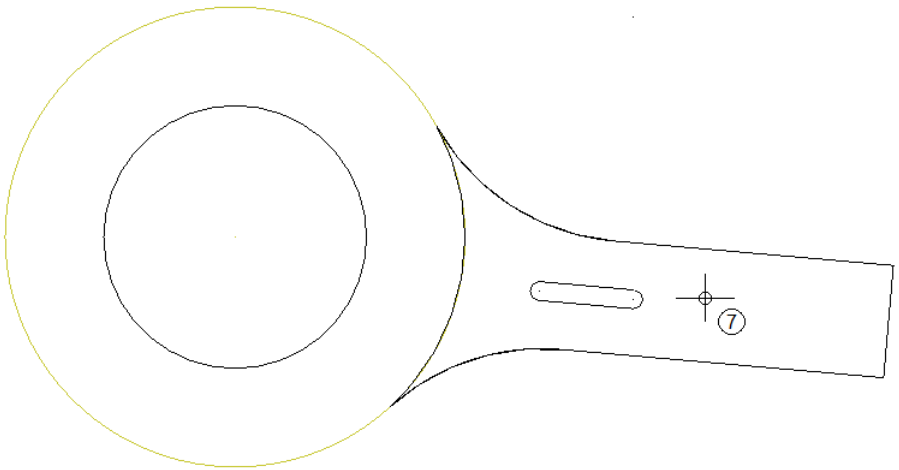


5 Check that the **Polygonize element** check box is selected in the **Input Options**.

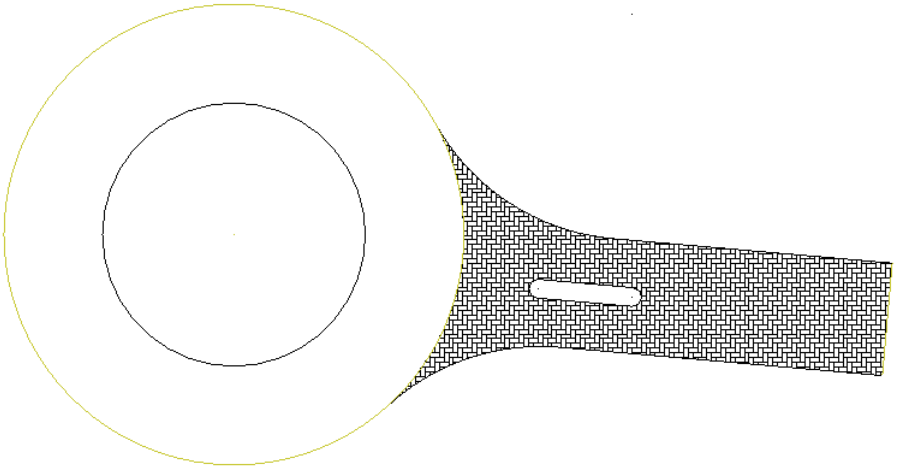
6 In the **Input Options** select **Outline auto-detect** and **Island detection**.
Island detection detects closed outlines within an area and cuts them out automatically.



7 Click within the closed outline of the road with the left mouse button.
Make sure that you do not click within the part you want to cut out.



The outline of the road is detected as a closed area and the traffic island is cut out automatically. You should hear an acoustic signal.



8 Press ESC to quit the **Pattern** tool.

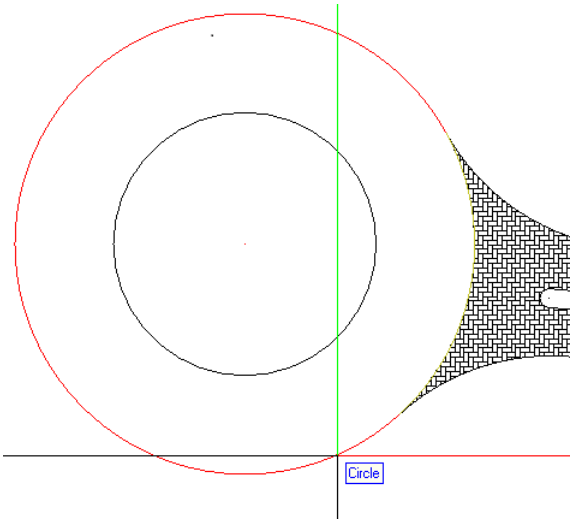
Applying a pattern to the rotary

The next step is to apply two different patterns to the rotary. The procedure is basically the same as the one described in the previous step.

To apply a pattern to the rotary

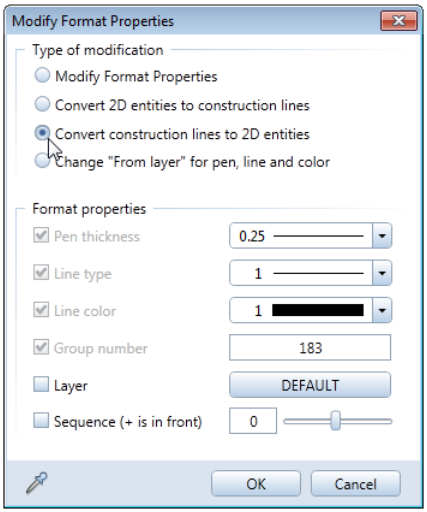
1 Before you apply patterns to the areas, delete the arc that is directly under the circle you created as a construction line. Select the **Delete** tool (**Edit** toolbar).

2 Point to the outer circle of the rotary. Make sure that you do not select the part of the circle that belongs to the road. The arc is displayed in the selection color. Click it.



3 Convert the circle you created as a construction line to a design entity.
Select the **Modify Format Properties** tool (**Edit** toolbar).

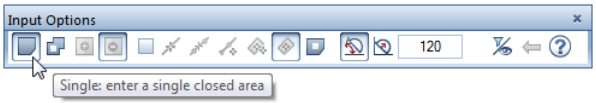
4 Select **Convert construction lines to 2D entities** and click **OK**.



5 Click the circle and press ESC.

6 Click **Pattern** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).

7 Click **Single** in the **Input Options**.

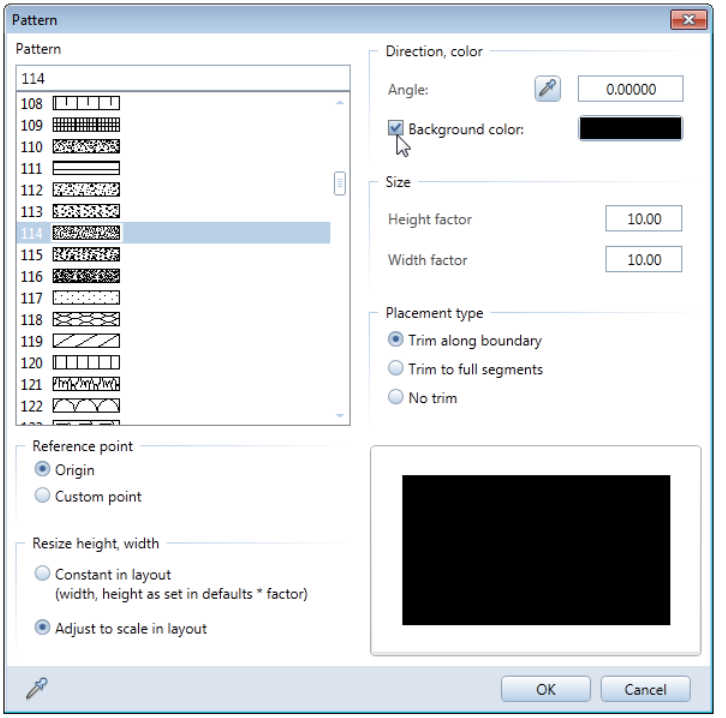


8 Click **Properties** on the **Pattern** Context toolbar.

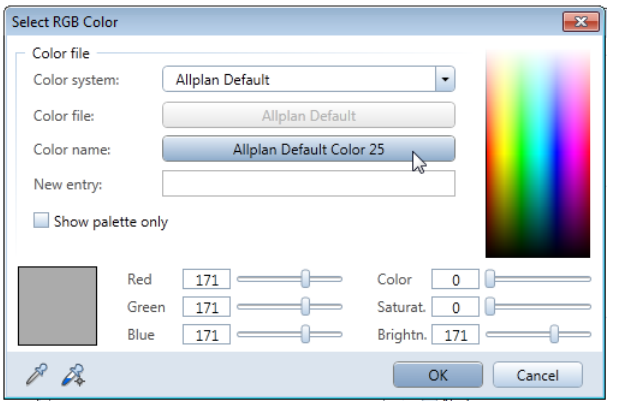
9 Select pattern **114**, enter **10** for the **Height factor** and the **Width factor** and set the following parameters:

- **Reference point** area:
  Origin
- **Resize height, width** area:
  Adjust to scale in layout
- **Placement type** area:
  Trim along boundary

10 The pattern is to have a background color.
Select the **Background color** option and click in the box to select a color.



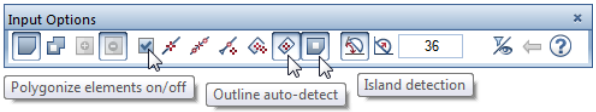
11 Click the **Color name** button and select **Default Allplan Color 25**.



12 Close the **Select RGB Color** and **Pattern** dialog boxes by clicking **OK**.

13 Check that the **Polygonize element** check box is selected in the **Input Options**.

14 In the **Input Options** select **Outline auto-detect** and **Island detection**.

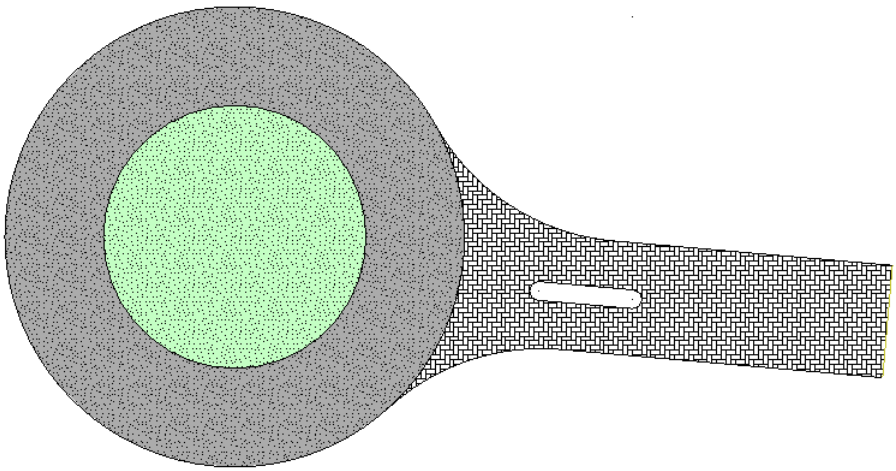


15 Click the outer circle with the left mouse button.

16 Press ESC again to quit the **Pattern** tool.

Apply pattern **105** to the inner circle yourself. Enter **10** for the **Height factor** and the **Width factor**. Select **Allplan Default Color 78** for the background color.

The result should look like this:



Applying a pattern to the traffic island

Finally, you will apply a pattern to the traffic island of the road. You will use the same pattern as for the inner circle of the rotary.

To apply a pattern to the traffic island

1 Click **Pattern** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).

2 To match a pattern you have already applied, click **Match parameters** on the **Pattern** Context toolbar.

3 Click the pattern in the inner circle of the rotary.

4 Click **Single** in the input options.

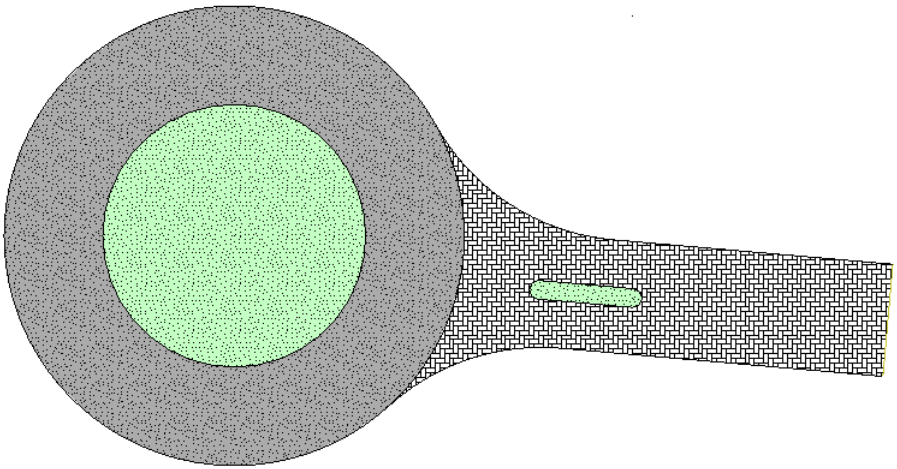
5 Check that **Outline auto-detect** is selected in the input options.

6 Zoom in on the area around the traffic island.

7 Click within the traffic island.

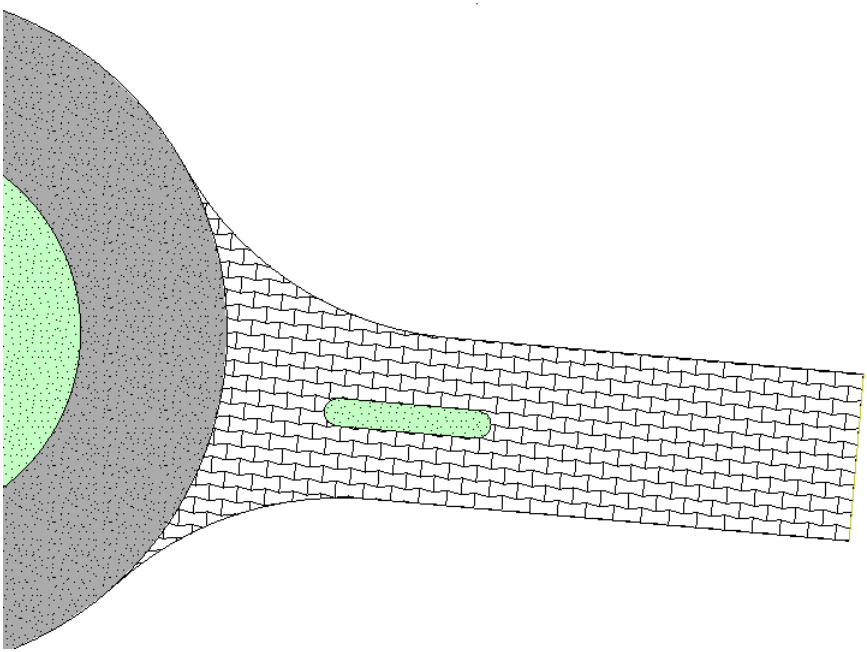
The pattern is applied to the traffic island.

The result should now look like this:



Defining a new pattern

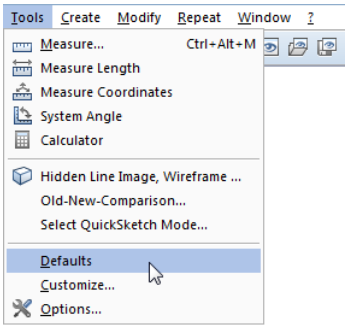
Allplan 2013 comes with various ready-made patterns (depending on the configuration). You can also modify existing patterns and define new ones. In the following exercise you will learn how to define a new pattern and apply it to the road.



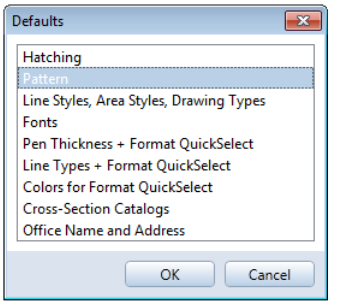
Please read the notes on defining hatching styles. They also apply to patterns.

Defining patterns

1 On the **Tools** menu, click **Defaults**.

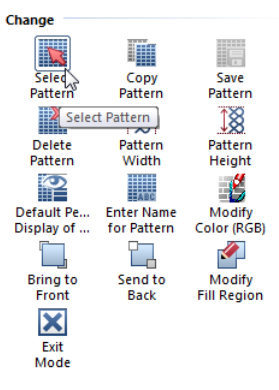


2 On the Context toolbar, click **Pattern**.



Begin by selecting an unassigned pattern.

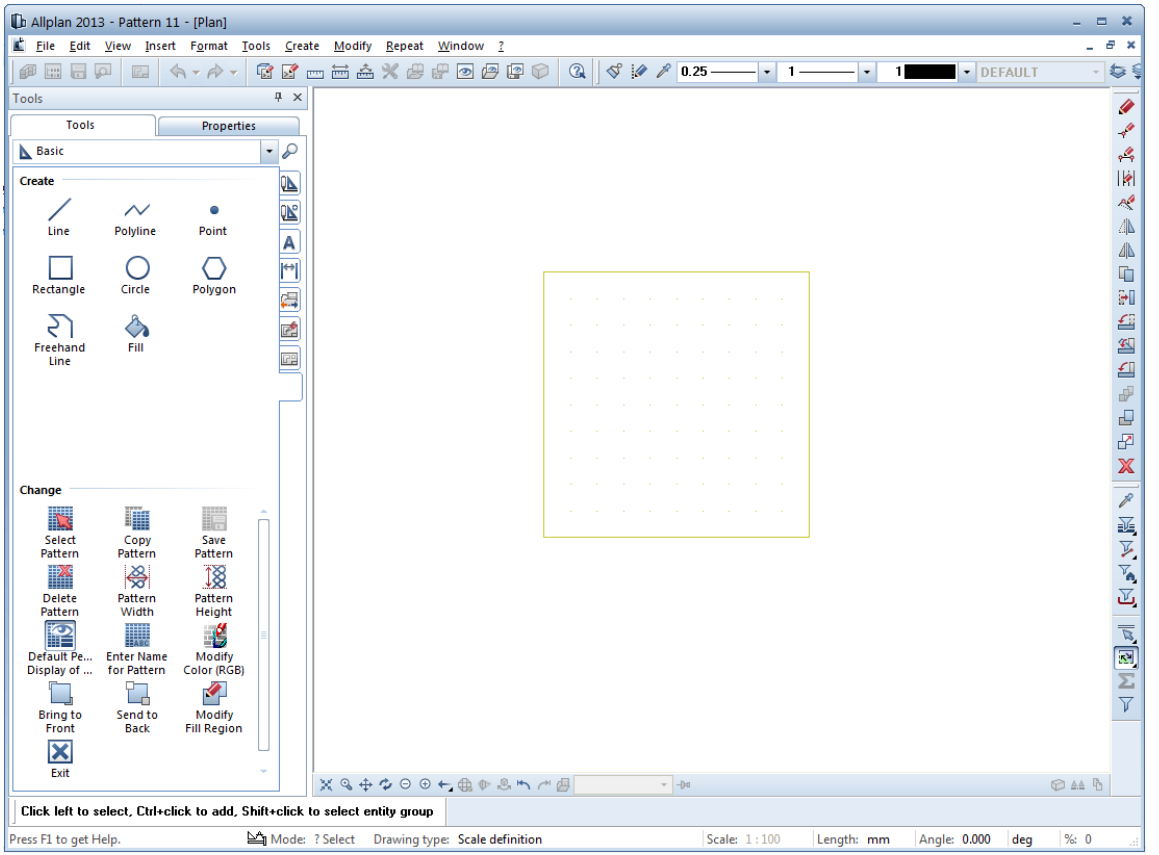
3 Click **Select Pattern** in the **Tools** palette (**Basic** family - **Pattern Editor** module - **Change** area).



Tip: The patterns that are already defined depend on the configuration you have purchased. Patterns 10 and higher are usually free. When you select a free pattern, only the editing frame and the temporary crosses are displayed on screen.

4 Select a free number (e.g. 11) in the **Select Pattern** dialog box and click **OK** to confirm.

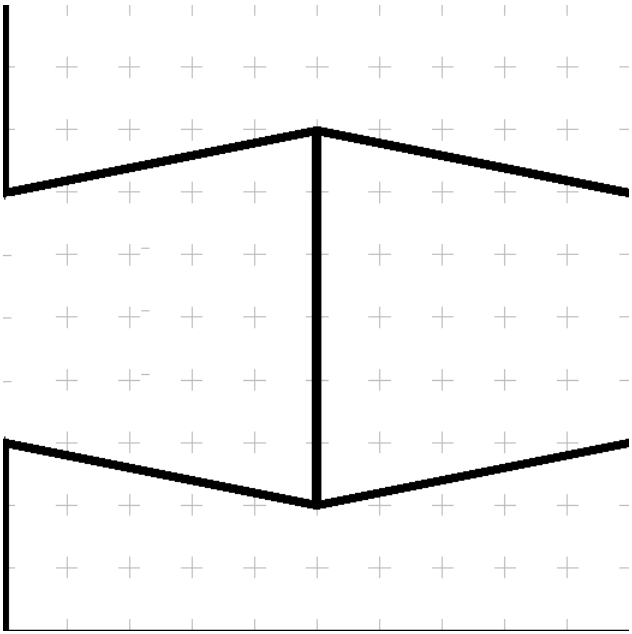
An editing frame is displayed on screen to facilitate the procedure of defining patterns. The frame contains a grid of dots to help you draw the pattern.



5 Click **Pattern Width** in the **Tools** palette (**Basic** family - **Pattern editor** module - **Change** area) and enter the *width* of the pattern in mm in the dialog line: **200**. Press ENTER to confirm.

6 Click **Pattern Height** in the **Tools** palette (**Basic** family - **Pattern editor** - *Change* area) and enter the height of the pattern in mm in the dialog line: **200**. Press ENTER to confirm.

7 Click **Line** in the **Tools** palette (**Basic** family - **Pattern editor** - **Create** area).
Click **Polyline** on the **Line** Context toolbar.
Draw the pattern as shown below.



8 Press ESC three times to quit the **Line** tool and to finish defining the pattern.

9 Click **Yes** when you see the **Would you like to save the pattern definition?** prompt.

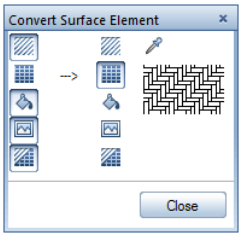
Applying the new pattern

The pattern is defined. Now you will apply the new pattern to the road. You need to make some settings in the **Pattern** dialog box to adjust the pattern to the road.

To apply the new pattern

1 Click **Convert Surface Element** in the **Tools** palette (**Basic** family - **Draft** module - **Change** area).

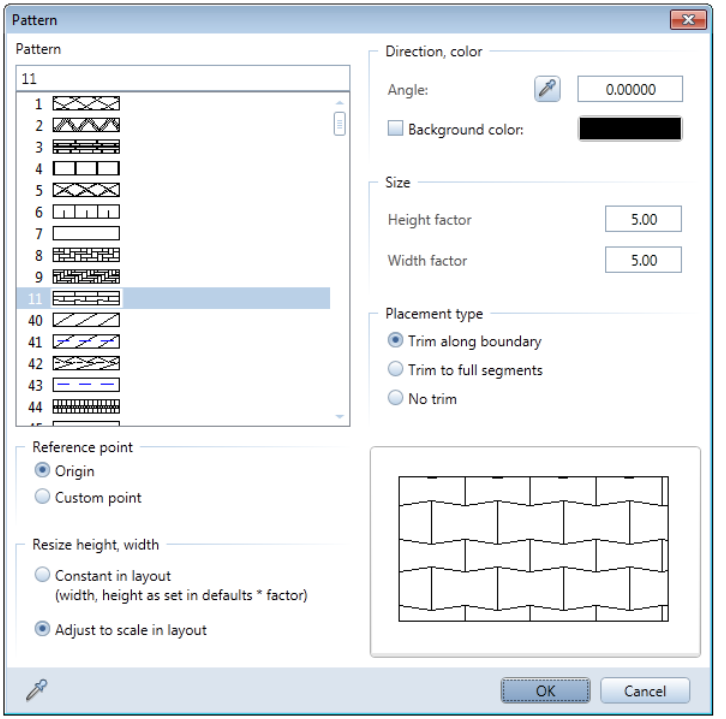
2 On the context toolbar, select the **Pattern** option and then click **Properties**.



The **Pattern** dialog box opens.

3 Select pattern **11** and enter **5** for the **Width factor** and **Height factor** in the **Size** area and set the following parameters:

- **Reference point** area:
  Origin
- **Resize height, width** area:
  Adjust to scale in layout
- **Placement type** area:
  Trim along boundary



The pattern is to be placed at an angle of 5°. You can copy the angle directly from the drawing.

4 In the **Direction, color** area, click beside **Angle**.
The dialog box closes and your design is displayed.

5 Click the top line of the road (see below).
The dialog box opens again and an angle of **-5°** is displayed.

Tip: The pattern is generated from a reference point. To define a new reference point, set the reference point to **Origin** and then to **Custom point**.

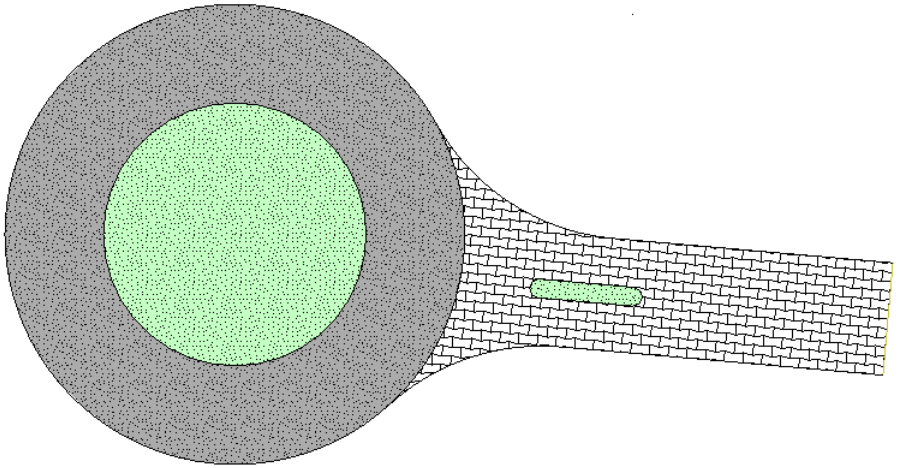
6 Here, the pattern is to be generated from the point at bottom right; i.e. this is the reference point. Click **Custom point** in the **Reference point** area to define the reference point.
The dialog box closes temporarily.

7 Click the point at bottom right to define it as the reference point.

8 Click **OK** to confirm the settings.

9 Click the pattern to be modified. The pattern changes depending on the settings you have made.

10 Press ESC to quit the tool.



Task 3: Completing the design

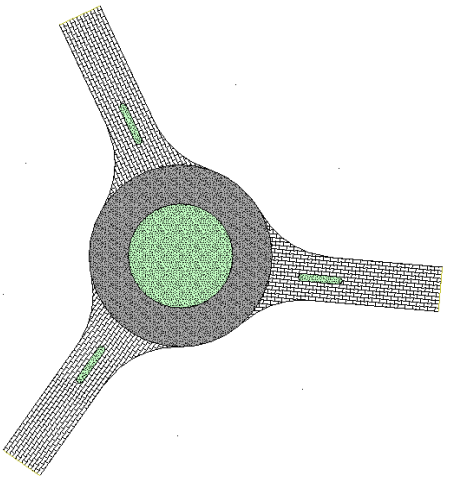
In this task, you will add the two missing roads to the rotary. You will learn about the **Polar Array** tool.

Tools:

Polar Array

Pattern Line

Objective:



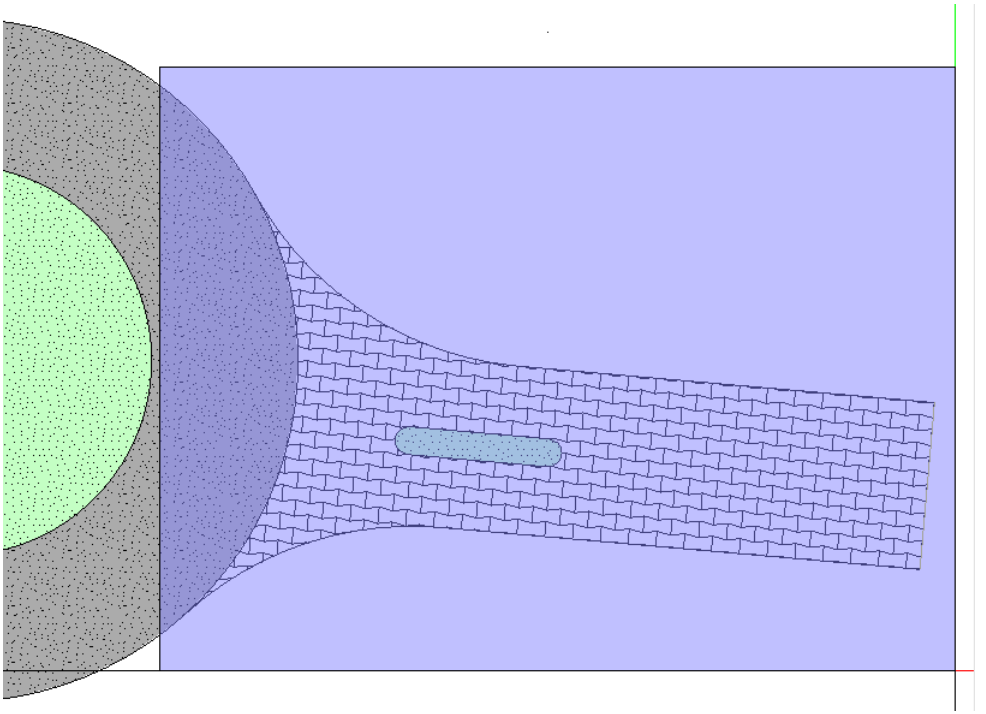
Creating the missing roads

Now you will complete the rotary so that three roads are leading up to it.

To create the missing roads

1 On the **Edit** toolbar, click **Polar Array**.

2 *Select the element(s) for polar array*
Enclose the road in a selection rectangle you open with the left mouse button.



The road, pattern and traffic island are displayed in the selection color.

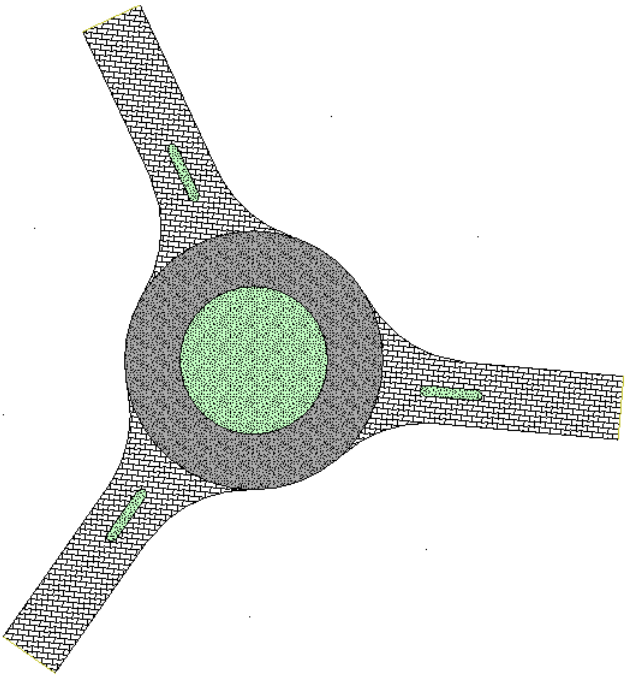
3 *Place center for polar array*
Click the center of the rotary.

4 Select **Rotate** in the input options to rotate the elements at the same time,

5 *How many times?*
Enter **3** and press ENTER to confirm.

6 Start point, reference line or angle of rotation
Enter **120°** for the angle of rotation and press ENTER to confirm.

7 Press ESC to quit the tool.



Modifying a pattern

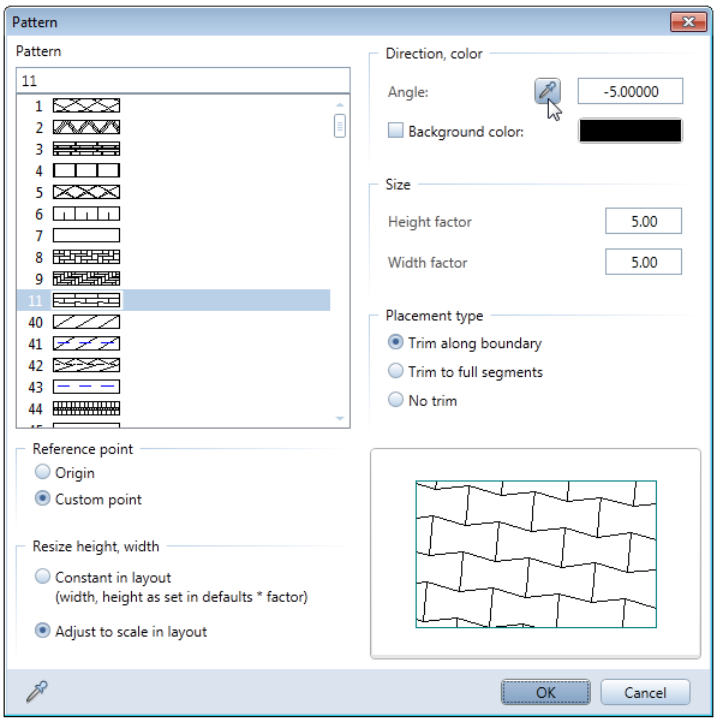
In this step, you will modify the pattern placed in the two new roads to adjust it to the lines representing the boundaries of the roads.

To modify a pattern

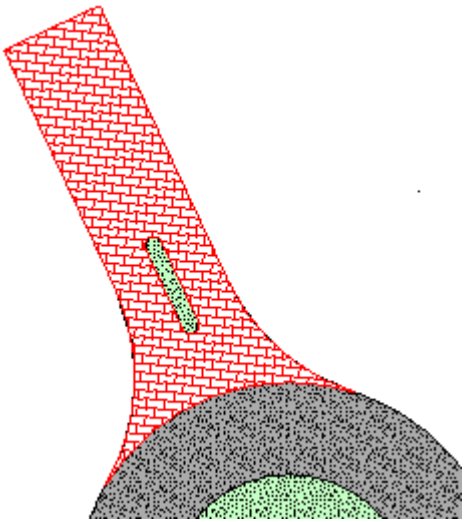
1 Double-click with the left mouse button within the pattern of the upper road.

It is displayed in the selection color and the **Pattern** dialog box opens.

2 To adjust the pattern to the line representing the boundary of the road, click **Match** to the right of the **Angle** parameter in the **Direction, color** area of the **Pattern** dialog box.



3 Click one of the lines representing the boundaries of the road to match its angle.

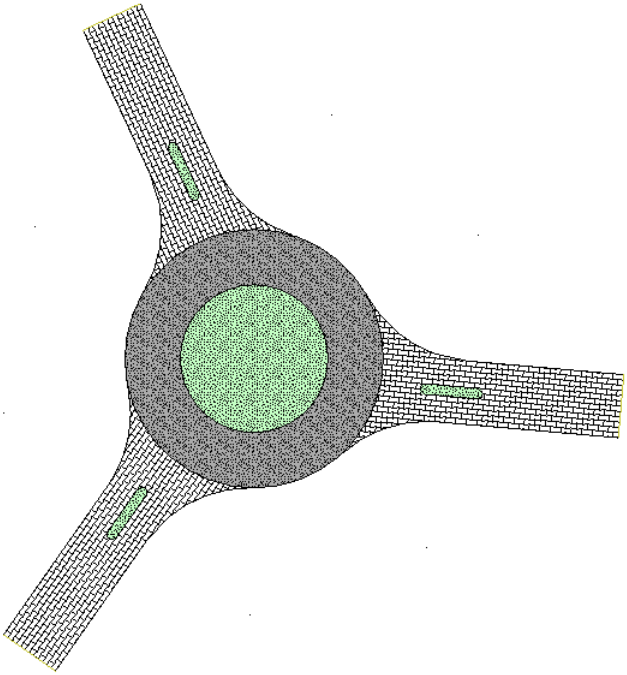


4 The **Pattern** dialog box displays an angle of **115 °**. Click **OK** to confirm the dialog box.

The pattern is adjusted accordingly.

5 Repeat these steps for road at the bottom.

The result should look like this:



Pattern line

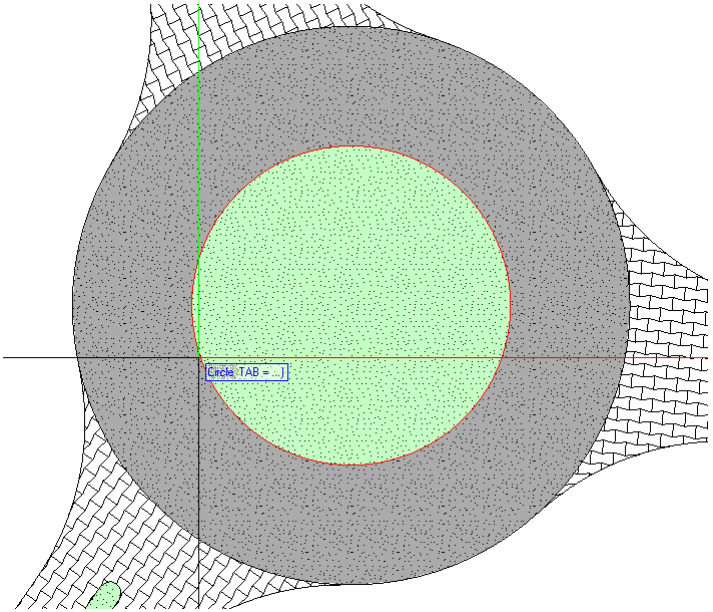
Finally, you will add a row of large paving stones to the edge of the inner circle of the rotary. To do this, you will use a pattern line.

To draw a line as a pattern line

1 Zoom in on the inner circle of the rotary.

2 Point to the inner circle.
Pay attention to **element info**: check that **Circle** is displayed.

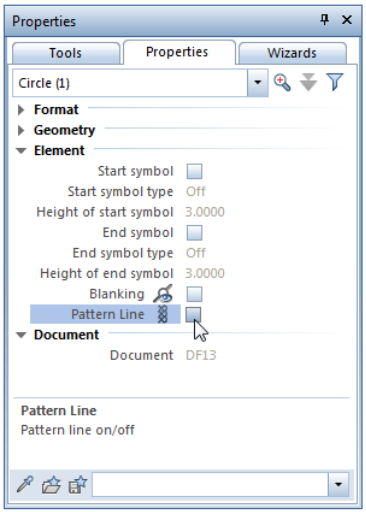
The circle is displayed in the selection color.



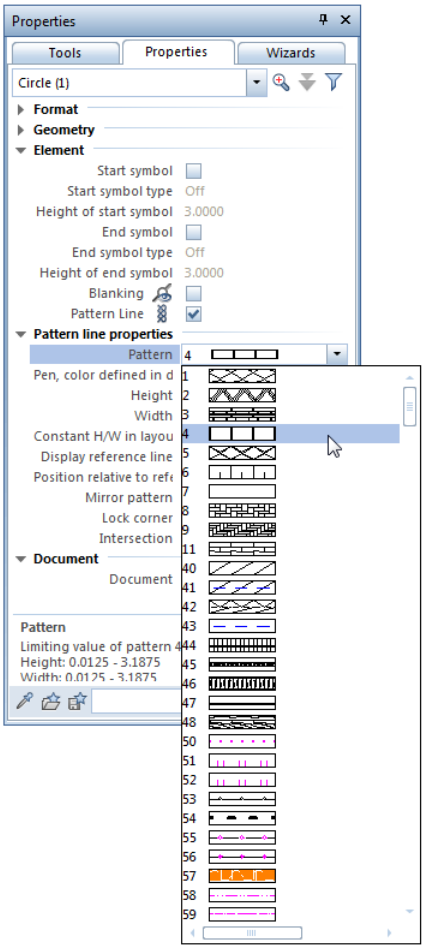
3 Double-click the inner circle with the left mouse button.

The **Properties** dialog box opens. You can see the properties of the selected circle.

4 In the **Properties** palette, select the **Pattern line** option.

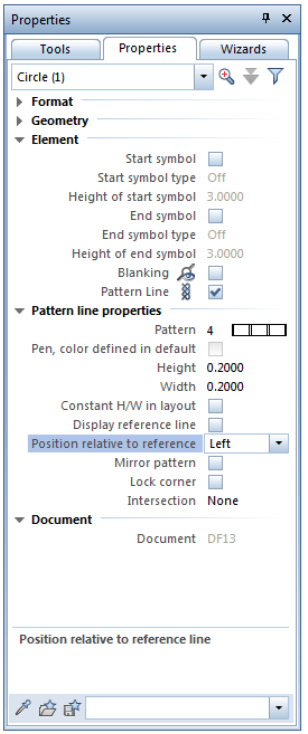


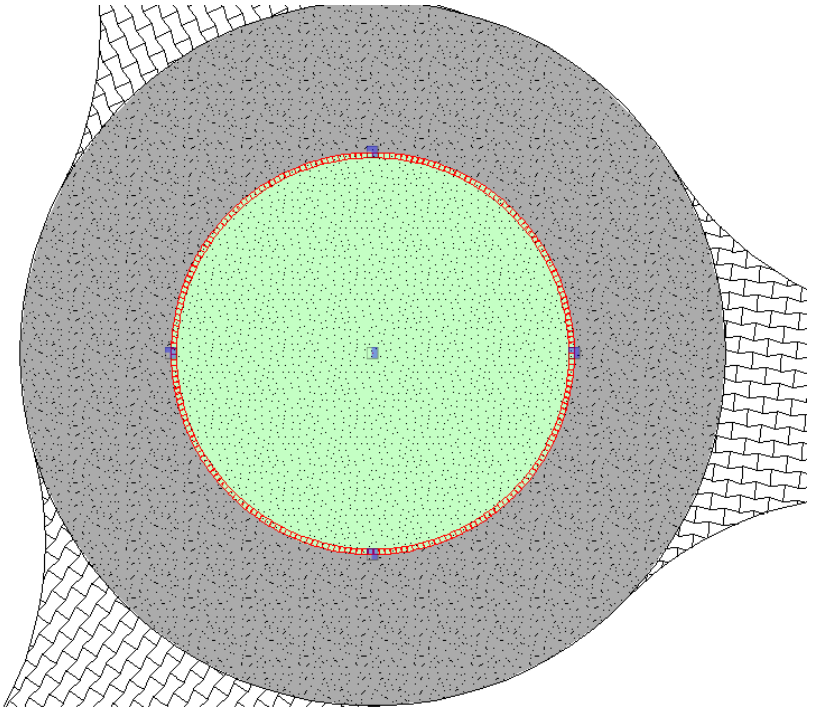
5 The pattern line properties are highlighted in yellow.
Open the list of patterns and select pattern 4.



6 Adjust the **Height** and **Width** of the pattern. Select **0.20** m for both values.

7 **Position relative to reference line**: select **left**.

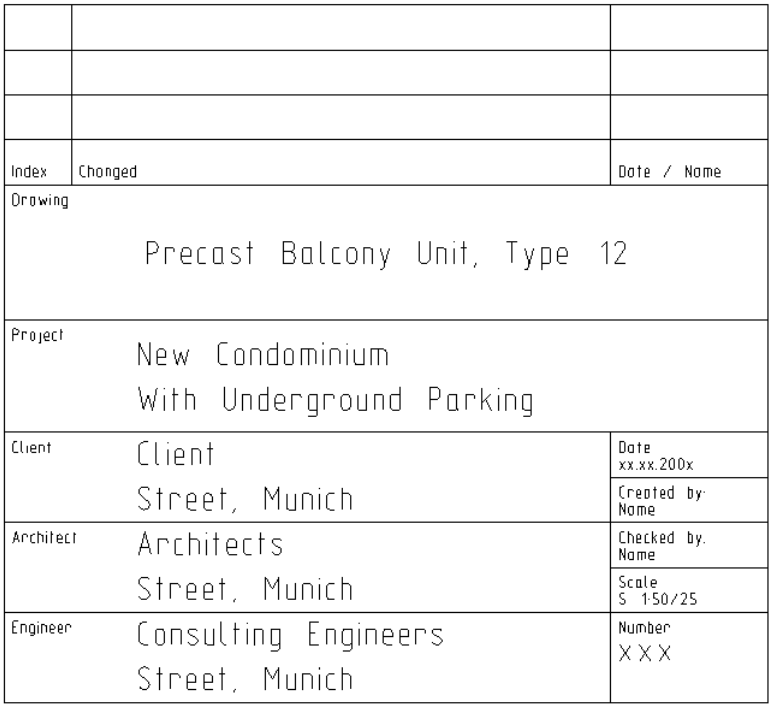




8 Press ESC.

Exercise 5: title block

In this exercise, you will create a title block and enter text for it.

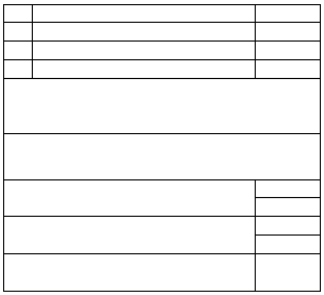


You will use the **Draft** and **Text** modules in the **Basic** family.

Note: There are also other ways of creating and labeling title blocks. The **Plot Layout** module contains the **Label** tool where you can select from a number of title blocks. These title blocks are label styles that convey information on date, project name and more. The Architecture Tutorial (unit 8) includes an example showing how to create a title block as a label style.

Task 1: Designing the title block

In the first part of the exercise that follows you will draw the layout of the title block with tools in the **Draft** module (**Tools** palette - **Basic** family).

Tools	Objective
Reference Scale	
Rectangle	
Parallel Lines	
Auto-Delete Segment	
Delete	
Modify Format Properties	

Each module has its own set of basic settings known as **Options**. These contain defaults that affect the manner in which the individual tools function.
This way, you can configure the program to suit your own preferences.

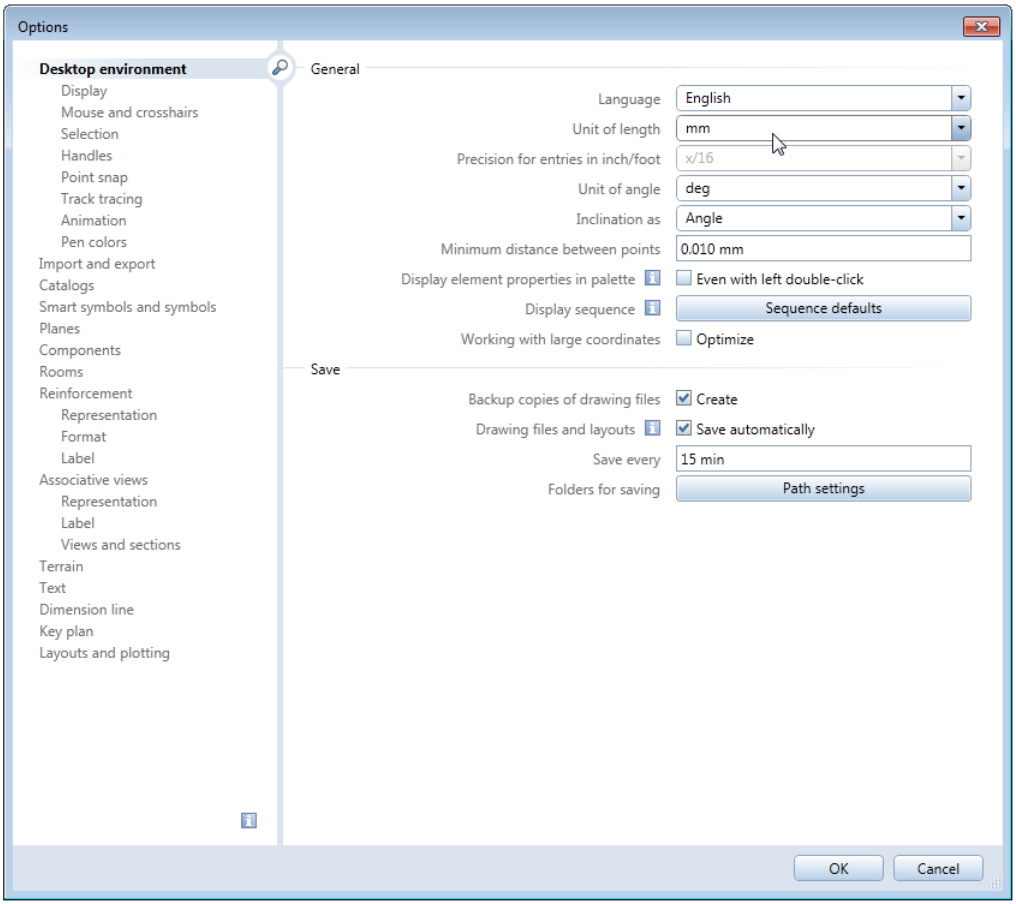
Setting the unit and reference scale

Start by selecting the unit of measurement for the values you enter. You will use **mm** for this exercise.

To set units

1 Click **Options** (**Standard** toolbar) and select **Desktop environment** in the **Options** dialog box.

2 Set the **Unit of length** to **mm**.



Tip: Alternatively, set the unit of measurement in the status bar: click in the box beside **Length** and select **mm** for this exercise.

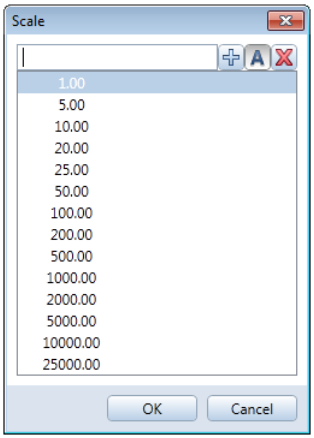
3 Click **OK** to confirm the settings.

Now change the reference scale. Until now you have worked at a scale of 1:100.
The title block will be drawn at a scale of 1:1.

To set the reference scale

Tip: Alternatively, set the reference scale in the status bar: click in the field beside **Scale** and select **1:1**.

1 On the **View** menu, click **Reference Scale**.



2 Click **1.00** in the **Scale** dialog box.

Border of title block

Start by drawing the outer border of the title block.

To draw the outer border as a rectangle

1 Click **Open on a Project-Specific Basis**, select the **Fileset** structure tab and open an empty drawing file. Name it **Title block** and close all the other drawing files.

2 Click **Rectangle** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).

3 The **Rectangle** Context toolbar opens. Select **Based on diagonal line**.

4 Place the first point in the workspace.

5 *Diagonal point*
Enter a length of **170**. Press the TAB key and enter **155** for the width.
Press ENTER to confirm.

The rectangle is drawn.

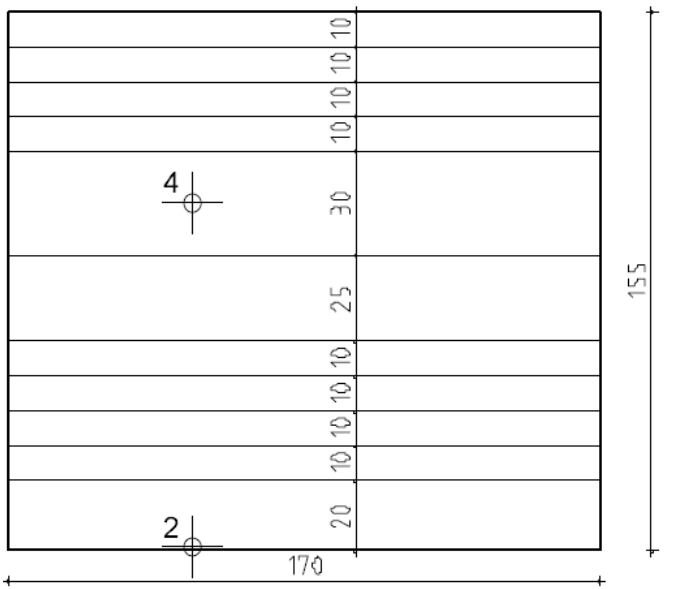
6 In the border of the viewport, click **Zoom All**.

Tip: Did you make an incorrect entry? click **Undo**. You can undo all steps back to the last save.

Create the inner lines as lines parallel to the border.

To draw inner lines

1 Click **Parallel Lines** (**Create** area).



2 *Click element*
Click the bottom line of the border.

3 *Through point or offset*
Enter **20** for the offset and press ENTER to confirm.

4 *Which side?*
Click inside the rectangle.

5 *Number*: **1**.

6 *Point through which element is to pass or enter offset*: **10**.
Number: **4**.

7 *Point through which element is to pass or enter offset*: **25**.
Number: **1**.

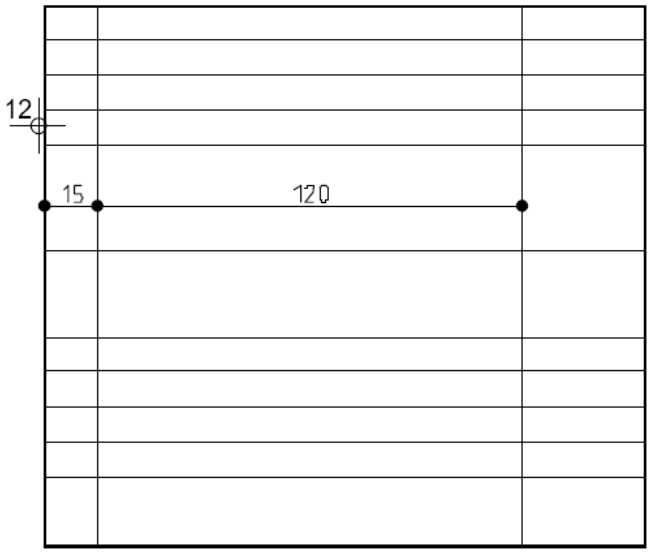
8 *Point through which element is to pass or enter offset*: **30**.
Number: **1**.

9 *Point through which element is to pass or enter offset*: **10**.
Number: **3**.

10 Press ESC to quit the tool.

11 To draw the parallel vertical lines, click **Parallel Lines** again.

12 Click the left-hand side and create two parallel lines - one at an offset of **15** and the other at an offset of **120**.



Delete Lines

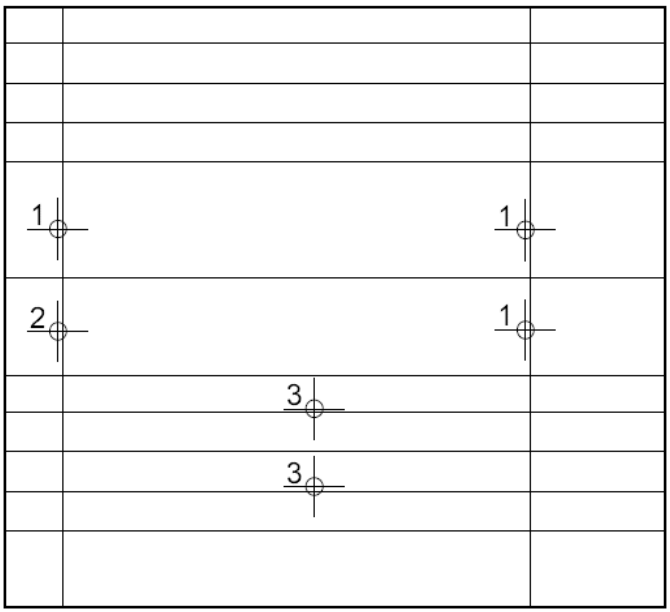
Finally, delete the lines you do not need.

To delete lines and segments of lines

1 Click **Auto-Delete Segments** (**Change** area) and delete the superfluous vertical line segments.

2 Click **Delete** (**Edit** toolbar) and delete the vertical line on the left.

3 Click **Auto-Delete Segments** again and delete the superfluous horizontal lines.

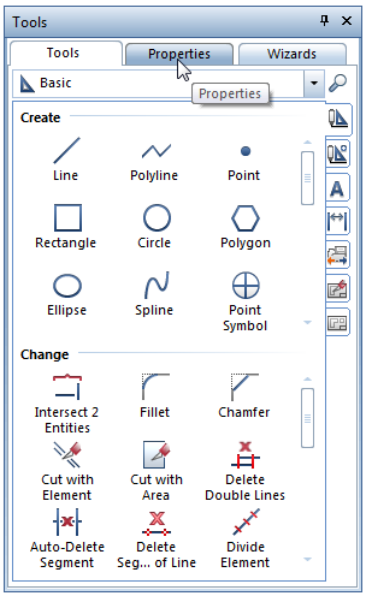


Modifying the pen thickness

The border of the title block needs to stand out.

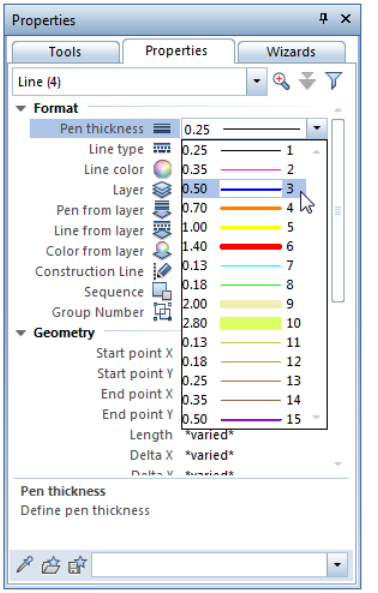
To modify the pen thickness

1 Click the **Properties** tab in the **Tools** palette.



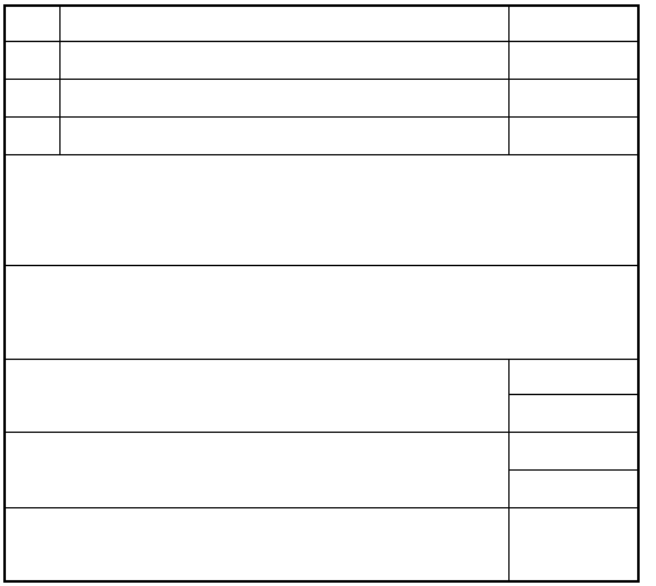
2 To select the border of the title block, press and hold down the SHIFT key and click a line of the border. This selects all lines with the same group number.

3 The **Properties** palette shows the format properties of the selected lines, amongst others.
Click the box beside **Pen Thickness** and select pen **3 0.50**.



4 To confirm, click in the workspace with the left mouse button.

Your drawing should now look like this:



Tip: The **Modify Format Properties** tool (shortcut menu or **Edit** toolbar) produces the same result.

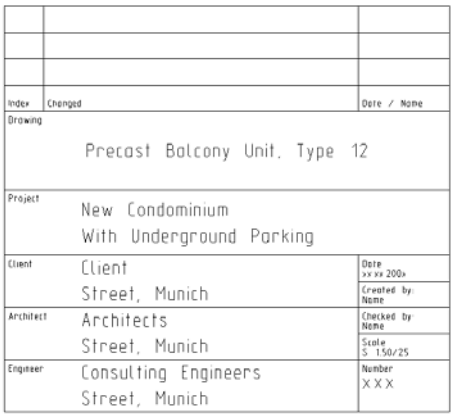
Task 2: Entering text for the title block

The following part of the exercise involves entering the text for the title block using the tools in the **Text** module (**Tools** palette, **Basic** family).

Tools

- **X Coordinate (delta point)**
- **Y Coordinate (delta point)**
- **Copy**
- **Edit Text**
- **Explode Paragraph**
- **Change Text Parameters**

Objective



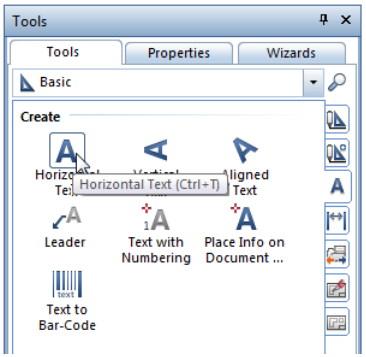
Entering centered text

Start by entering a label for the contents of the plan in the title block.

To enter centered text

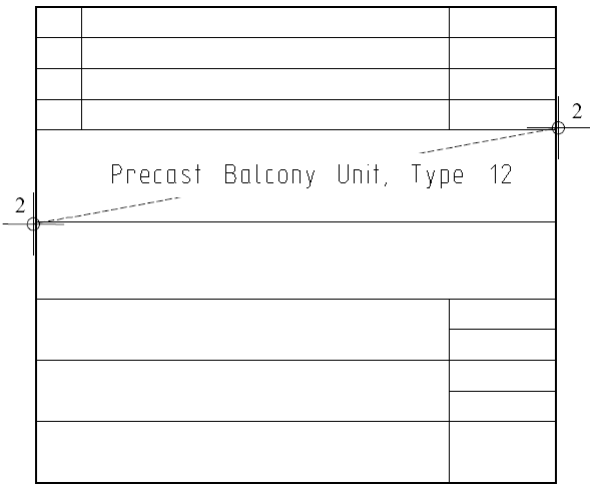
➲ Switch to the **Tools** palette.
Select the **Text** module (**Basic** family).

1 Click **Horizontal Text** in the **Create** area of the **Tools** palette.

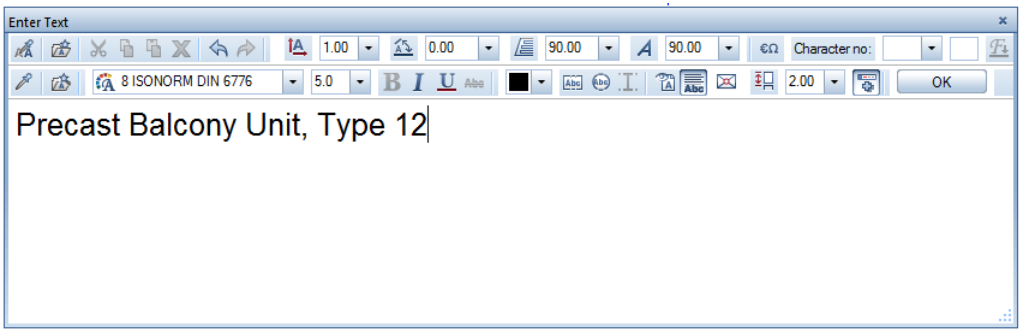


The start point of the text will be exactly in the middle of the small rectangle - in other words, the midpoint of an imaginary diagonal line.

2 Click in the workspace with the right mouse button. The shortcut menu (**Point Assistant**) opens. Select **Midpoint** and click two diagonally opposite points in the field.



3 Click to expand the dialog box so that all the parameters are visible and enter the text parameters:
- Click to **center the text's anchor point.**
- **Text height: 5.0**
  The **Text width** adapts dynamically according to the **Aspect ratio** set (in this example: 1.00).
- **Line spacing: 2.00**
- **Font**: 8 ISONORM DIN 6776.



4 For the text, enter **Precast balcony unit, type 12**

5 Click **OK** or press CTRL+ENTER.
The **Horizontal Text** tool remains active.

Paragraph text

Enter the name of the construction project in the next field. It is to be left-aligned and you will enter the text as paragraph text. To enter paragraph text, you need to specify a value for the line spacing.

Paragraph text:

When **Paragraph text** is active, the lines you enter will form a paragraph. The individual lines of text in a paragraph retain their original spacing regardless of the reference scale you set. The lines in a paragraph can also be addressed as a single entity for easy manipulation.

To delete individual lines from a paragraph, use .
resolves a paragraph into lines.

Line spacing:
The spacing between lines is based on the **line spacing value multiplied by text height**. Whenever you press ENTER to confirm a line of text, the program automatically goes to the next line.

Point snap:
To position text exactly, use the point snap feature and enter an offset. This is very useful when you want to place a point relative to an existing point.

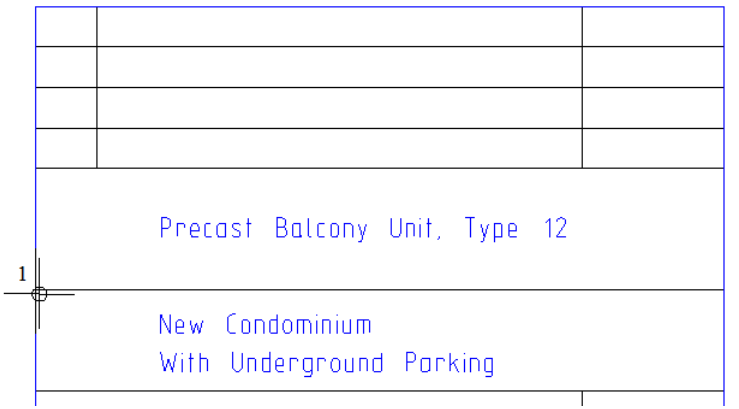
To enter paragraph text

Tip: You can use to save combinations of text settings as favorites:
Use to enter a name in the list and specify the parameters.

➲ The **Horizontal Text** tool should still be active.
You will define the text's anchor point by **snapping a point and entering the offset value**.

1 Point to the point in the title block as shown below.
Do not click the point!

Allplan will use this point as the reference point (i.e. the values you enter are measured from this point). The point is marked with a cross.
Now the values you enter for and are based on this reference point (the point snapped). To indicate this, the **X coordinate** and **Y coordinate** boxes in the dialog line turn yellow.



2 Enter a value of **30** for **dX**, press the TAB key, enter a value of **-5** for **dY** and press ENTER to confirm.

3 Change the position of the text's anchor point to **top left** and activate **Paragraph text**.

4 Enter the following text:
New Condominium [ENTER]
With Underground Parking

5 Press CTRL+ENTER or click **OK** to finish entering text.

6 Press ESC to quit the tool.

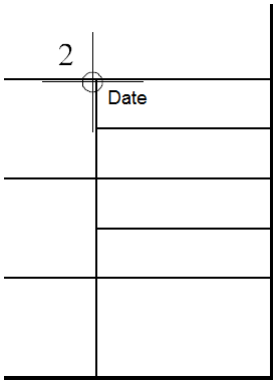
Horizontal text

Enter a line of text on the right in the title block and copy it to the fields below.

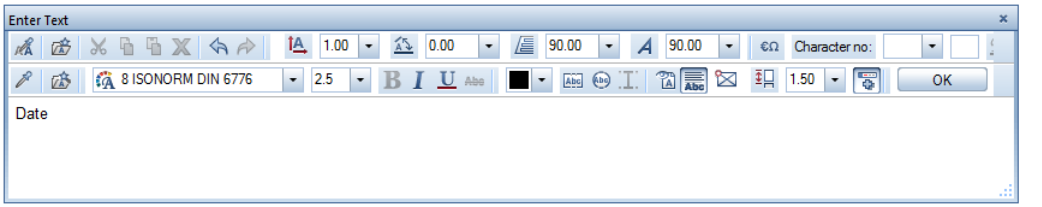
To enter and copy text

1 Click **Horizontal Text** in the **Create** area of the **Tools** palette.

2 Use the point snap feature to specify where you want the text to start:
   a) Point to the top left corner of the field (see below)
   b) **dX = 2**, TAB key
   c) **dY = -2**
   d) Press ENTER to place the point



3 Set the starting point to **top left**. Change the **Text height** to **2.5** and the **Line spacing** to **1.5**.
For the sample text, enter: **Date**.



4 Click **OK** to confirm.

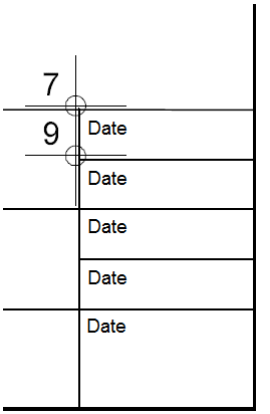
5 Press ESC to quit the tool.

6 Click the text **Date** with the right mouse button and on the shortcut menu, choose **Copy**.

7 *From point*
Click the top left corner of the field.

8 Enter **4** for the number of copies and press ENTER to confirm.

9 *To point*
Click the top left corner of the field below.



10 Press ESC to quit the tool.

Editing text

Modify the text using the **Edit Text** tool.

Text modification:
Text can be edited at any time. This provides a comfortable approach if you are using sample text - all you have to do is update the text.

To edit text

1 Click **Date** at the top with the right mouse button. On the shortcut menu, select **Edit Text**.

The relevant dialog box appears and can be modified.

2 Press ENTER at the end of **Date** to go to the next line and enter a placeholder for the date in the next line: **XX. XX. 20XX**

Note: Make sure that **Paragraph text** is active so that you can modify the two lines together.

3 Click **OK** to confirm.

4 Change the entries underneath and use placeholders as shown here following the instructions in steps 2 and 3.

Date xx.xx.200x
Created by: Name
Checked by: Name
Scale S 1:50/25
Plan number X X X

Changing text parameters

Change the appearance of the placeholder for the plan number. Assign it different text parameters. You will give it a character height of 5 mm and a character width of 6 mm. First, you need to 'explode' the paragraph.

Define text parameters:
When you enter text, you can use one of the 20 Allplan fonts or you can use all the TrueType fonts you have installed.
The **Text Height** and **Text Width** parameters are absolute values. This means that the text will print using the values you enter regardless of the selected reference scale.

To change text parameters

1 Click the **Plan number...** paragraph with the right mouse button. The shortcut menu opens. Select **Explode Paragraph**.

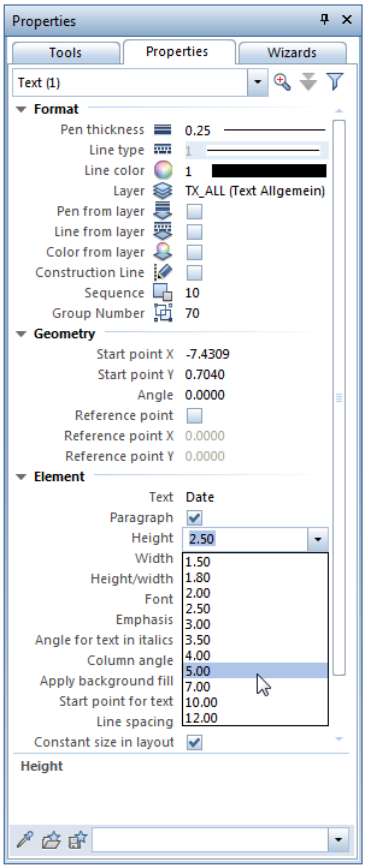
   This explodes the paragraph and you can now modify each line separately.

2 Press ESC to quit the **Explode Paragraph** tool.

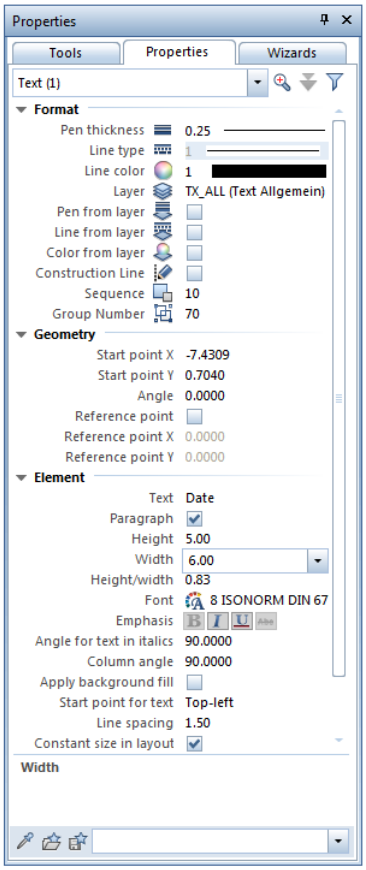
3 Switch to the **Properties** palette.

4 Click the placeholder XXX with the left mouse button.

5 The **Properties** palette shows the parameters of the selected text. Click the box beside **Height** and select **5.00**.

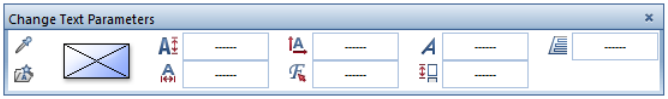


6 Click the box beside **Width**, enter **6.00** and press ENTER to confirm.



7 Click in the workspace with the left mouse button.

Note: You can also use the **Change Text Parameters** tool (**Tools** palette - **Text** module - **Change** area or shortcut menu of the text you want to modify).



8 Complete the label using the information provided below.

Index	Changed	Date / Name
Drawing	Precast Balcony Unit, Type 12	
Project	New Condominium With Underground Parking	
Client	Client Street, Munich	Date xx xx 200x
		Created by: Name
Architect	Architects Street, Munich	Checked by: Name
		Scale S 1.50/25
Engineer	Consulting Engineers Street, Munich	Number XXX

Task 3: Saving the title block as a symbol in the catalog and retrieving it

In the last part of the exercise you will save the title block as a symbol in a symbol catalog. Then, you will learn how to retrieve it and place it in an empty drawing file.

Tools

 **Write to Library**

 **Get from Library**

Symbols

Symbols are design entities that you can use whenever you need. Symbols automatically adapt to the scale of the drawing file. They can be addressed (click with the middle and left mouse buttons) and modified as a single entity. You can alter symbols and save them using another name.

Symbols are often used for drawings and other common components. In time, you will find that you develop your own extensive symbol libraries for title blocks, fixtures, equipment etc. that you can use time and again.

Symbol catalogs

Symbols are managed in symbol catalogs. Each sub-folder can contain a large number of symbols. Using the ProjectPilot, you can also copy, delete and rename them.

Sub-folders are assigned to libraries.

Office: This folder contains the office's standard libraries and sub-folders. The data in this folder is available to the entire office:

- Standalone: for all the local projects
- Network: for all local and remote users and projects Only the system administrator can store and manage symbols.

Project: The catalogs in this path belong to a specific project and are only available in that project.

Private: The catalogs in this path belong to the user that is currently logged on and cannot be accessed by other users in a network.

If you are not keen on making your own symbol catalog, you can use the extensive symbol catalogs available from Nemetschek.

Saving a symbol in a catalog

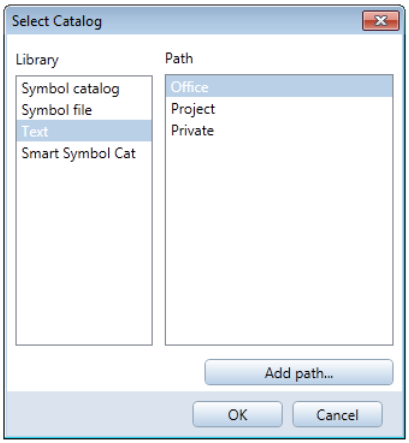
Insert the title block as a symbol in a catalog.

To insert a symbol in a catalog

1 Click **Write to Library** (**Standard** toolbar).

The title block is to be made available to the entire office.

2 Click **Office** in the **Path** area and **Text** in the **Library** area.



Tip: You can also change the position of a symbol's base point when you retrieve it.

3 Click **OK** to confirm.

4 *Select text you want to save as a text symbol*
Use the left mouse button to open a selection rectangle around the title block. It is displayed in the selection color.

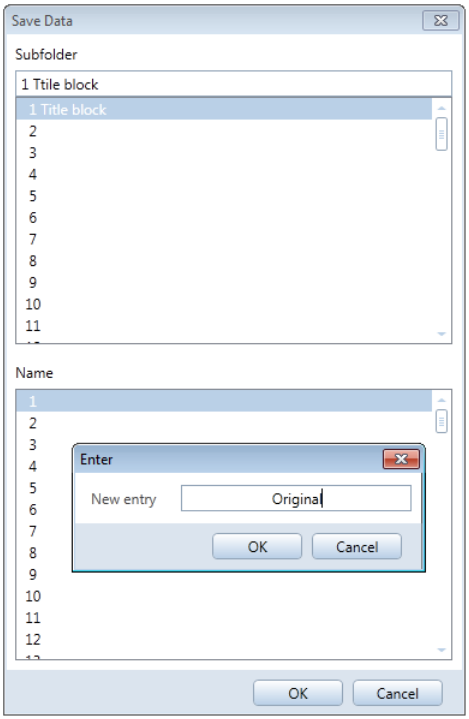
5 *Select the text symbol's base point*
Click the bottom right corner. This is the point at which the element is attached to the crosshairs when you retrieve it later.

6 In the dialog box that appears, choose the option **Dumb symbol without Snoop functionality** and click **OK** to confirm.

7 Click an empty line under **Subfolder** and enter a name for the symbol file: **Title block**.
(If you choose a name that is already assigned, only the name is overwritten.)

8 Click an empty line under **Name** and enter a name for the symbol: **Original**.
(Choosing an assigned name will cause the symbol it contains to be overwritten.)

9 Press ENTER to finish.



10 Press ESC to quit the tool.

Retrieving a symbol from a catalog

Now retrieve the symbol and place it in an empty drawing file.

In practice, the new drawing file might be a drawing file for another construction project. All you would need to do then is change the project-specific information and save the title block again as a symbol - this time in the Project folder.
Besides the symbols you create and save yourself, you can use this approach to retrieve symbols in the Nemetschek symbol catalogs as well as DWG and DXF format symbols.

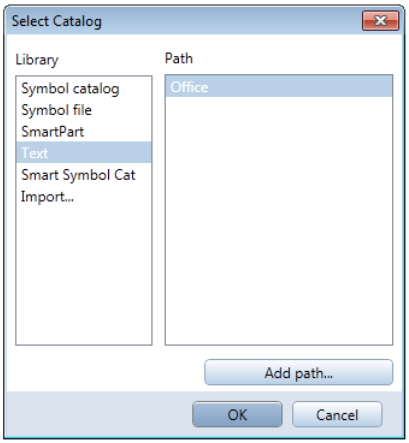
To retrieve a symbol from a catalog

1 Click **Open on a Project-Specific Basis** (**Default** toolbar), select the **Fileset structure** tab, open a new, empty drawing file and close the drawing file with the **title block**.

2 On the **View** menu, click **Reference Scale** and select **1** (1.000). Alternatively, click the **Scale** field in the status bar.

3 Click **Get from Library** (**Default** toolbar).

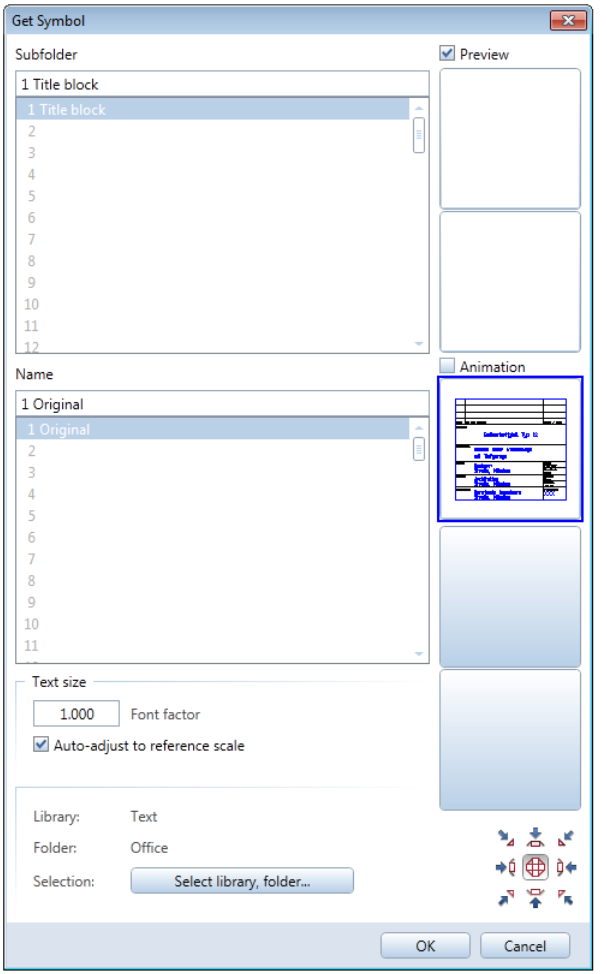
4 In the dialog box which appears, select the **Office** folder and the **Text** library.



5 Click **OK** to confirm.

The **Get Symbol** dialog box appears.

Tip: Activate the **Preview** check box to get a preview of the symbol.



Tip: Using the input options, you can change the position of the symbol's base point and define a cursor snap angle.
The tools on the shortcut menu assist you in the process of defining the symbol's drop-in point precisely.

6 Select **Original** in the **Title block** subfolder.

7 Click **OK** to confirm.

Now you are back in the workspace. The symbol is attached to the crosshairs at its base point.

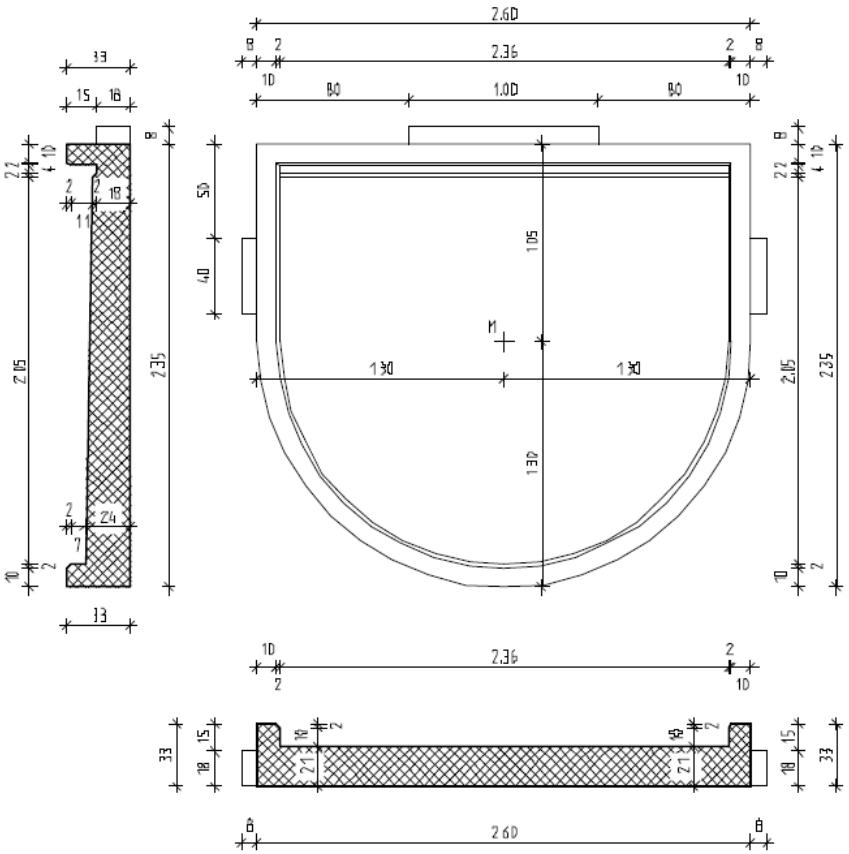
8 To place the symbol, click in the workspace.

9 Press ESC to quit symbol retrieval mode.

10 If the title block appears too small, click **Zoom All** in the border of the viewport.

Exercise 6: precast balcony unit

- Creating and modifying dimension lines
- Defining and using hatching styles



Task 1: Design Precast Balcony Unit

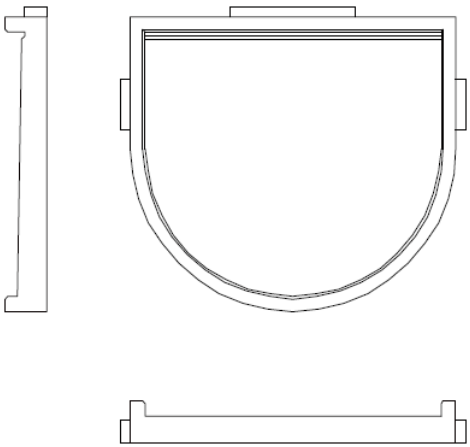
The first part of this exercise involves drawing the floor plan and two sections for a precast balcony unit.

You will use the **Draft** module in the **Tools** palette (**Basic** family).

Tools:

- **Rectangle**
- **Fillet**
- **Parallel Lines**
- **Auto-Delete Segments**
- **Line**
- **X Coordinate (Delta Point)**
- **Y Coordinate (Delta Point)**
- **Mirror and Copy**
- **Midpoint**
- **Stretch Entities**
- **Fold Line**

Objective:



Initial settings

Start by making initial settings.

To select a drawing file and set options

1 Click **Open on a Project-Specific Basis**, select the **Fileset** structure tab and open an empty drawing file. Enter **Precast balcony unit** for the name and close all the other drawing files.

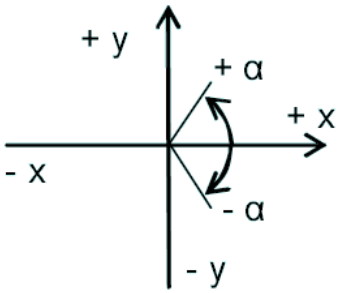
2 Click the **Length** in the status bar and select **m**.

3 On the **View** menu, click **Reference Scale** and select **25**.

Tip: When you define the scale by clicking , you can also select it in the status bar.

You will start by drawing the outline.

Bear the coordinate system in mind and the rotation direction of angles!



To get a suitable view, use the tools in the border of the viewport:

Zoom All	**Enlarge View**
Zoom Section	**Reduce View**
Pan	**Refresh**

Drawing the outline

To draw the outline in plan

1 Click **Rectangle** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).

2 The **Rectangle** Context toolbar opens. Select **Based on diagonal line**.

Note: Check that **Create rectangle as a polyline** is not active in the input options, as you will edit individual lines of the rectangle later.

3 Click where you want the rectangle to start.

When you move the mouse, a preview of the diagonally opposite point is displayed attached to the crosshairs (”rubber-band”).

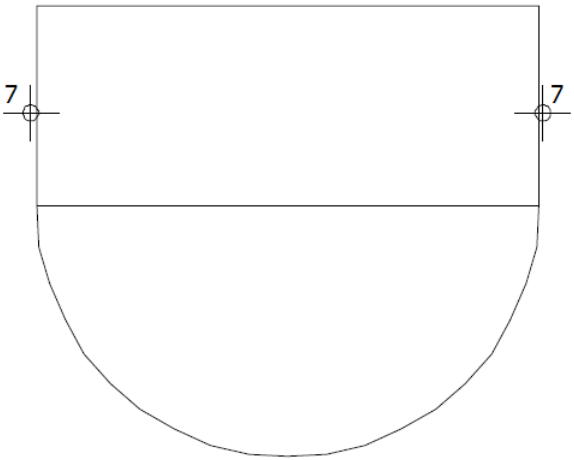
4 *Diagonal point*
Enter a length of **2.60**. Press the TAB key and enter **1.05** for the width.
Press ENTER to confirm.

5 In the border of the viewport, click **Zoom All**.

6 Click **Fillet** in the **Tools** palette (**Basic** family - **Draft** module - **Change** area).

7 Click the left and right side of the rectangle and confirm the radius of the fillet proposed by the system.

Allplan offers four options for applying a fillet.
Select the semi-circle at the bottom.



8 Click **Zoom All** again.

9 Press ESC to quit the **Fillet** tool.

10 Delete the bottom line of the rectangle.
Click this line with the right mouse button and select **Delete** on the shortcut menu.
(Alternatively, you can also select on the **Edit** toolbar and then click the line).

11 Press ESC to quit the tool.

Tip: Did you make an incorrect entry?
Click **Undo** (**Default** toolbar).

Creating inner parallel lines

Now you will draw the inner lines of the precast balcony unit.

To create inner parallel lines

1 Click **Parallel Lines** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).

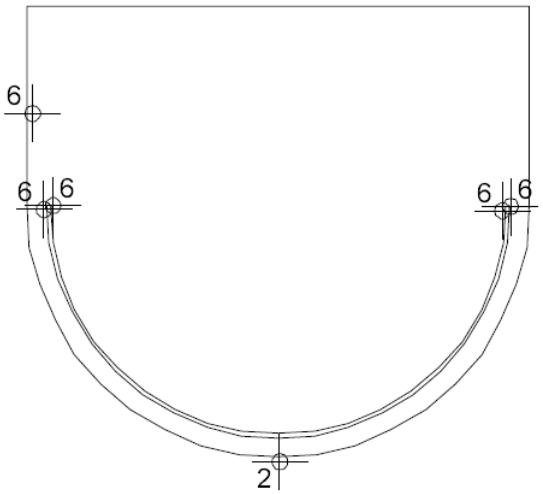
2 Click the semi-circle you have just created.

3 Enter **0.1** for the offset.
Which side?
Click within the outline; Allplan is copying the circle inwards.
Press ENTER to confirm the number (**1**).

4 For the next offset, enter **0.02**.
Which side? Click the inside again.
Confirm the number (**1**).

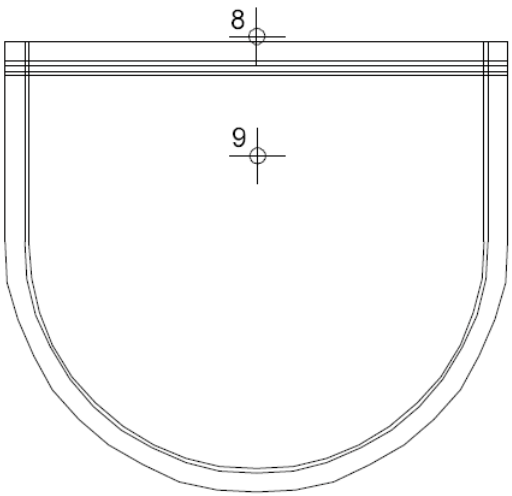
5 Click again to create lines parallel to the lines on the sides.

6 Click the line on the left and then the endpoints of the semi-circle one after the other (see below).



7 Click again to create lines parallel to the line at the top.

8 Click the line at the top and enter **0.1** for the offset.



9 Click below the line to specify the side where you want to create the parallel lines. Confirm the number (1).

10 Now create three parallel lines. Enter **0.02** for the first offset, **0.04** for the second offset and **0.02** for the third offset. Confirm the number (1) each time.

11 Press ESC to quit the tool.

Deleting redundant line segments and drawing fillets

Delete the redundant line segments in the corners and complete your design by adding fillets.

To delete redundant line segments and to add fillets

Tip: If you inadvertently deleted elements, you can quickly restore them by immediately double-clicking in the workspace with the right mouse button (the last action is undone). You can also use **Undo** (you can go back (undo) as many steps as you want, as far back as the last time the data was saved and compressed.).

1 Click one of the lines you want to delete with the right mouse button and select **Auto-Delete Segments** on the shortcut menu.
(Alternatively, you can also click in the **Change** area and then click the relevant line).

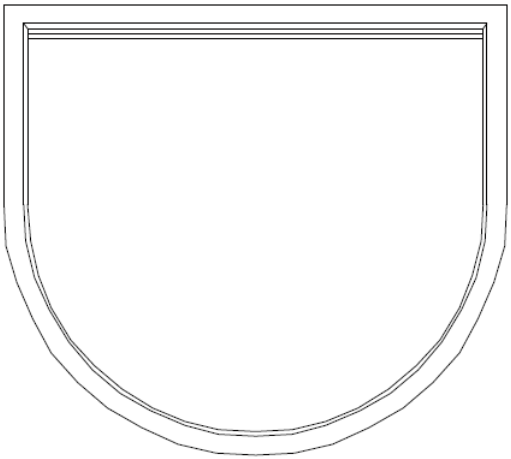
2 Click all the line segments you want to delete.

Use **Zoom Section** (in the border of the viewport) to set a suitable view.

3 Click **Line** in the **Tools** palette (**Create** area).

4 Draw the two fillets as shown below.

Your drawing should now look like this:



5 Press ESC to quit the tool.

Drawing "Isokörbe"

Create the 'Isokörbe' (special type of reinforcement cage) at the top and on the sides.

To draw 'Isokörbe' in plan

1 Click **Line** in the **Tools** palette (**Create** area).

2 Click **Polyline** on the **Line** Context toolbar.

3 Point to the top left corner.

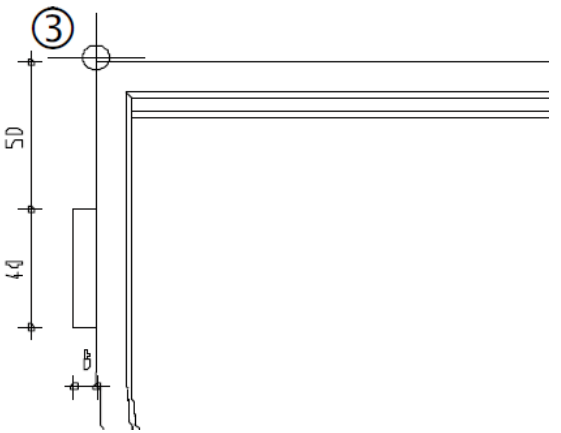
Allplan will use this point as the reference point (i.e. the values you enter are measured from this point). The point is marked with a cross.
Now the values you enter for and are based on this reference point (the point snapped). To indicate this, the **X coordinate** and **Y coordinate** boxes in the dialog line turn yellow.

4 Press the TAB key to go to the **Y coordinate** box.
Enter **-0.50** for dY and press ENTER to confirm.

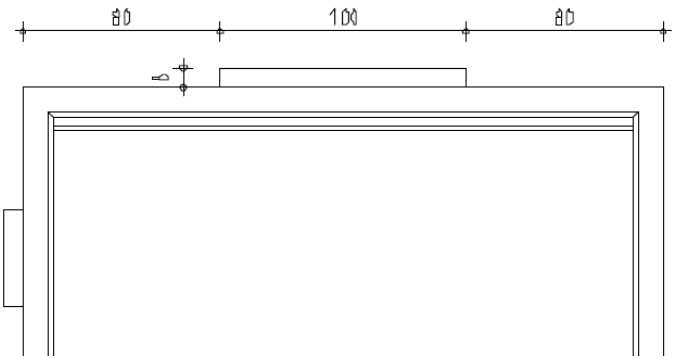
This defines the starting point of the line.

5 Enter the following values in the dialog line:
dX = -0.08
dY = -0.40
dX = 0.08

6 Press ESC to quit the tool.



7 Now draw the 'Isokorb' at the top using the procedure previously described. Careful with the direction and the sign (positive/negative)!

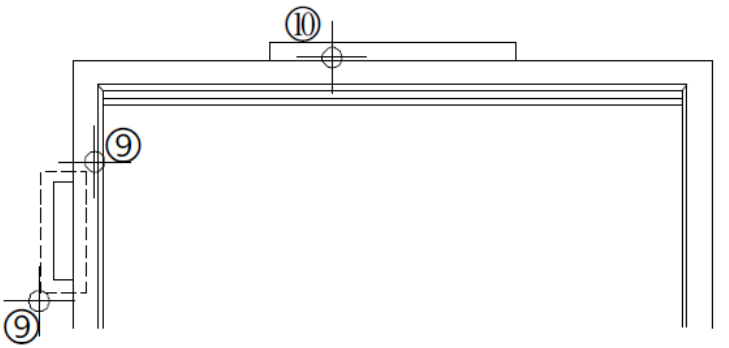


8 You can create the 'Isokorb' on the right by mirroring. Click **Mirror and Copy** (**Edit** toolbar).

9 Select the 'Isokorb' on the left by enclosing it in a selection window (from left to right) with the left mouse button pressed down.

10 To define the first point for the mirror axis, click the line at the top with the right mouse button and select **Midpoint** on the shortcut menu.

Make sure that you do not click the midpoint of the line or any other existing point.
This defines the first point of the mirror axis.



11 To obtain a mirror axis that is exactly vertical, press the TAB key to switch to the **Y Coordinate** box in the dialog line.
Enter any **dY** value (not equal to 0).
This creates the 'Isokorb' on the right and completes the design.

12 Press ESC to quit the tool.

Outline of Longitudinal Section

Next, you will draw the outline of the longitudinal section and place it below the floor plan.

To draw the outline of the longitudinal section

1 Click **Line** in the **Tools** palette (**Create** area).

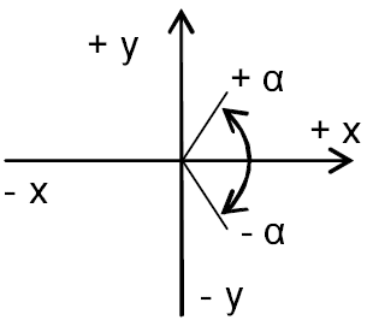
2 Enable the **Polyline** function in the **Line** dialog box.

3 Click **Select Pen Thickness** on the **Format** menu and select pen thickness **0.50** mm in the list box.

Note: You can change this setting if you want while you draw.

4 Place the first point below the plan.
Create the lines by entering the following sequence of values in the dialog line:

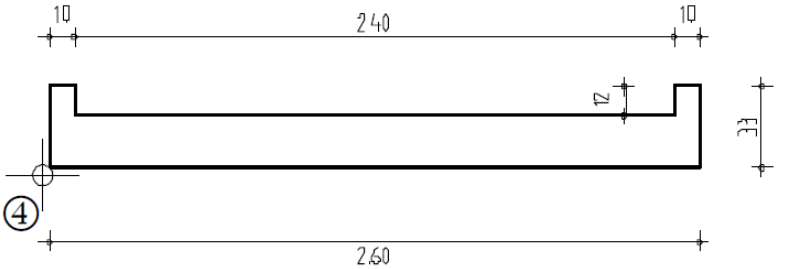
Tip: In the event that you enter an incorrect value, click on the **Line** Context toolbar. The last entry is deleted and you can resume your work at the end point of the previous line.



Bear the coordinate system in mind!

dX = 2.60, dY = 0.33, dX = -0.10, dY = -0.12

dX = -2.40, dY = 0.12, dX = -0.10, dY = -0.33.



5 Press ESC to quit the tool.

Modifying the outline

The next step involves modifying the outline.

To modify the outline of the longitudinal section

1 Select the **Stretch Entities** tool (**Edit** toolbar).

2 *Select the points you want to modify*
Click the bottom right point of the upstand on the left (see below)

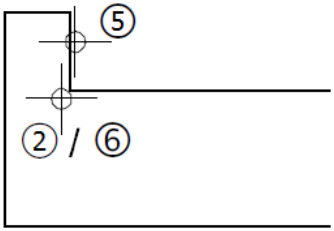
3 *Place a point (from point) or enter dx:*
Enter **0.02** for **dX** in the dialog line, confirm **dY** and **dZ** (**0**). Press ESC to quit the tool.

4 Click **Fold Line** (**Edit** toolbar).

5 Click the right line of the upstand.

6 *End point:*
Point to the point at bottom right, which you have just modified. Allplan snaps to this point and marks it with a cross.

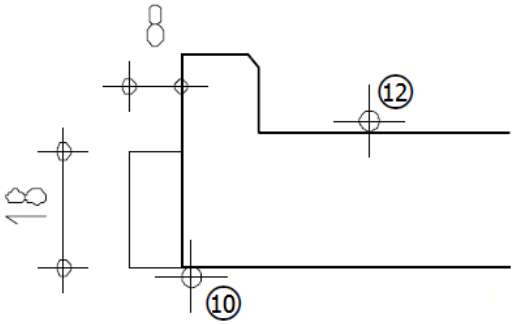
7 Press the TAB key to activate **Y Coordinate**, enter a value of **0.10** for **dY** and press ENTER to confirm.



8 Press ESC to quit the tool.

9 You should be able to modify the upstand on the right yourself. When finished, press ESC to quit the tool.

10 Select pen thickness **0.25** on the **Format** toolbar and draw the 'Isokorb' on the left using **Line** (**Tools** palette - **Create** area). Start at bottom left.
dX = -0.08
dY = 0.18
dX = 0.08

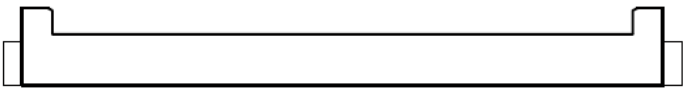


11 Press ESC to quit the **Line** tool.

12 Using the procedure described above, create the 'Isokorb' on the right-hand side of the longitudinal section using the **Mirror and Copy** tool (**Edit** toolbar):

- Press and hold down the left mouse button and enclose the 'Isokorb' in a selection rectangle (from left to right).
- Click the line at the top with the right mouse button and select **Midpoint** on the shortcut menu.
- Press the TAB key to switch to **Y Coordinate** in the dialog line and enter any value for **dY**.

Your design should now look like this:



13 Press ESC to quit the tool.

Drawing the cross-section

Finally, you will draw the entire cross-section in a single operation.

To draw the cross-section

1 Select pen thickness **0.50** mm and click **Line** (**Tools** palette - **Create** area).

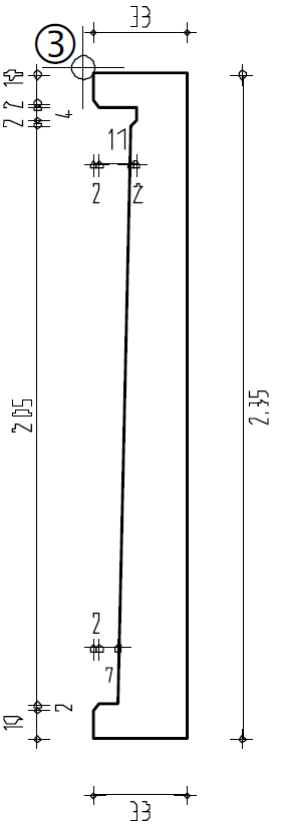
2 Click **Polyline** on the **Line** Context toolbar.

3 Place the starting point at top left so that it is beside the floor plan.

Tip: *Skip a coordinate*: pressing the TAB key takes you to the next data entry box.

Enter relative coordinates: Enter values for , and in the dialog line (use the TAB key to switch between the data entry boxes) until you find the drop-in point. Press ENTER to place the point.

4 Enter the following sequence of values in the dialog line.
You can use the finished section to check the entries you make.



dX = 0.33 ENTER
dY = -2.35 ENTER

dX = -0.33 ENTER
dY = 0.10 ENTER

dX = 0.02 TAB key
dY = 0.02 ENTER

dX = 0.07 ENTER

(press the TAB key to switch to)

dX = 0.04 TAB key
dY = 2.05 ENTER

dX = 0.02 TAB key
dY = 0.02 ENTER

(press the TAB key to switch to)

dY = 0.04 ENTER
dX = -0.13 ENTER

(press the TAB key to switch to)

dX = -0.02 TAB key
dY = 0.02 ENTER

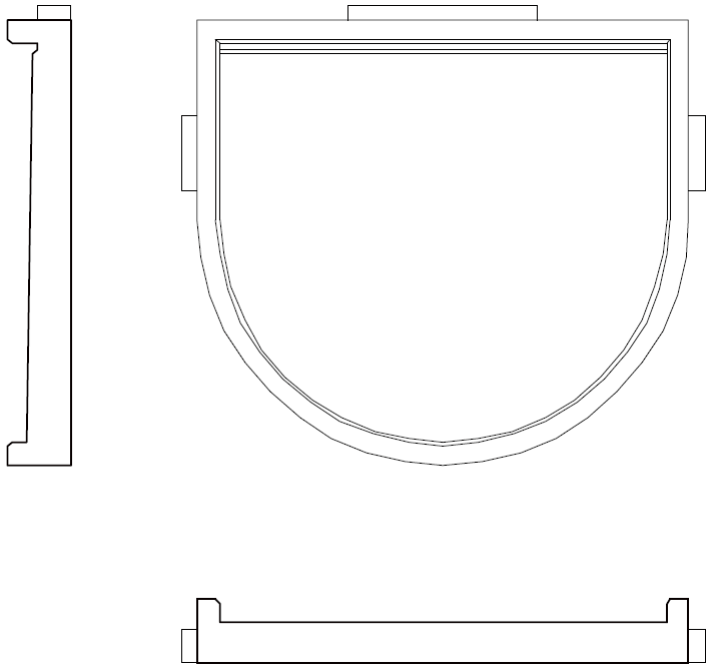
(press the TAB key to switch to)

dY = 0.10

5 Press ESC to quit the tool.

6 Select pen thickness **0.25** mm and complete the 'Isokorb' (8/18 cm) at the top.

Your drawing should now look like this:



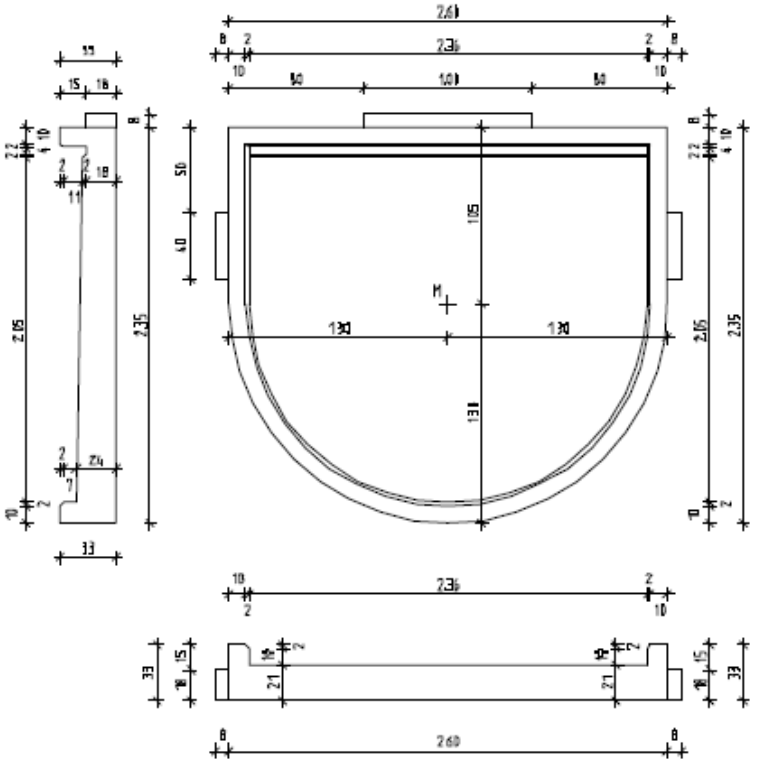
Task 2: Dimensioning the precast balcony unit

Now you will dimension the precast balcony unit using the tools in the **Dimension Lines** module (**Tools** palette - **Basic** family).

Tools:

- Horizontal Dimension Line
- Vertical Dimension Line
- Parallel Lines
- Auto Dimensioning
- Add Dim. Line Point
- Modify Dim. Line

Objective:



The first step is to define the dimension line parameters. Dimensioning then involves three steps:

- Define the type of dimension line (vertical, horizontal, angle or direct)
- Specify a location for the dimension line
- Click the points you want to dimension

You can modify dimension lines at any time: for example, you can add and delete dimension line points, move dimension lines and change the settings for dimension line parameters.

Setting dimension line parameters

Start by making settings for the dimension line parameters.

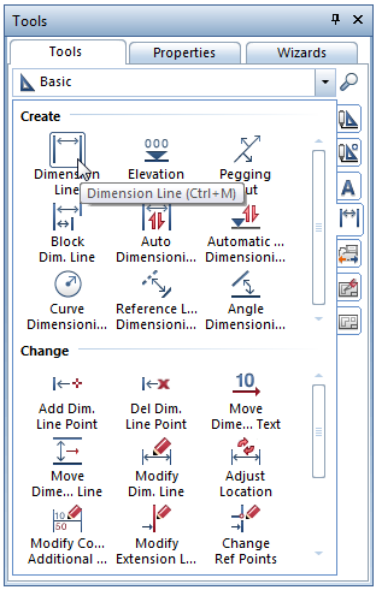
Tip: In the **Options** on the **Dimension line** page, you can set a tolerance value for tilted (dimension) text, specify the decimal separator and enter values for blanking.

The most important parameters are the unit, the position of the dimension text, and the dimension text height and width. Dimension lines always reference the design dynamically (dimension lines are associative; the points you click are the reference points). Dimension lines automatically update to reflect any changes you make to the design.

To set dimension line parameters

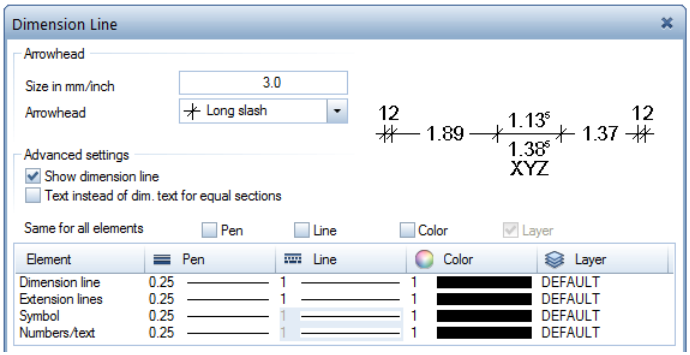
1 In the **Tools** palette, activate the **Dimension Lines** module (**Basic** family).

2 Click **Dimension Line** (**Create** area).



3 Click **Properties**.

4 Check the settings in the top (general) part of the dialog box, select an **Arrowhead (slash)**, enter its **Size (3.00)** and set the **Format properties** for the individual components of the dimension line.



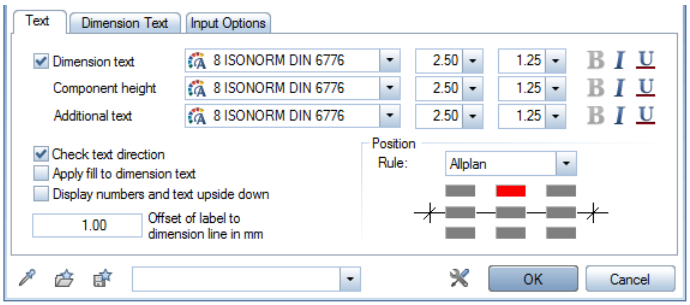
All dimension lines are created with the pen, line, color and layer set here, regardless of the settings on the **Format** toolbar.

5 Check the settings on the **Text** tab in the bottom part of the dialog box and set the text parameters as shown below.

6 Select a font and define the dimension text height and width by entering the following values:

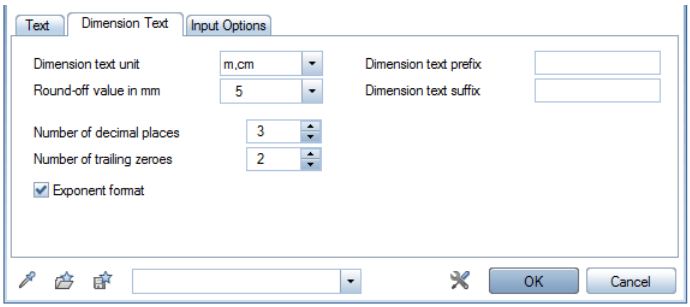
- **Dim. text height: 2.5**
- **Aspect: 1.25** (as a result, the text width is 2.0)

7 To define the **Position** of the dimension text, click the upper box in the middle.

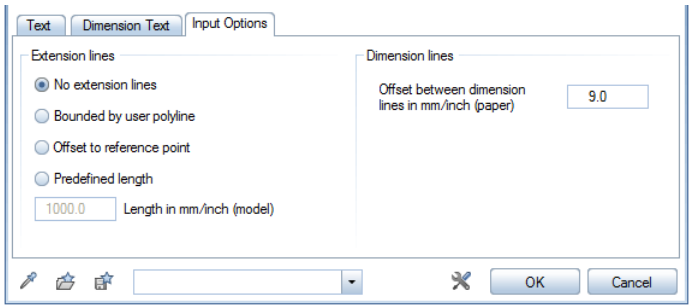


8 Open the **Dimension Text** tab and check the following parameters:

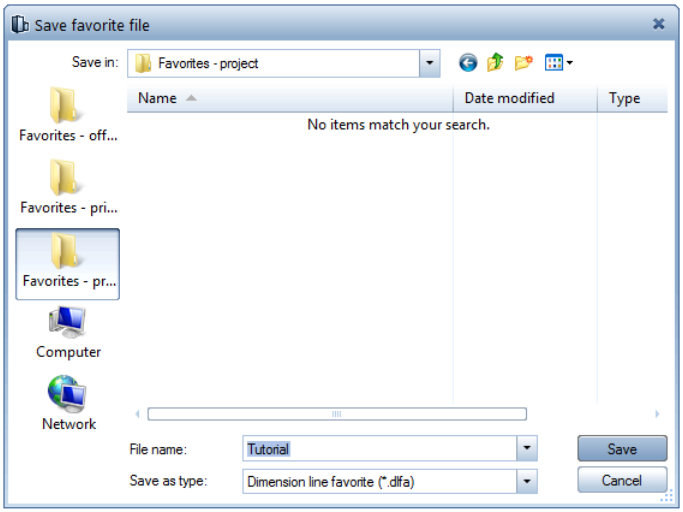
- **Dimension text unit**: m, cm
- **Round-off value in mm**: 5
- **Number of decimal places**: 3
- **Number of trailing zeros**: 2
- **Exponent format** option: selected



9 Open the **Input Options** tab and select the **No extension lines** option.
Set the **Offset between dimension lines in mm/inch (paper)** to **9**.



10 Click at bottom left and save the parameters as a favorite file. Enter "Tutorial" for its name.



11 Click **Save** to confirm.

12 Click **OK** to confirm the **Dimension Line** dialog box.

Creating horizontal dimension lines

You will now dimension the longitudinal section using horizontal dimension lines.

To create horizontal dimension lines

➲ The **Dimension Line** tool is still open.

1 Set the view so that there is enough space at the top for the dimension line.

2 On the Context toolbar, click **Horizontal**.

3 *Through point or click dimension line*
Define the position of the dimension line by clicking above the longitudinal section. This is the point through which the dimension line will pass.

4 Click the six points you want to dimension.

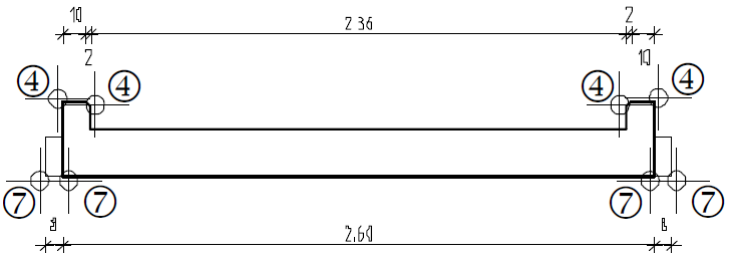
A preview of the dimension line is displayed immediately. Any new points you click are automatically included in this preview. You can click the point to be dimensioned in any sequence.

5 To finish entering points, press ESC.

Horizontal remains active so that you can create the next dimension line.

6 *Through point or click dimension line*
Click below the longitudinal section to define the point through which the dimension line is to pass.

7 Click the points to be dimensioned and press ESC to finish creating horizontal dimension lines.



Creating vertical dimension lines

Now you will continue with vertical dimension lines.

To create vertical dimension lines

➲ The **Dimension Line** tool is still active.

1 On the Context toolbar, click **Vertical**.

2 Click to the left of the longitudinal section to define the point through which the dimension line is to pass.

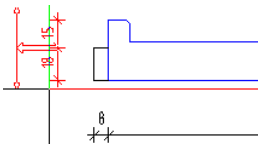
Tip: You can specify the offset between the individual dimension lines in the **Properties**. You can also move dimension lines later using the **Move Dimension Line** tool.

3 Click the corners of the 'Isokorb' and the upstand and press ESC to quit the tool.

Vertical remains active so that you can create the next dimension line.

4 *Place a point for the dimension line or click a dim. line*
Point to the left of the dimension line as the next dimension line is to be created to the left of the first one.

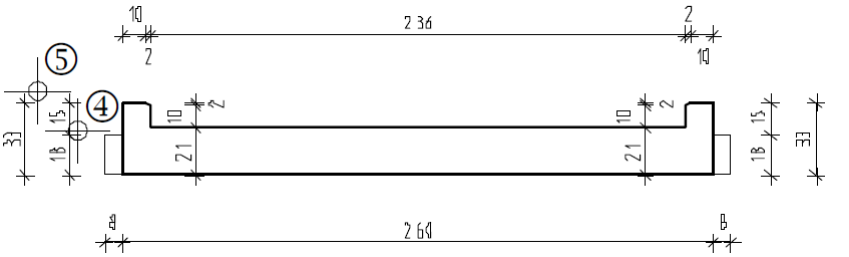
Allplan snaps to this dimension line and displays it in the selection color. A symbol indicates the side on which the new dimension line will be created.



5 Click in the workspace to confirm.

6 Click the points to be dimensioned.

7 Now you should be able to create the missing vertical dimension lines in the section and on the right yourself.



Creating dimension lines automatically

A part of the floor plan will be dimensioned automatically. All you need to do is draw a line through the components. Allplan will automatically dimension the points where the line and the components intersect.

To create dimension lines automatically

1 Click **Auto-Dimensioning** in the **Tools** palette (**Create** area).

2 Click **Match parameters from dimension line** and click an existing dimension line.

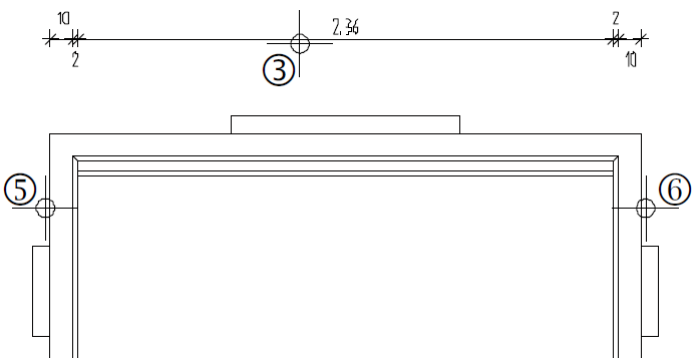
3 Click above the floor plan to define the point through which the dimension line is to pass.

4 *Place direction point 1 or enter a direction angle or line*: confirm the value **0.00**.

5 *Place point 1 for the section*: define the first point by clicking above the 'Isokorb' to the left of the exterior edge of the precast unit.

6 *Place the next point for the section*: click the equivalent point on the right.

7 *Place the next point for the section*: press ESC twice to quit the tool. Allplan automatically dimensions all the points where the line and the design intersect.



Adding dimension line points

As the dimensions of the 'Isokörbe' are still missing, you will now add the relevant dimension line points.

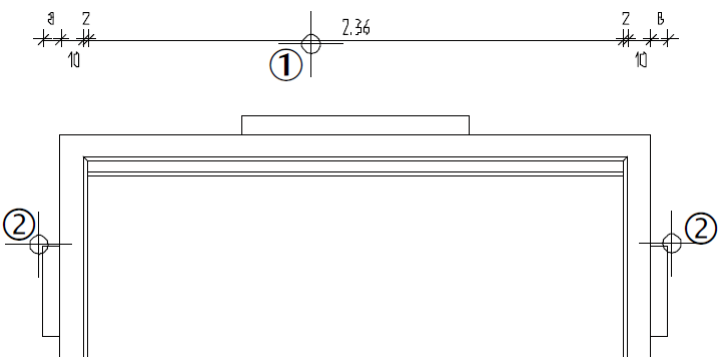
Any changes you make to the design using modification tools will automatically be reflected in the dimension lines if all the dimension lines are in the same drawing file or if the drawing file with the dimension lines is open in edit mode.

There are times when you will find that dimension line points are missing or no longer required as the design has changed. In these cases, you do not need to create new dimension lines. You can simply add or delete dimension line points.

To add dimension line points

1 Using the right mouse button, click the dimension line to which you want to add dimension line points and on the shortcut menu, click **Add Dim. Line Point**.
(Alternatively, you can also select **Add Dim. Line Point** in the **Tools** palette - **Change** area, and then click the dimension line).

2 Click the points to be dimensioned (left and right exterior edges of the 'Isokörbe').

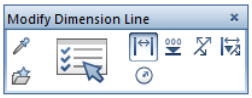


3 Press ESC twice to quit the tool.

Tip: To remove a dimension line point, click **Del Dim. Line Point** (**Tools** palette - **Change** area) and then a point on the dimension line. You can also use the shortcut menu.

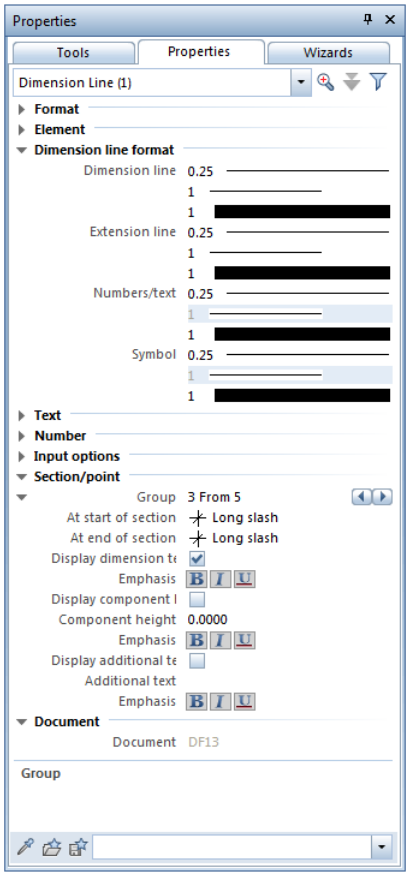
It is also possible to change the parameter settings of dimension lines (apart from the spacing between dimension lines).

- Click **Modify Dim. Line**.

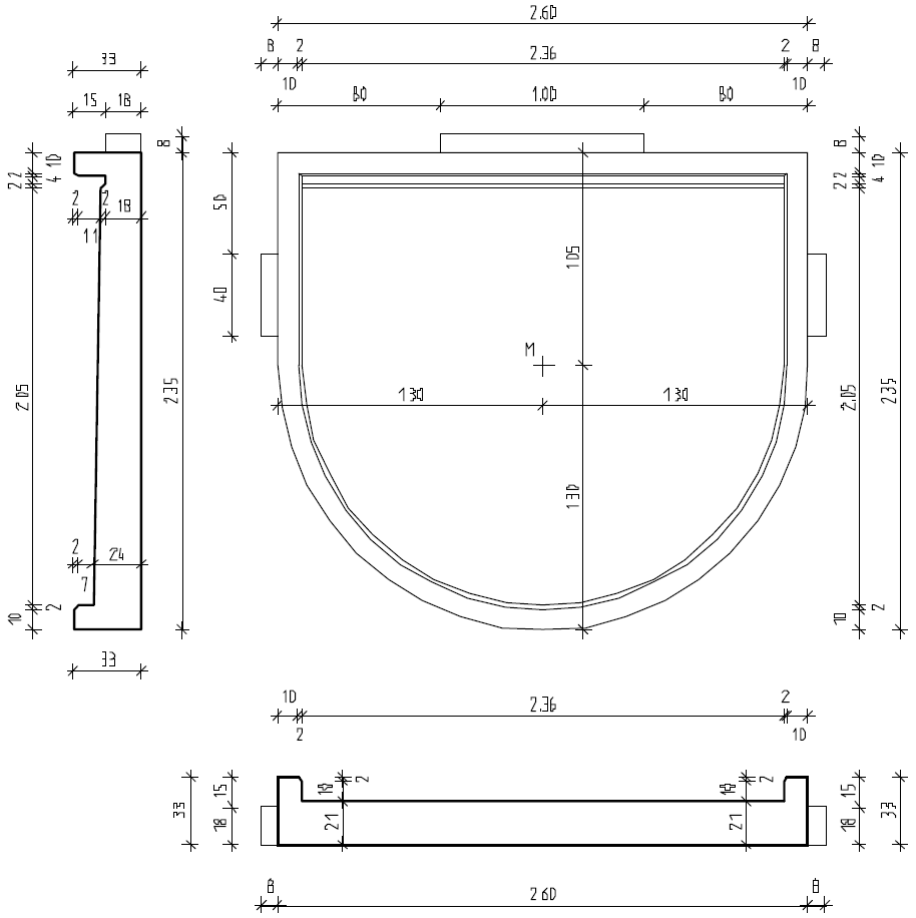


  - Set the new dimension line parameters in the **Properties** and then click the dimension lines to apply the changes. You can also use the parameters of dimension lines you have already created. Click **Match parameters from dimension line** and click the dimension line whose settings you want to use.
  - You can also use the Context toolbar to select a dimension line type to which you want to apply the new parameters and then enclose all the dimension lines in a selection rectangle.

- You can also modify dimension lines by clicking a dimension line with the right mouse button and selecting **Properties** on the shortcut menu.
  Depending on the dimension line section clicked, you can change arrowheads or alter other parameters using the **Properties** palette. Any changes you make apply to the clicked section only.
  Use  and  to toggle between the individual dimension line sections or elevation points.



Complete the dimension lines as shown below:



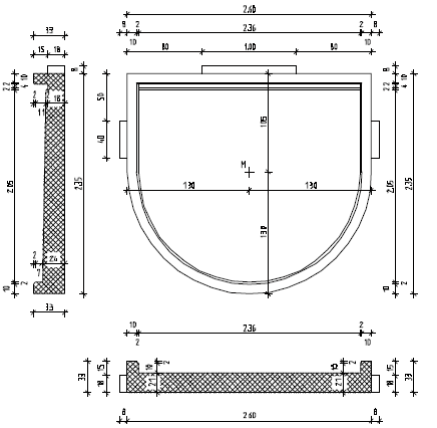
Task 3: Applying hatching to precast balcony unit and creating a quick printout

The following part of the exercise involves applying hatching to the sections of the precast balcony unit using the tools in the **Draft** module (**Tools** palette - **Basic** family).

Tools:

- **Hatching**
- **Outline auto-detect**
- **Convert Surface Element**
- **Reshape Surface Element, Architectural Area**
- **Show/Hide**
- **Print Preview**
- **Print**

Objective:



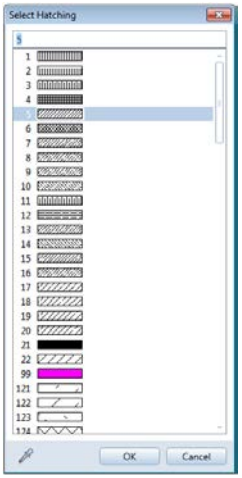
Defining and creating hatching

In the first step, you will select a hatching style that represents reinforced concrete and apply it to the longitudinal section of the precast balcony unit.

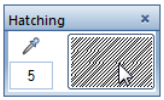
To define and create hatching

1 Click **Hatching** in the **Tools** palette (**Basic** family - **Draft** module).

Tip: When you click the hatching number on the **Hatching** Context toolbar, you can select the hatching style you want to use in the following dialog box:



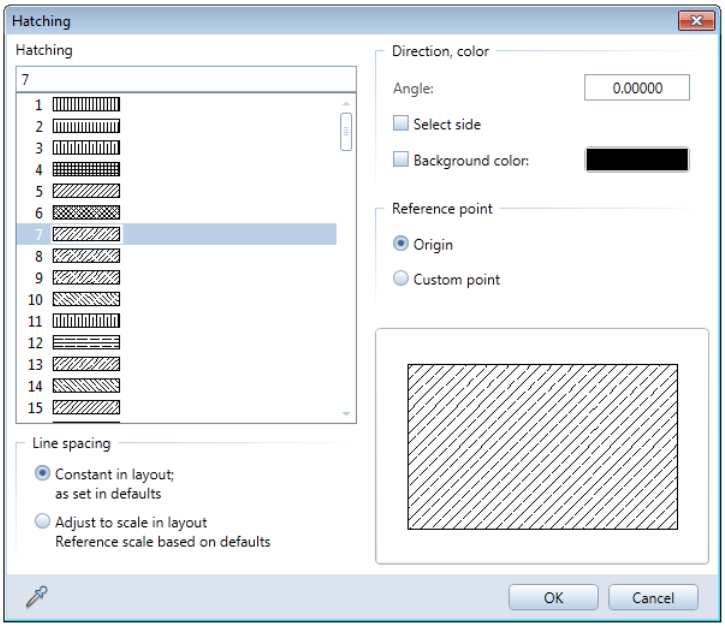
2 Click the button with the hatching style.



3 In the **Hatching** dialog box, select hatching style **7**.

4 Make additional hatching settings as you require.

- **Line spacing** area:
  Constant in layout, as set in defaults
- **Reference point** area:
  Origin



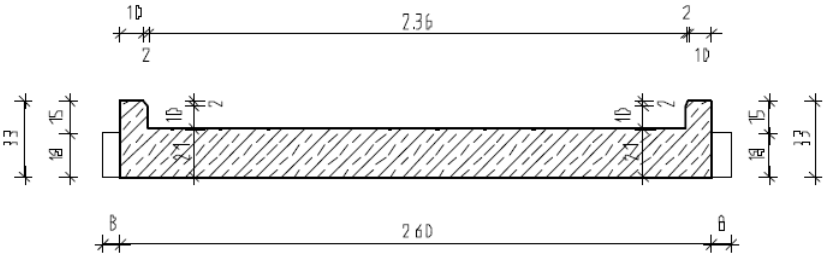
5 Click **OK** to confirm the dialog box.

6 Click  **Outline auto-detect** (input options, icon must be pressed in).

Tip: To apply hatching to rectangular areas, click two diagonally opposite points and press ESC.

7 Click within the area to which you want to apply hatching. The system will detect the boundary of the area automatically.

8 Press ESC to finish defining the area.



9 Press ESC to quit the tool.

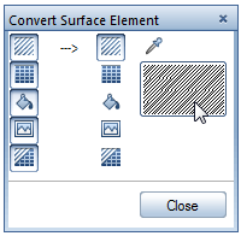
Changing the hatching style

The next step is to change the hatching style. Select a different hatching style.

To change the hatching style

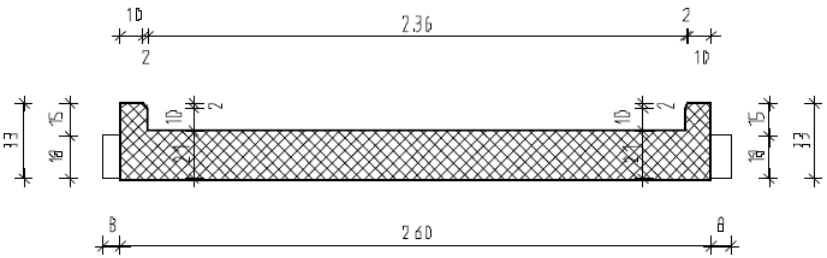
1 Click **Convert Surface Element** in the **Tools** palette (**Basic** family - **Draft** module - **Change** area).

2 The **Convert Surface Element** dialog box is displayed. Make settings as shown below and click the button with the hatching style.



3 Select hatching style **6** in the Hatching dialog box (see "Defining and creating hatching" on page 188) and click **OK** to confirm.

4 *Select surface elements to convert to hatching* Click the hatching you have applied to the longitudinal section.



5 Press ESC to quit the tool.

Tip: To change the hatching style, you can also click the hatching with the right mouse button and select **Properties** on the shortcut menu. The program opens the **Properties** palette where you can modify the hatching parameters (see above).

Cutting out the hatching around the dimension text

Now you will remove the hatching around the dimension text.

Tip: You can also apply white fills to dimension text.

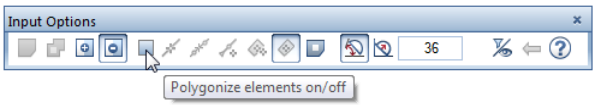
To do this, select the **Apply fill to dimension text** check box in the **Properties** of the dimension line, **Text** tab.

To cut out the hatching around the dimension text

1 Click **Reshape Surface Element, Architectural Area** in the **Tools** palette (**Basic** family - **Draft** module - **Change** area).

2 *Select element to modify:* click the hatching applied to the longitudinal section.

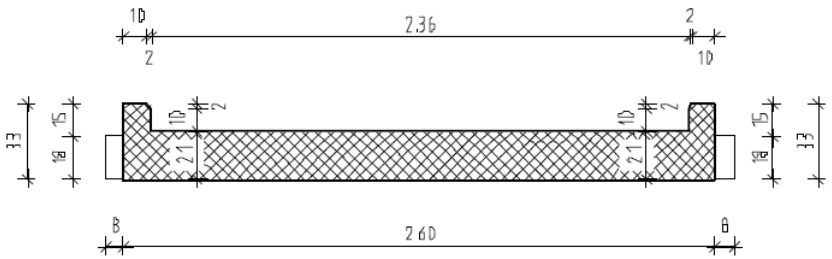
3 Clear the **Polygonize elements** check box in the **Input Options** and select **Minus**.



By switching off **Polygonize elements** in the input options, you automatically deactivate **Outline auto-detect**.

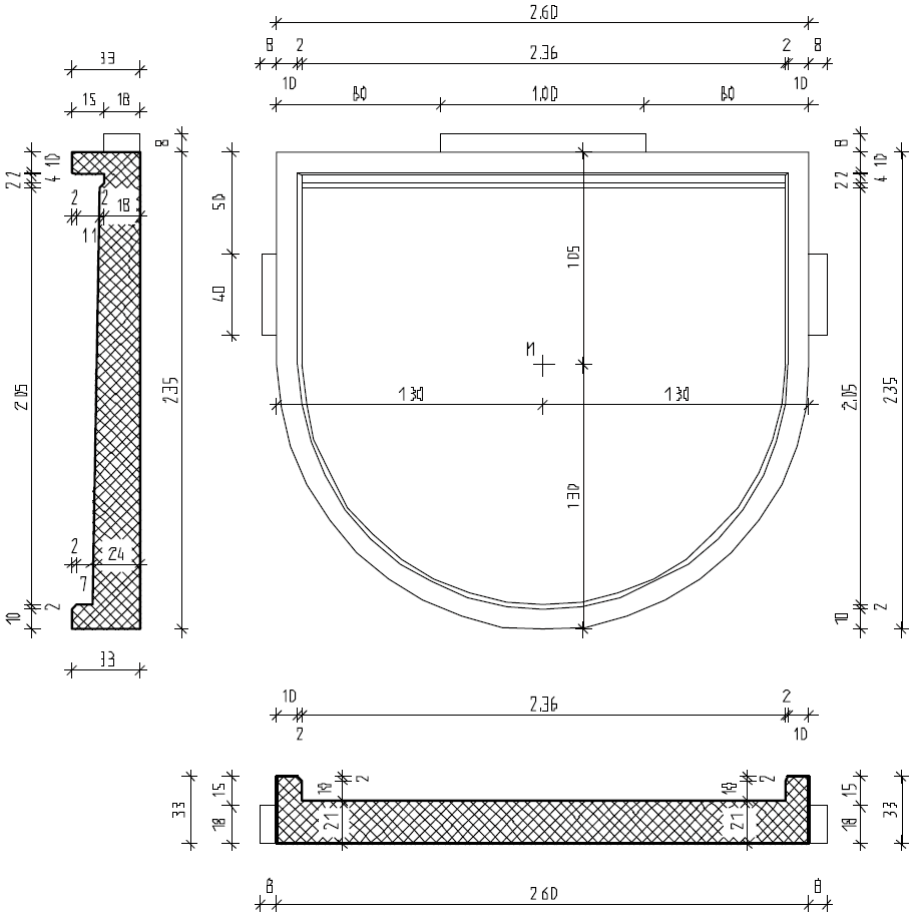
4 Enclose the area around the dimension line in a selection rectangle using the left mouse button and press ESC twice. The hatching disappears.

5 Repeat steps 2 and 4 for the second dimension line.



Apply Hatching to Cross-Section

Using the procedure described above, you will now apply hatching to the cross-section as shown below:



Creating a quick printout

Finally, you will create a quick printout of the precast element. The drawing file with the **Precast balcony unit** must still be current.

Quick printout

The quick printout feature allows you to quickly print interim results. Often, it is convenient to have the current edit status on paper without having to assemble a layout first.

To do this, use the **Print** tool (**File** menu). You can use this tool to print the current contents of the design viewport or animation window on a printer or plotter, which you can select in advance. Before you start printing, you need to check that your output device has been installed and configured correctly. This way, you can also print details or sections of floor plans.

Allplan uses the settings (e.g. margins, header, footer, construction lines) you have made in the **Print Preview** to create the quick printout. You can also set a scale and define the section to be printed in the print preview options.

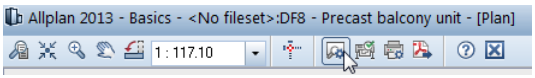
To print the current contents of the screen without making print settings beforehand, select the **Quick Print** tool on the **File** menu. In this case, the standard printer is used.

To create a quick printout

Tip: To create more printouts, click **Quick Print** on the **File** menu.

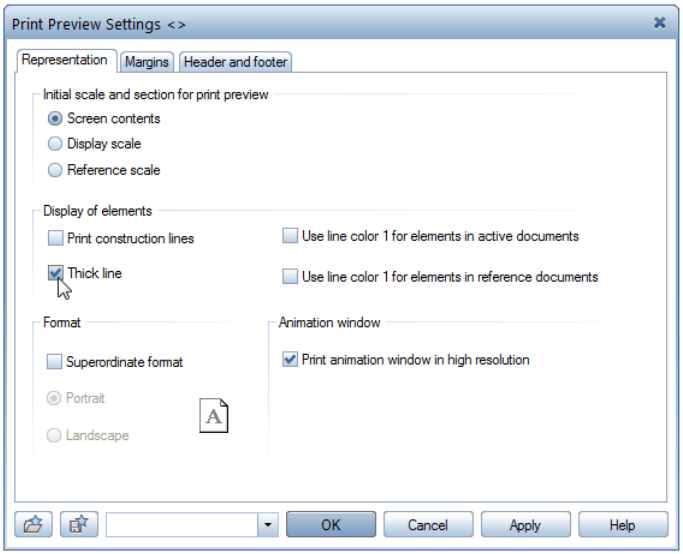
Allplan uses the most recent settings for printing without prompting you.

1 Click **Print Preview** (**Default** toolbar).



2 Click **Print Preview Settings**, select the **Representation** tab and select the **Thick line** check box. This not only makes the different line weights visible on screen but also ensures that they are also printed as such.

In addition, you can use the **Print construction lines** option to specify whether construction lines are to be included in printouts. Specify the other options to suit your own preferences.

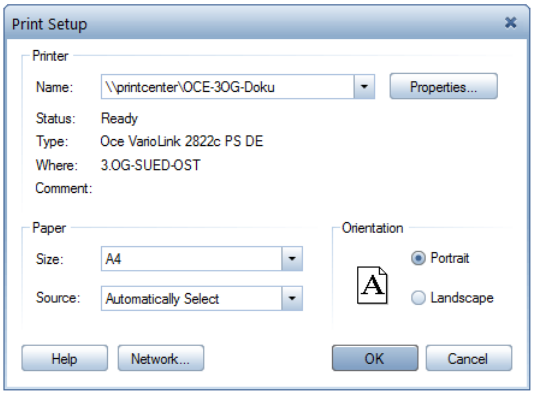


3 If necessary, set the scale in the print preview.

4 Click **Set Up Printer** if you do not want to use the default printer.

5 The **Print Setup** dialog box appears. Select the printer you want to use in the **Name** area and click **OK**.

Tip: Click **Properties** to set the paper size etc. For more information, please consult the printer documentation.



6 Click **Quick Print**.

The data is sent to the printer you have selected in **Set Up Printer**.

7 Press ESC to close the print preview.

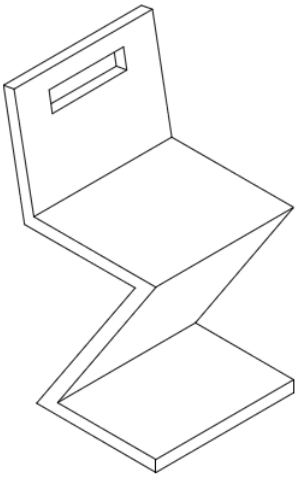
Unit 3: 3D Modeling

Unit 3 provides an introduction to the **3D Modeling** module. You will create a chair based on the zigzag chair designed by Rietveld. You will learn

- How to create the initial elements in 2D
- How to convert 2D entities to 3D
- How to automatically create a 3D solid based on an outline and a path
- How to define a work plane so that you can draw in a sloping plane as if you were working in plan
- How to design a box and use it to create the opening in the back of the chair

Exercise 7: 'Rietveld' Chair

This exercise involves creating a chair based on the zigzag chair designed by Rietveld.



You will use the tools in the **Draft** (**Basic** family). You should already be familiar with these tools. In addition, you will find an introduction to the options available in the **3D Modeling** module (**Bonus Tools** family).

Task 1: Drafting and designing in 2D, converting to 3D

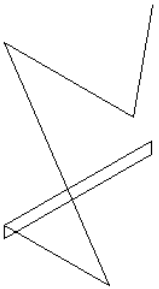
You will start by drawing the profile and the elevation view of the chair as 2D elements in plan. These elements will then be converted to 3D and rotated in space.

Tools:

Convert Elements, Architecture to 2D option:

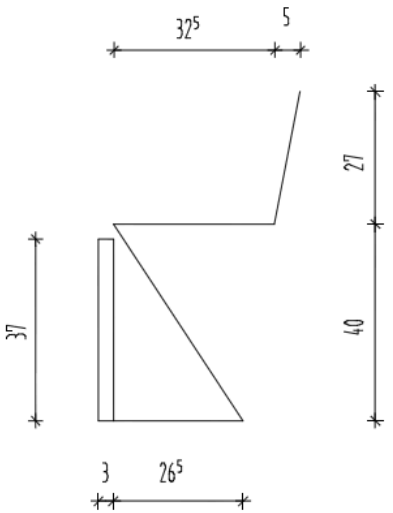
Rotate 3D Elements

Objective:



Designing the 2D elements

First design the profile and elevation of the chair in plan using the **Rectangle** and **Line** drafting tools. As you are already familiar with these tools from the previous exercises, you will find that designing these 2D elements is not difficult. For this reason, not every step of the exercises that follow is described in detail.



To draw the cross-section and profile of the chair in plan

1 Click **Open on a Project-Specific Basis**, select the **Fileset** structure tab and open an empty drawing file. Name it **Rietveld chair** and close all the other drawing files.

2 To draw the profile of the chair, click **Rectangle** in the **Tools** palette (**Basic** family - **Draft** module - **Create** area).

3 Click where you want the rectangle to start.

4 Enter the length of the rectangle: **0.03**
This value defines the thickness.

5 Enter the width of the rectangle: **0.37**
This value defines the width of the chair.

6 Click **Line**. The **Rectangle** tool closes automatically.
Click **Polyline** in the **Line** dialog box.

7 Click the bottom right corner of the rectangle to define the first point of the line.

8 Choose **Delta point** in the dialog line. Enter dx= **0.265** to draw the first line. Press ENTER to confirm.

Tip: Pressing the TAB key takes you to the next data entry box in the dialog line.

9 Enter the following values in the dialog line
dx = **-0,265**
dy = **0.40**

10 Enter dx= **0.325** to draw the third line. Press ENTER to confirm.

11 To draw the fourth line, click **Delta point** again.
Enter the following values in the dialog line:
dx = **0.05**
dy = **0.27**

12 Press ESC twice to quit the **Line** tool.

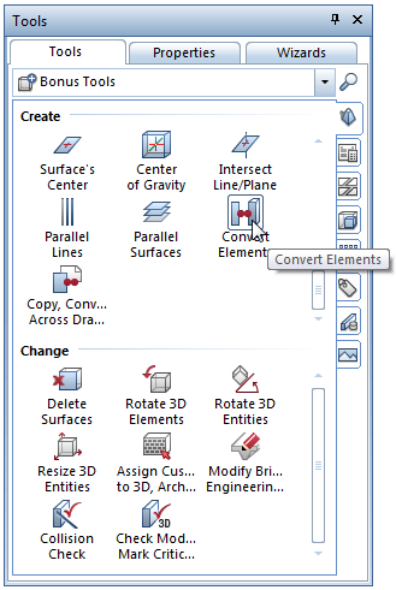
Converting 2D elements to 3D

The elements you have drawn are 2D elements. To create the chair as a 3D object, you need to convert them to 3D. This is done in the **3D Modeling** module.

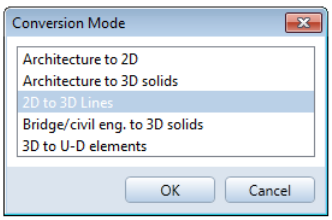
To convert 2D elements to 3D

1 Select the **3D Modeling** module in the **Tools** palette (**Bonus Tools** family).

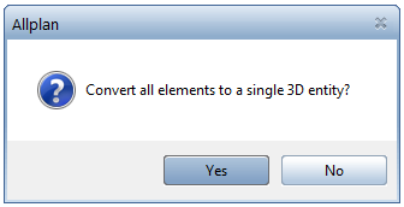
2 Click **Convert Elements** (**Create** area).



3 Select **2D to 3D Lines** to convert the 2D elements to 3D elements.



4 Now the program asks whether to convert all elements to a single 3D entity.



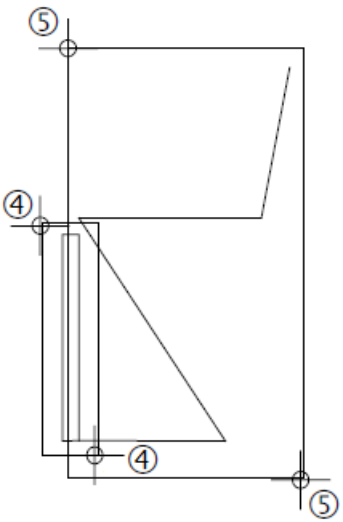
Click **Yes**.

The selected elements are combined to make a single 3D element which can then be addressed as a single entity. As the cross-section and the profile are required, you need to select each element separately.

Tip: When you convert circles, ellipses etc., you can specify how many edges are used to approximate a full circle.

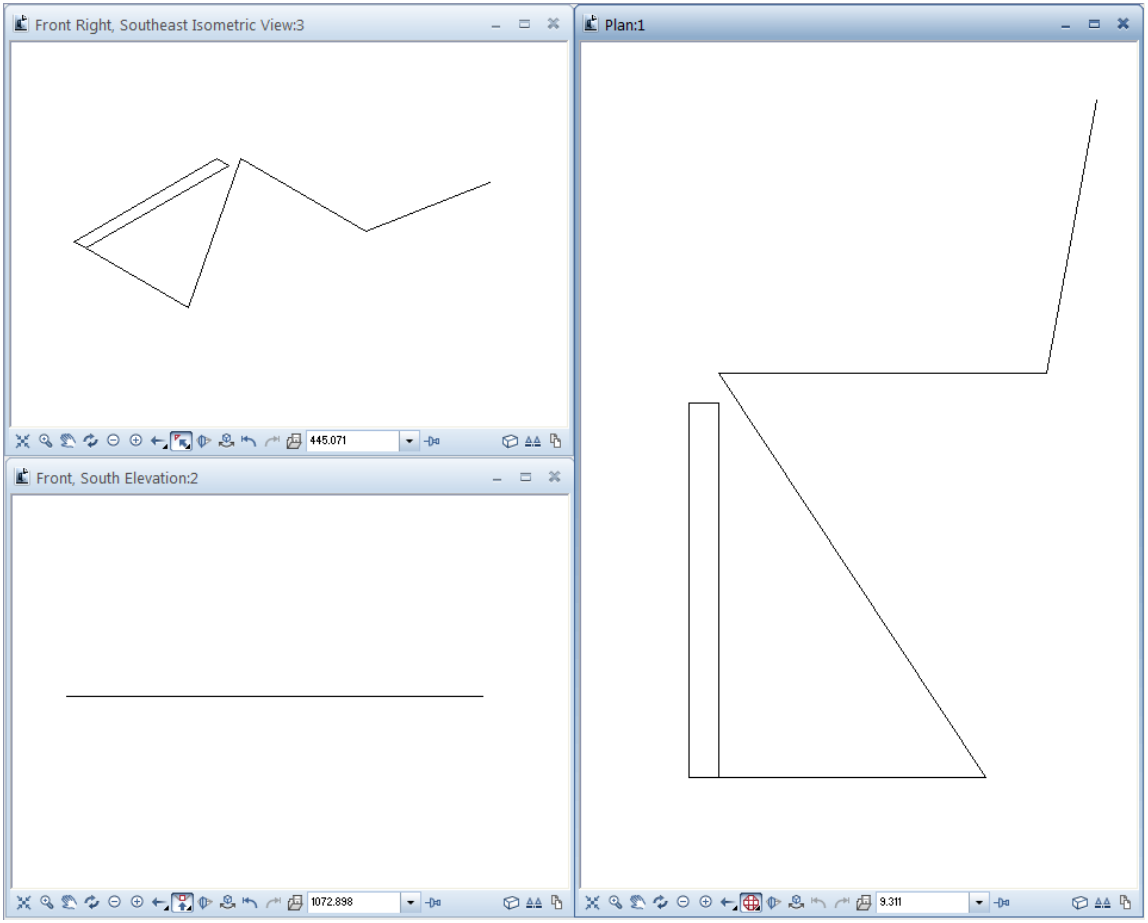
5 Select the profile of the chair by enclosing it in a selection rectangle with the left mouse button (see below).

6 To convert the elevation view of the chair to 3D, enclose it in a selection rectangle with the left mouse button (see below).



7 To get an impression of how the elements look in 3D, click **3 Viewports** on the **Window** menu.
Now you can see the elements in plan, isometric and elevation view.

8 Click **Zoom All** in each viewport.
The following should now be displayed on your screen:



Tip: You can see that the elements are actually 3D elements as they are displayed in isometric and elevation view.

It is advisable to keep these three viewports for the steps that follow.

9 Press ESC to quit the **Convert Elements** tool.

Rotating the 3D elements

The 3D elements are still "flat on the floor" (xy plane). The next step is to rotate the 3D elements in space. The difference between this and rotating elements in 2D is that you can define an axis of rotation which lies freely in space (in 2D, you can only enter a point of rotation).

To rotate the 3D elements

➲ The **3D Modeling** module is still active.

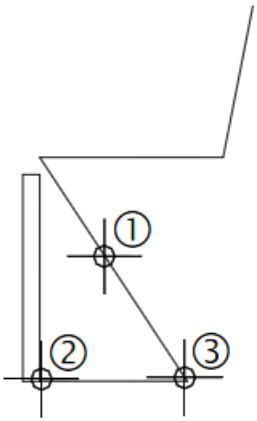
1 Click **Rotate 3D Elements** (**Change** area) and click the elevation of the chair in plan view.

The element is displayed in the selection color.
Now Allplan 2013 prompts you to specify an axis of rotation.

Tip: As you have converted the 2D elements to a single 3D element, you do not need to enclose the entire elevation view in a selection rectangle. It is enough if you just click a point of the element.

2 Define the bottom line of the chair's elevation view as the axis of rotation. First click the left point of the line. The sequence in which you enter the points is important for defining the angle later.

3 Click the right point of the line. This defines the axis of rotation.

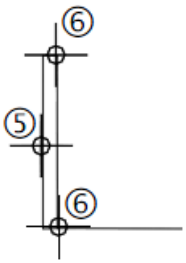


Tip: You can use the 'right hand rule' to determine the positive direction of the rotation angle.
Point the thumb of your right hand in the direction of the rotation axis. Your fingers will indicate the positive direction of rotation.

4 Rotate the elevation view upwards by 90 degrees. Enter **90** and press ENTER to confirm.
Now, the rotated elevation view of the chair should only be visible as a straight line in plan view (see below).

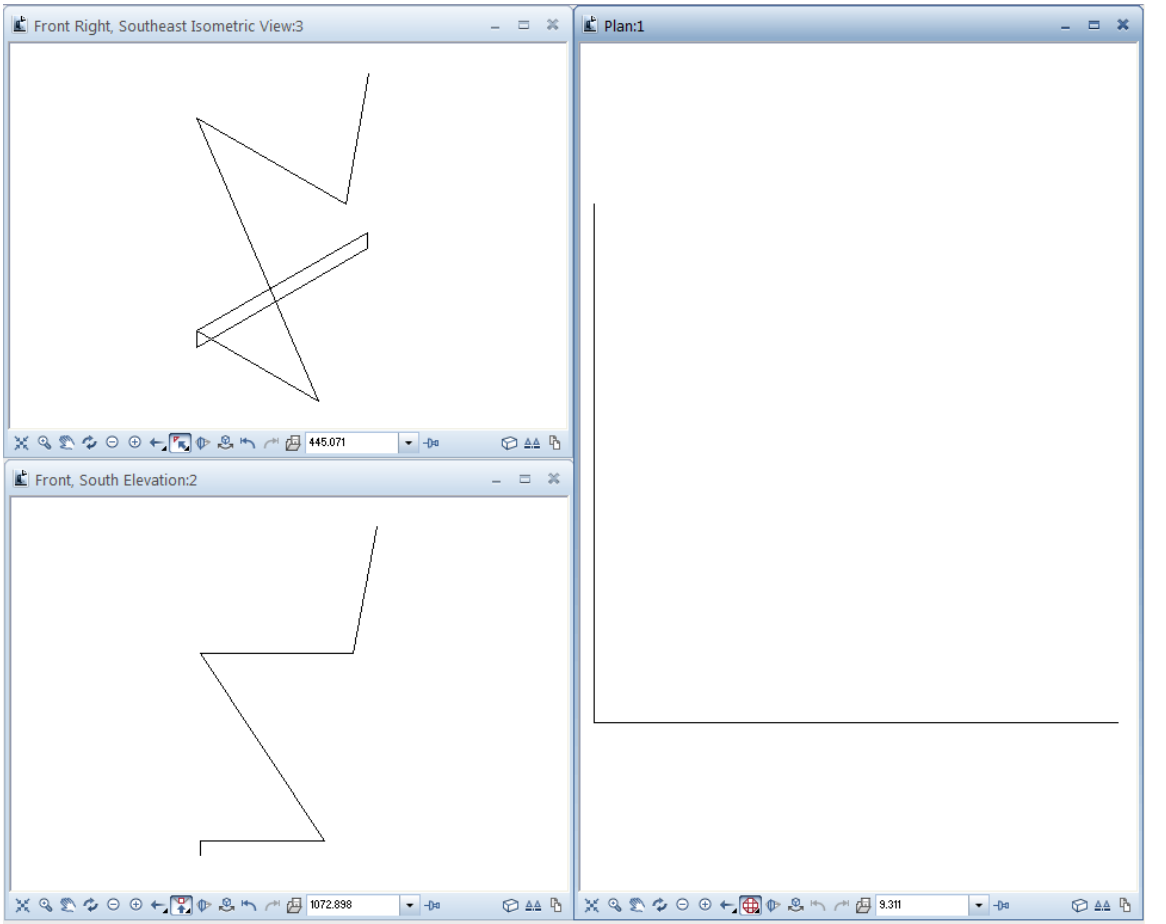
5 Next, rotate the profile of the chair. Click it.

6 Define the axis of rotation as shown below and make sure that you click the point at the top first.



7 Enter the angle of rotation: **90**.

8 Click **Refresh** in each viewport.
The following should now be displayed on your screen:



9 Press ESC to quit the **Rotate 3D Elements** tool.

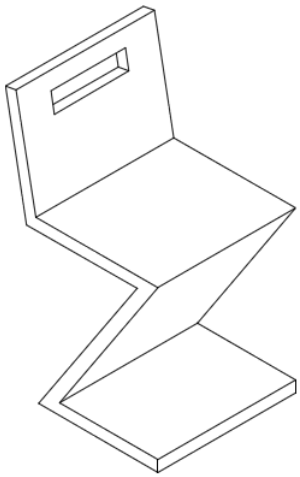
Task 2: Designing the 3D elements

You will now use the 3D elements to create the chair as a polyline sweep solid. Next, you will design the opening in the back of the chair. To do this, you will draw a 3D solid (box) which will then be subtracted from the back of the chair.

Tools:

- **Polyline Sweep Solid**
- **Work Plane**
- **Box**
- **Subtract and Remove Solid**

Objective:



Creating a polyline sweep solid

The next exercise involves creating the chair as a polyline sweep solid. A polyline sweep solid is created based on a profile (outline), which is swept along a path to form the new solid. You will use the profile of the chair as the outline and the elevation view as the path.

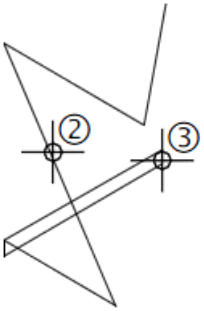
To create a polyline sweep solid

➲ The **3D Modeling** module is still active.
3 Viewports are open.

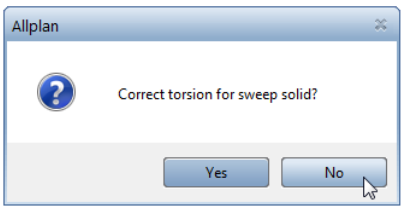
1 Click **Polyline Sweep Solid** (**Create** area).

2 To define the path for the polyline sweep solid, click the elevation of the chair in isometric view (see below).

3 To define the profile for the polyline sweep solid, click the profile of the chair in isometric view.

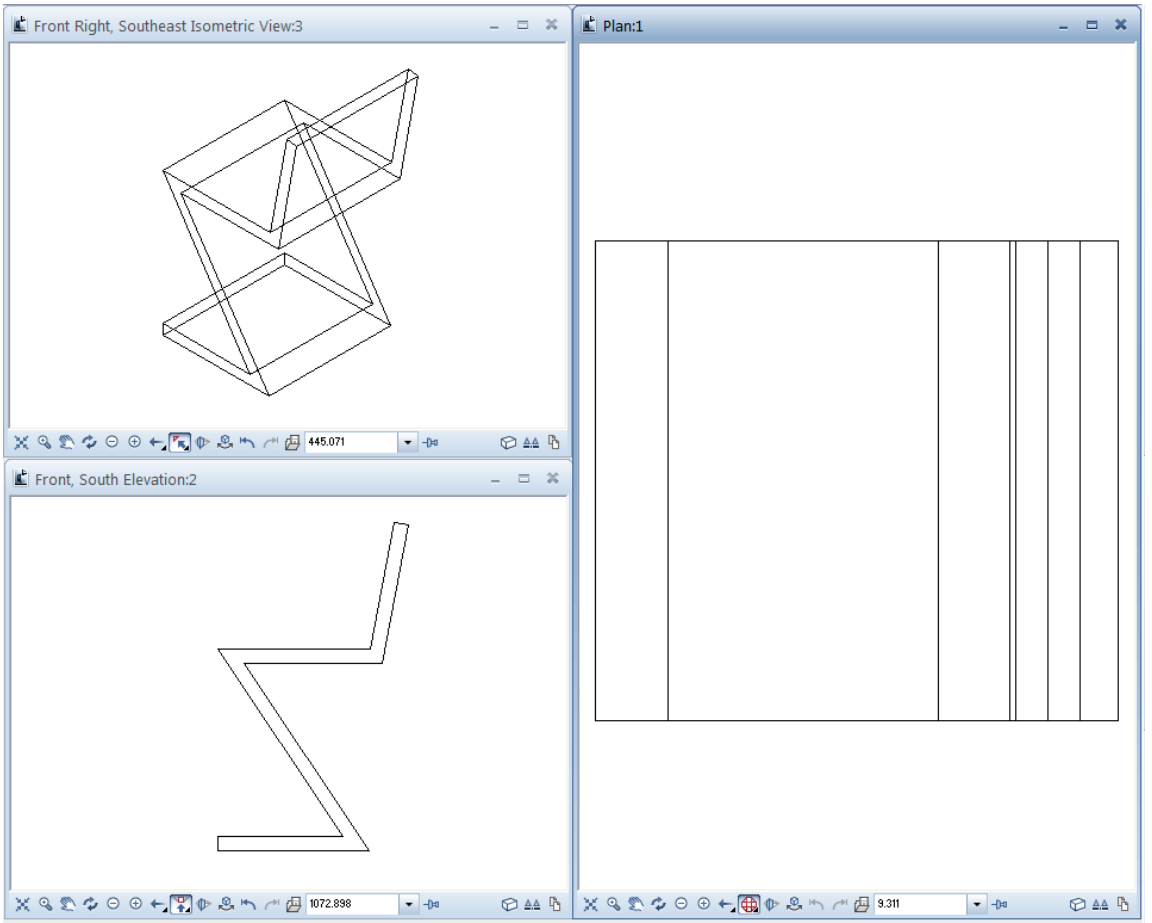


4 When no torsion is desired, you can configure the program to correct it. In this example, torsion does not need to be corrected. Consequently, click **No**.



The polyline sweep solid is created, the path is deleted.

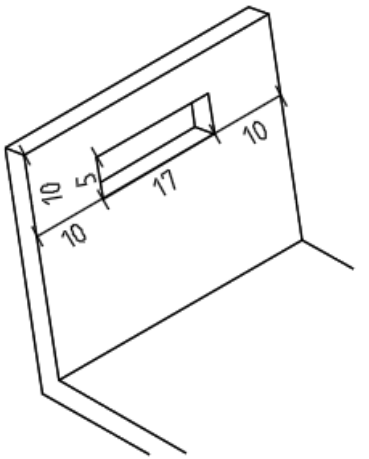
5 Click **Refresh** in each viewport.
The following should now be displayed on your screen:



6 Press ESC to quit the **Polyline Sweep Solid** tool.

Defining a work plane and creating a 3D box

The chair is still missing the opening in its back. You will start by creating it as a box. To facilitate the procedure of positioning the box in the sloping back of the chair, you will define a work plane (= user-defined coordinate system) whose x and y axes are parallel to the edges of the back of the chair. This way, you can draw in the work plane as if you were working in plan.

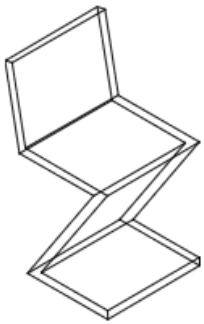


To define a work plane and create a 3D box

➲ The  **3D Modeling** module is still active.
3 Viewports are open.

1 Click to activate the viewport with the plan view (the window on the right).

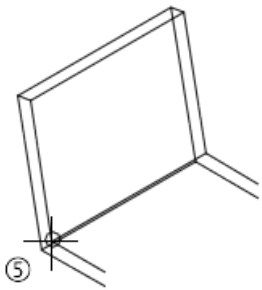
2 To facilitate the process of entering the work plane, display the chair in isometric view.
Click **Rear Left Isometric View** and then **Refresh**.
The result should look like this:



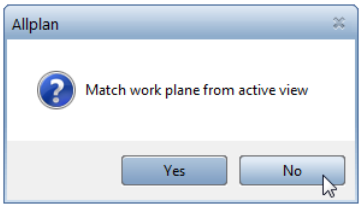
3 On the **View** menu, point to **Toolbars** and click **Special**.

4 Click **Work Plane** (**Special** toolbar).

5 To define the origin of the work plane, click the bottom left corner of the back of the chair (see below).



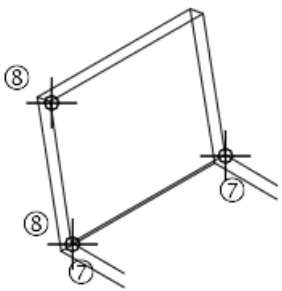
6 Choose **No** at the following prompt asking whether you want to use the current view as the work plane.



You will now be prompted to define the work plane by entering four points.

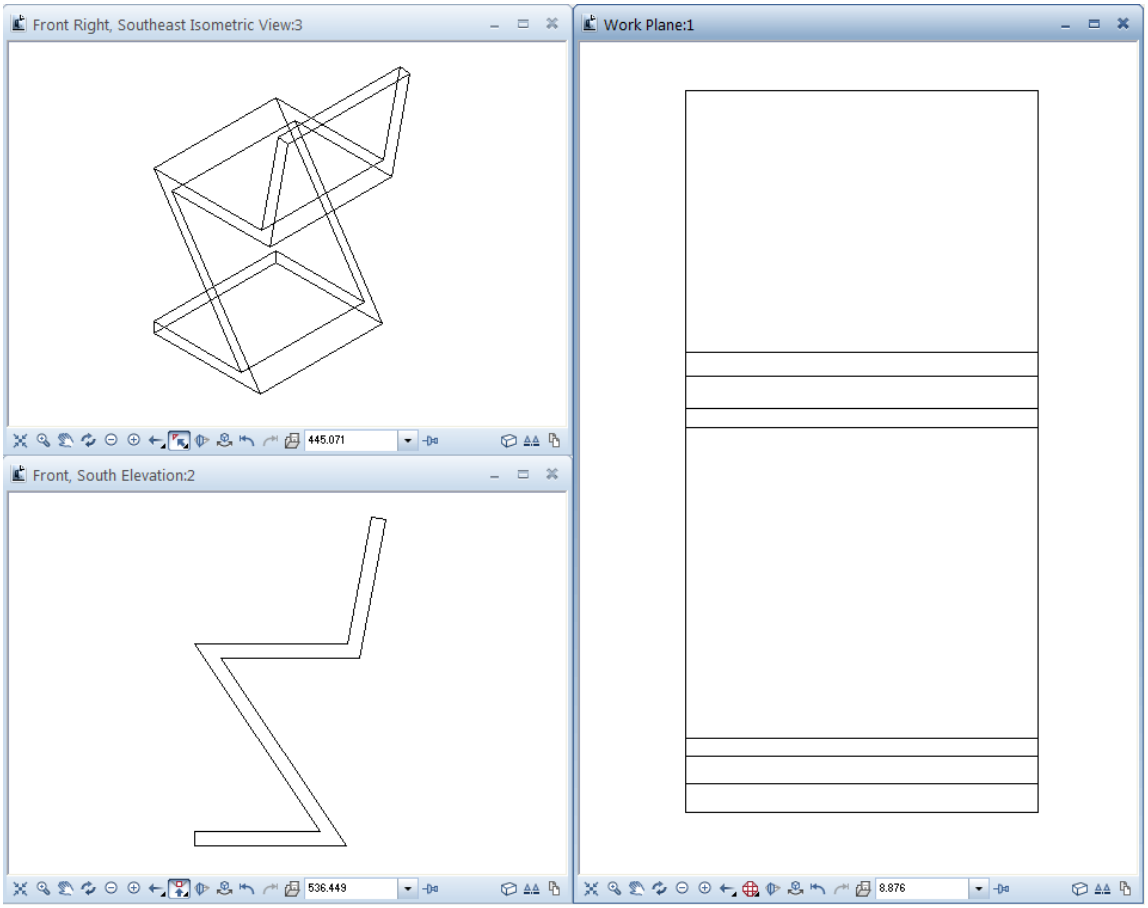
7 To define the x axis, click the two end points of the bottom edge of the chair (see below). As the positive x axis is to be to the right, click the point on the left first.

8 To define the y axis, click the two end points of the rear left edge of the chair (see below). As the positive y axis is to be upwards, click the bottom point first.



The z axis, which is generated automatically in the origin, is perpendicular to the x-y plane.

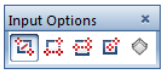
The following should now be displayed on your screen:



Now all the entries you make apply to the axes of the defined work plane: you can enter the values defining the box as if you were working in plan.

9 Click **Box** (**Create** area).

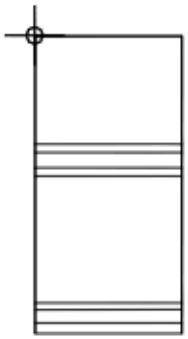
10 Check that **Based on diagonal line** is active in the input options. If it isn't, activate it now.



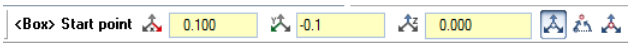
Always work in the viewport on the right!

11 Make sure that **Delta point** is active in the dialog line.

12 Point to the point at top left to define the reference point for the corner of the box. You can see this point in the other two viewports, too.



13 **Delta point** is active.
Now enter the offset of the corner in the dialog line:
dx = **0.1**
dy = **-0.1**

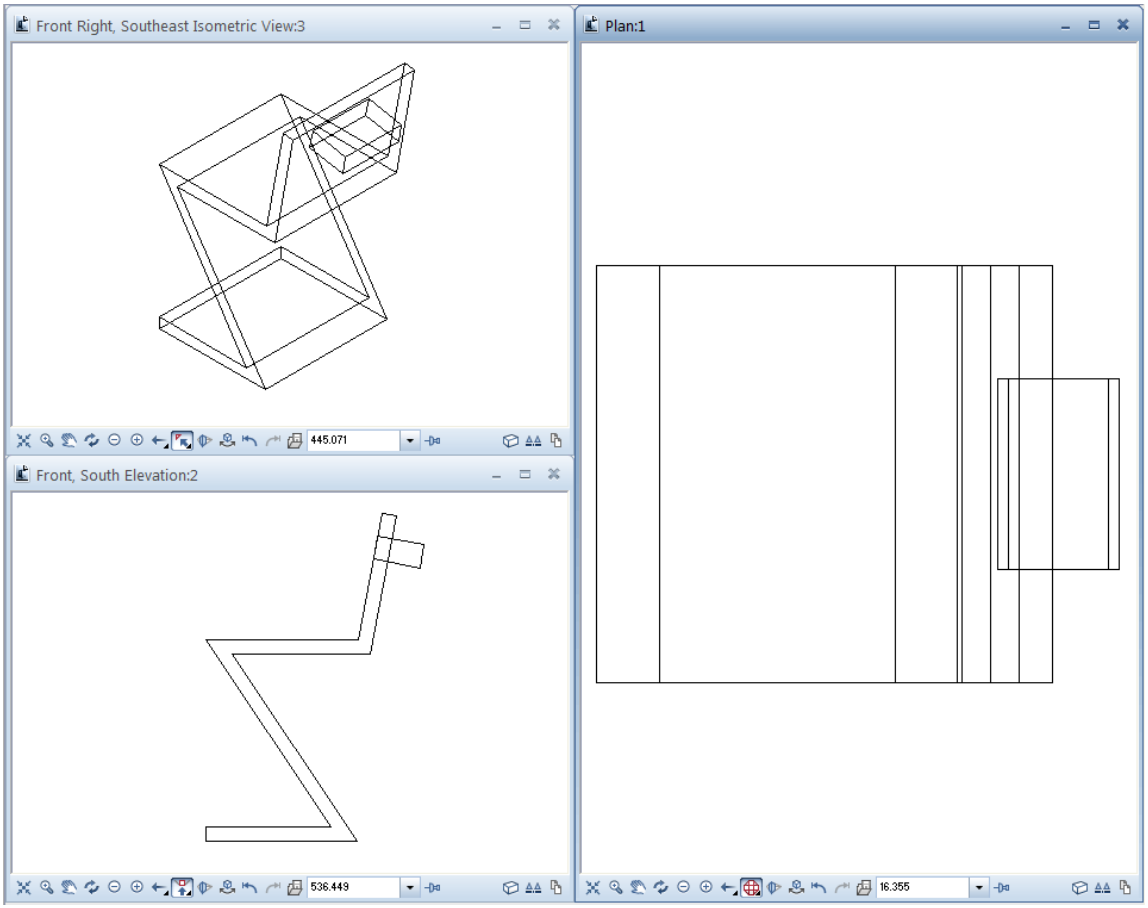


Press ENTER to confirm.
This defines the corner of the box.

14 Enter dx = **0.17** for the length of the opening and dy = **0.05** for its width. Then press ENTER to confirm.

15 To define the height of the box in the z direction, enter a value that is larger than the thickness of the back of the chair. Enter **-0.10** for the height. The box is drawn.

16 Click **Plan** to return to the normal work plane.
The following should be displayed on your screen:



17 Press ESC to quit the **Box** tool.

Creating the opening

To finish, we will remove the volume of the box we have just created from the 3D element. The box will be deleted in the process.

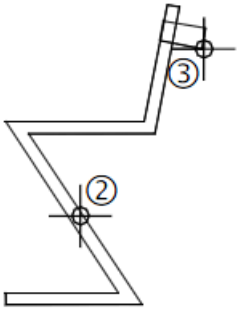
To create the opening

➲ The  **3D Modeling** module is still active.

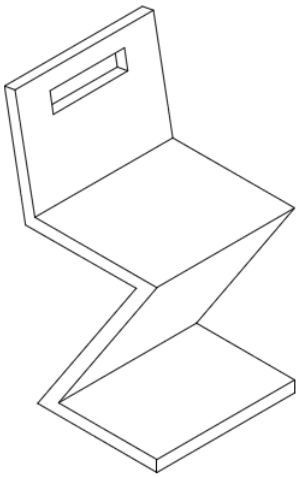
1 Click  **Subtract and Remove Solid** (**Create** area) to create the opening in the back of the chair and to delete the box.

2 *Click 1st solid* Click the chair. This is the solid in which the opening is to be created.

3 *Select all the solids you want to subtract:* Click the box. This is the (only) solid which is to be subtracted from the first solid.



The opening is created in the back of the chair and the result should look like this:

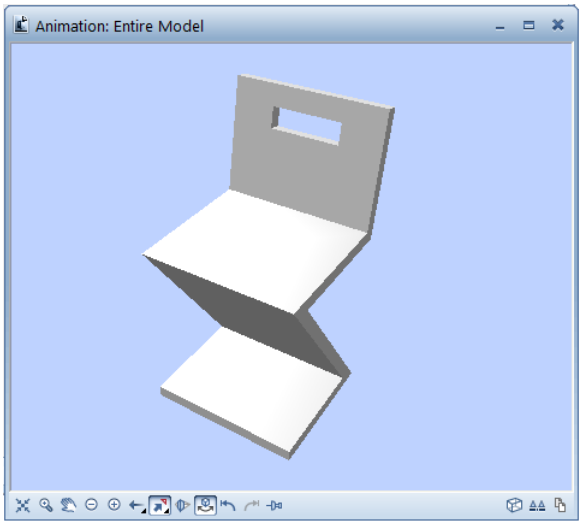


A note on design check, color and texture

Design check

1 Press the F4 key.

An animation window opens and you can see the chair. The color depends on the color you used to draw the 3D object (when the color is black, the chair is displayed in white).



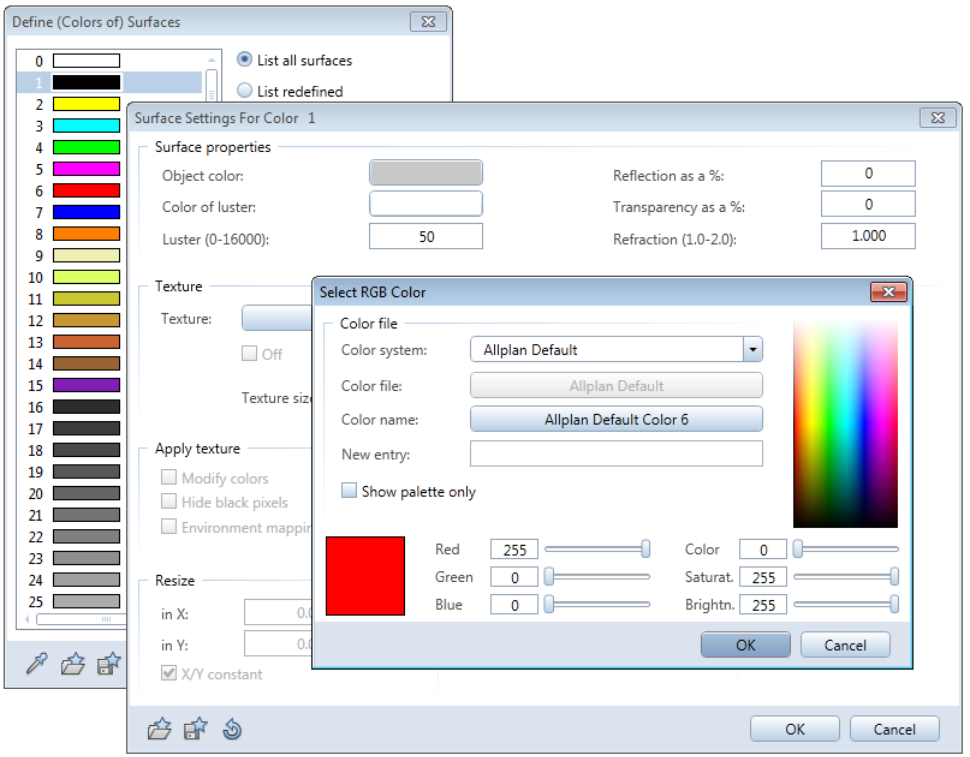
2 Press and hold down one of the mouse buttons and drag: you are navigating the virtual model in **sphere mode**, which is set by default.
When you press the CTRL key at the same time, you are moving in **camera mode**.

3 Experiment with the navigation modes and start trying things out on your own.

4 White is boring? What about red?
Click in the animation window with the right mouse button (do not click the stair) and select **Surface Settings** on the shortcut menu.

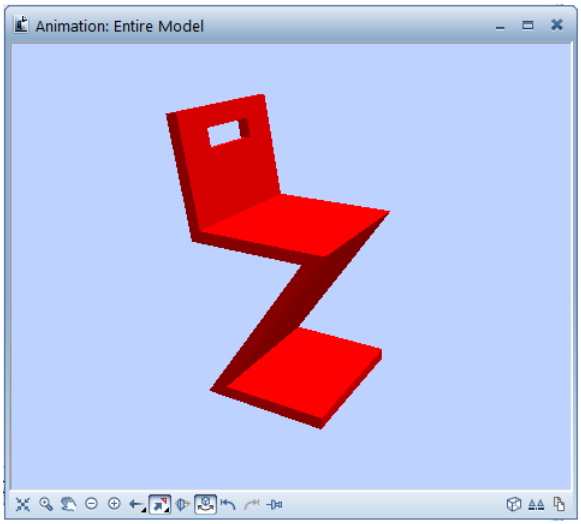
Each element color can be assigned a separate color or animation surface. This applies to all elements that were drawn in this color. This way, you can quickly assign colors to similar elements.

5 Select the color you used to draw the chair and click **Modify**. The **Surface Properties for Color 1** dialog box opens. Click **Object color** and select the desired color in the palette.



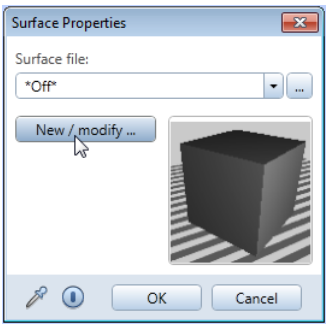
6 Click **OK** to confirm the dialog boxes.

The chair is displayed in the selected color.

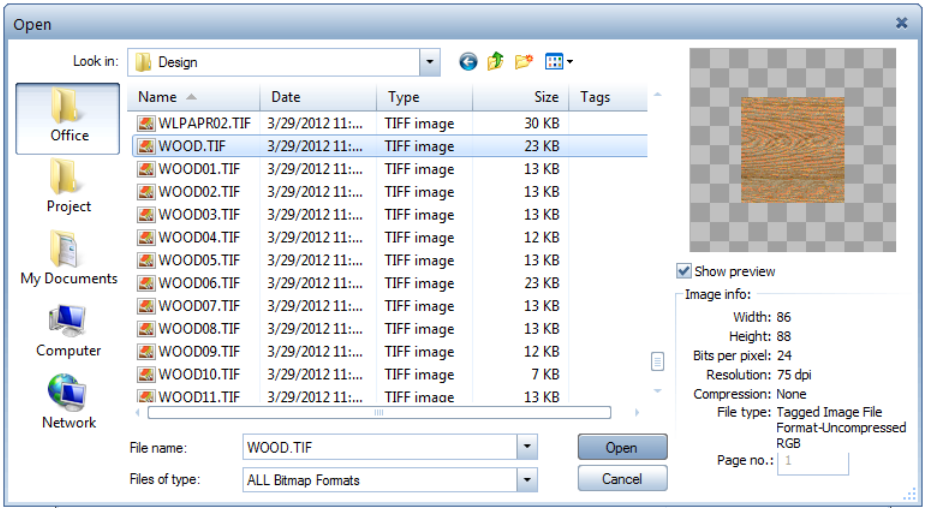


7 Or would you like to display the chair so that the grain of the wood shows?
Click the chair in the animation window with the right mouse button and select **Custom Surface Properties** on the shortcut menu.

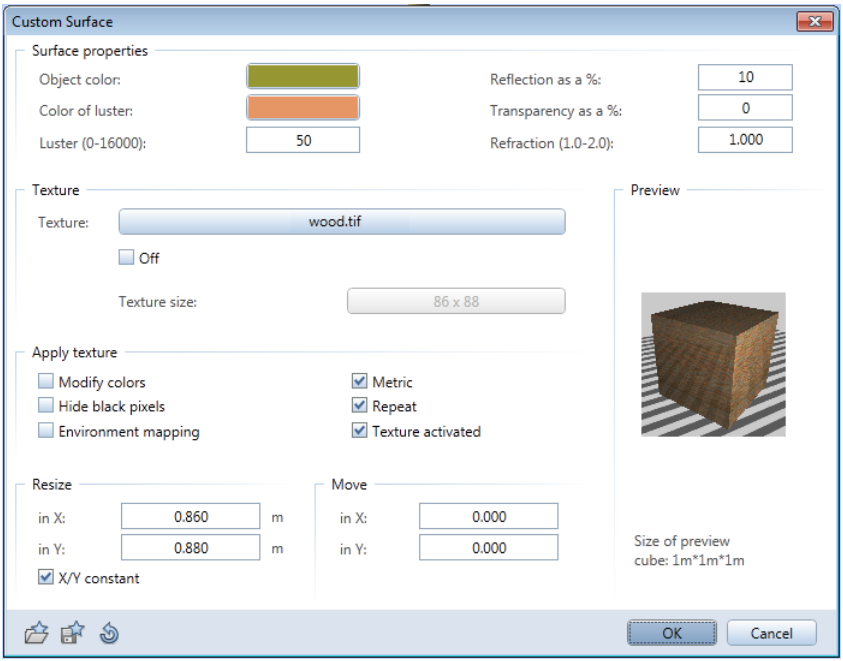
Custom surfaces belong to the element to which they are assigned and have a higher priority than surfaces that are assigned to the element color.



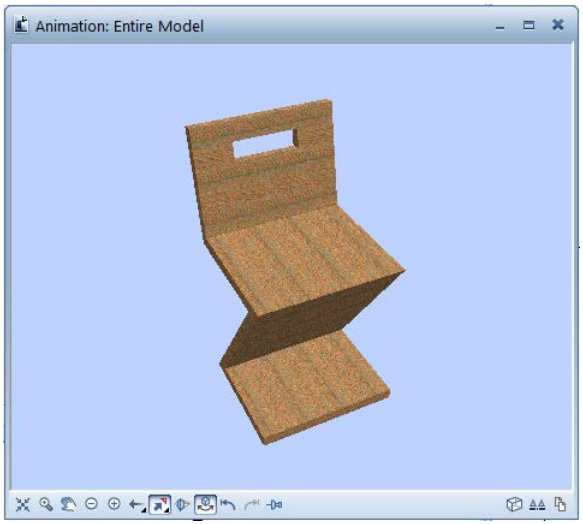
8 Click **New / modify ...**, click the texture button and select a texture in the design folder of the office standard.



9 Make settings for the **Custom Surface** (see illustration below), click **OK** to confirm and save the surface under a new name (`wood_chair.surf`, for example).



The result might look like this:



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