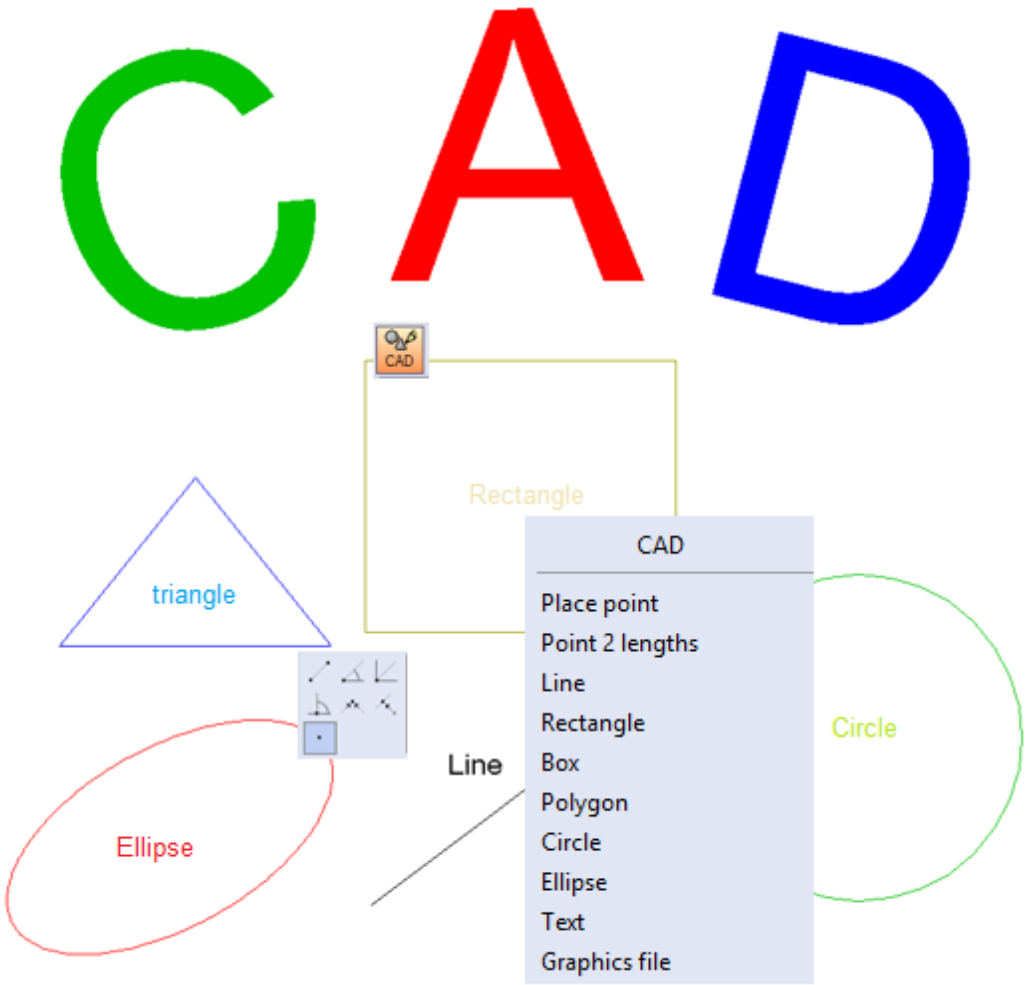
SEMA SOFTWARE

CAD Basics



Published by:

SEMA GmbH
Computer Software und Hardware-Vertrieb
Salzstraße 25
87499 Wildpoldsried at Kempten, Germany

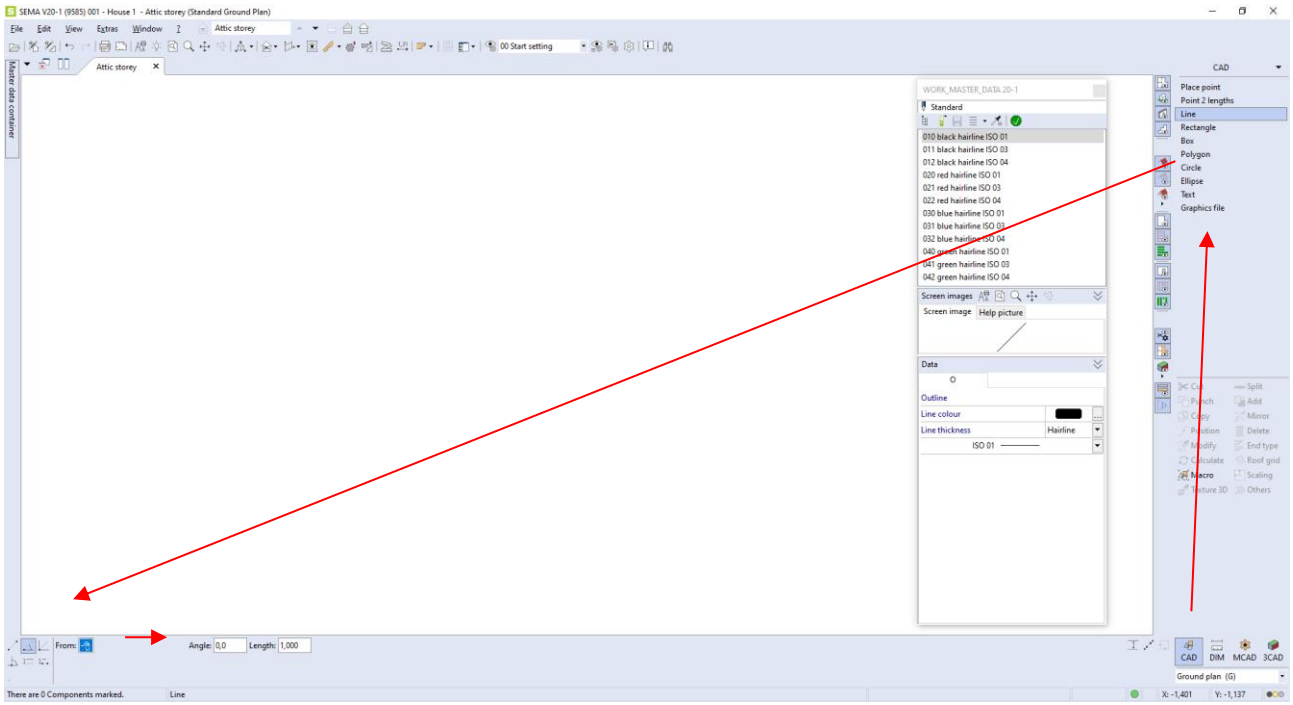
Printed in Germany
Item No. INSTR-BASIC-CAD-EN 07/2020

Contents

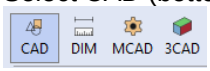
1. Standard procedure to create CAD components 4
2. Drawing lines 5
2.1. Additional Option 2: Draw line with starting point, angle and length 5
2.2. Additional Option 3: Draw line with starting point and X/Y measurement 5
2.3. Additional option 4: Draw line at right angle to a reference line 6
2.4. Additional option 5: Draw line parallel and with same length to a reference line 6
2.5. Additional option 6: Draw line parallel to a reference line 7
2.6. Additional option 1: Draw line free with two points 7
3. Help point via “Point 2 lengths" 8
4. Rectangle/ Box 9
4.1. Difference between rectangle and box 9
4.1.1 Rectangle 9
4.1.2 Box 9
4.2. Additional option 1: Define component by two points 10
4.3. Additional option 2: Define component by width and height 10
4.4. Additional option 3: Define component by angle, width and height 11
4.5. Additional Option 4: Define component by angle width angle height 11
4.6. Additional option 5: Define component by one point 12
4.7. Additional option 6: Define component along a line 12
5. Circle 13
5.1. Additional option 1: Circle by center point and radius 13
5.2. Additional option 2: Segment of circle by center point, radius and two angles 13
5.3. Additional option 3: Segment of the circle by 3 points 14
5.4. Additional option 4: Segment of the circle by two points and radius 14
6. Place Point 15
6.1. Additional option 5: Define point by point of intersection of two lines 15
6.2. Additional option 6: Define point by projection on a line 15
6.3. Additional option 7: Define point directly 16
7. Polygon 16
8. Ellipse 16
9. CAD Text 16
10. Graphic files 17
11. Further drawing input options 17
11.1. Move insert point 17
11.2. Change angle reference 18
11.3. Change reference point for line length 20
11.4. Connected lines 21
11.5. Calculator function in input fields 22
11.6. Mouse grab intersections or midpoints 22
11.7. Zoom function 22

CAD Basics

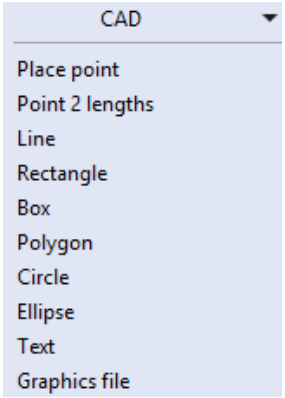
1. Standard procedure to create CAD components



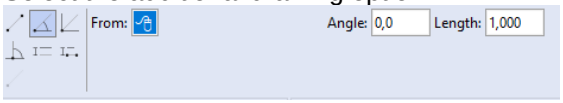
1. Select CAD (bottom right screen):



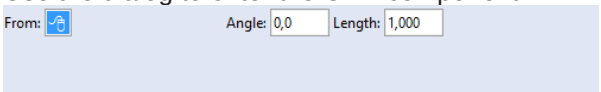
2. Selection of command:



3. Select the additional drawing option:



4. Use the dialog to enter the CAD component:

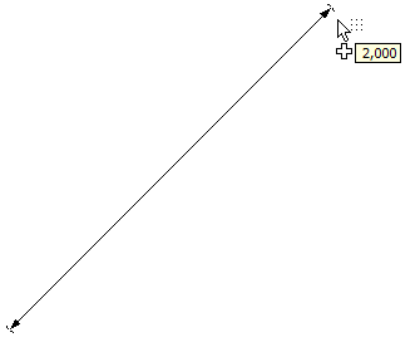


2. Drawing lines

Select CAD and choose ***Line***.

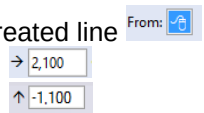
2.1. Additional Option 2: Draw line with starting point, angle and length

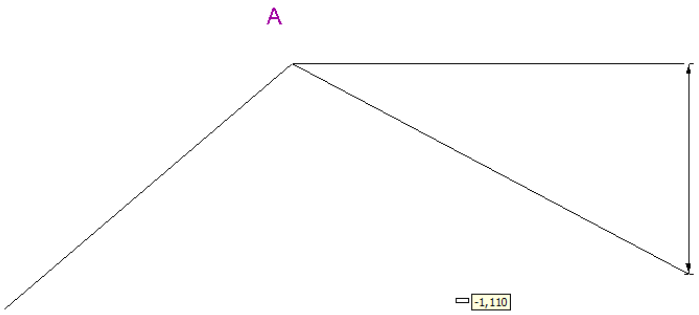
- Select insert point with a left mouse klick
- Select angle
- Select length



2.2. Additional Option 3: Draw line with starting point and X/Y measurement

- Select endpoint of previously created line
- Insert horizontal length
- Insert vertical length

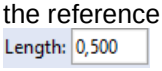


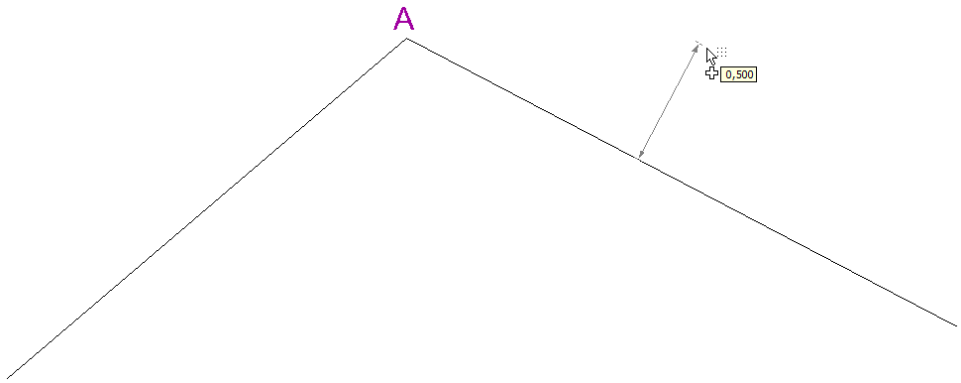


2.3. Additional option 4: Draw line at right angle to a reference line

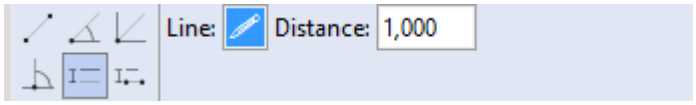
- Select reference line 

- Select the distance to the reference point A 

- Select the line length 

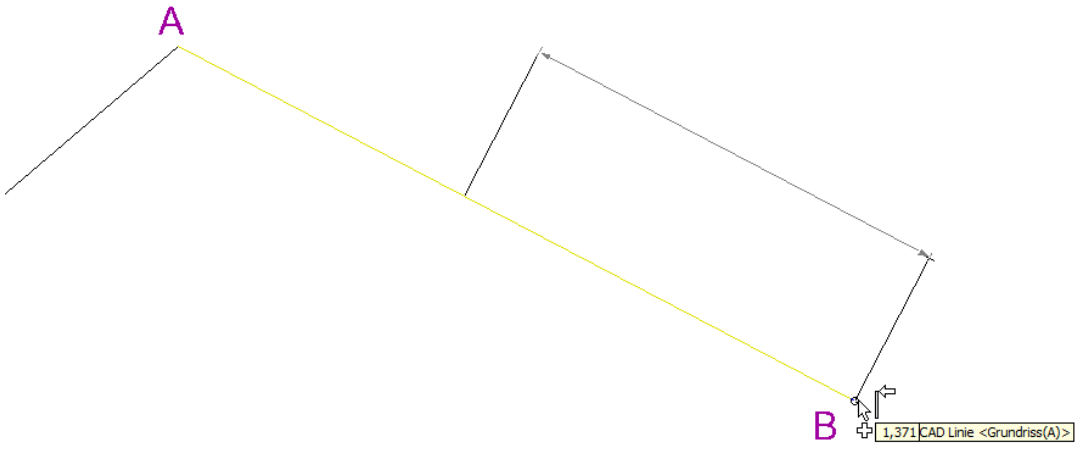


2.4. Additional option 5: Draw line parallel and with same length to a reference line



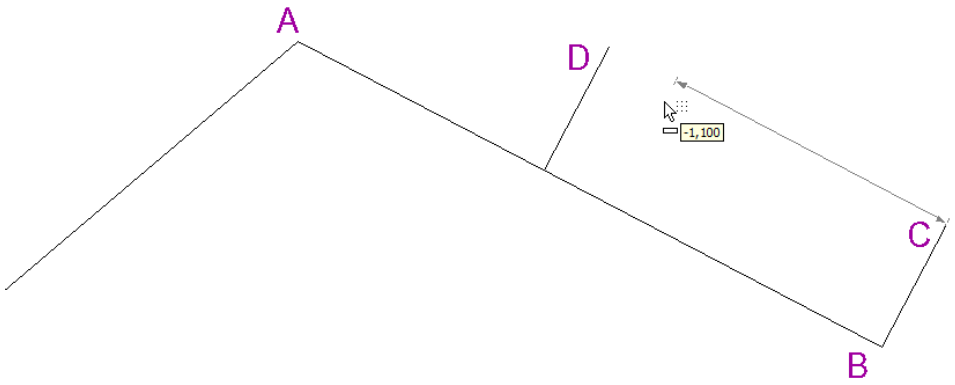
- Select the last drawn line for the reference line 

- Use the mouse to select distance. Select point B with a mouse click
- Distance can also be typed in manually



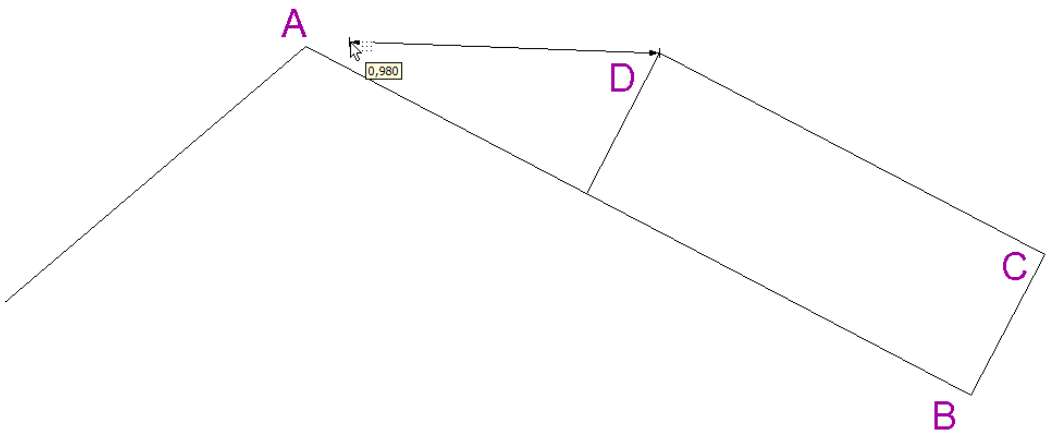
2.5. Additional option 6: Draw line parallel to a reference line

- Select line A-B for the reference line 
- Select the distance on reference point D or C
- Select start point on point C
- Select end point on point D



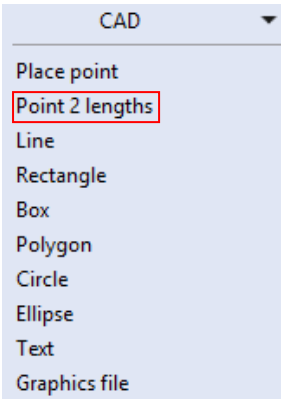
2.6. Additional option 1: Draw line free with two points

- Select reference point D with a left mouse click for the start 
- Select end point A with a Left mouse click 

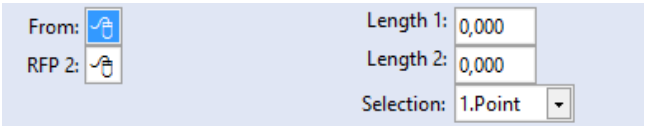


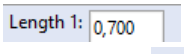
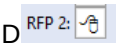
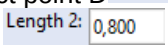
3. Help point via “Point 2 lengths"

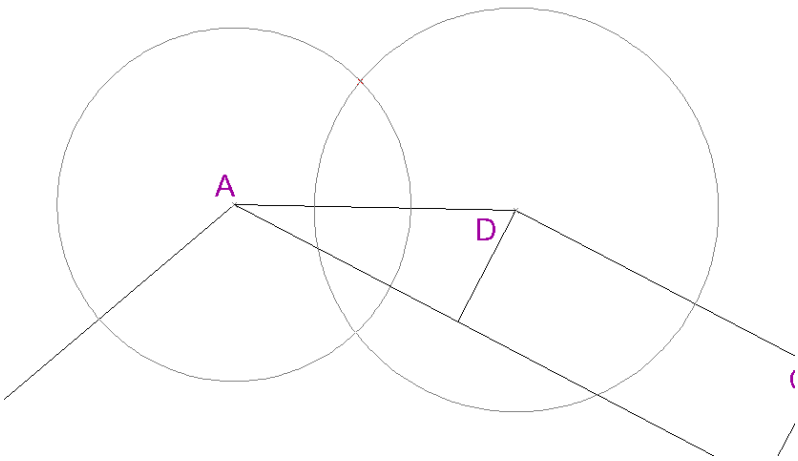
Select Point 2 lengths.



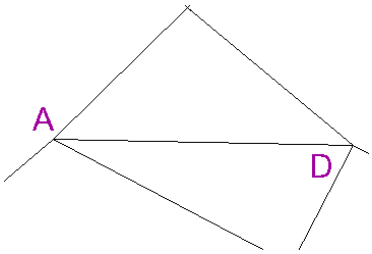
Following mask opens



- Select point A 
- Input of the first radius via 
- For the reference point 2 select point D 
- Input of the second radius via 
- The space bar can be used to decide on which intersection the point has to be created. The selected point is marked with a red cross



Now the point can be connected to point A and point D via the function line and the 1 additional option.



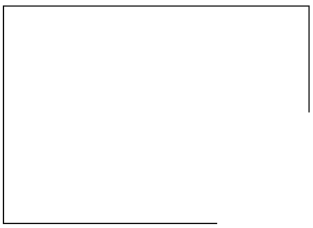
4. Rectangle/ Box

4.1. Difference between rectangle and box

4.1.1 Rectangle

A rectangle is created with four single lines. If the function *Punch/Box* is used the lines will be cut where the punch box hits the marked lines. Lines are separated.

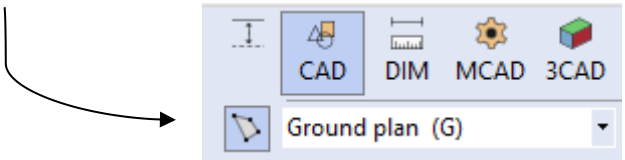
Example: **Punch/Box** on the right bottom corner.



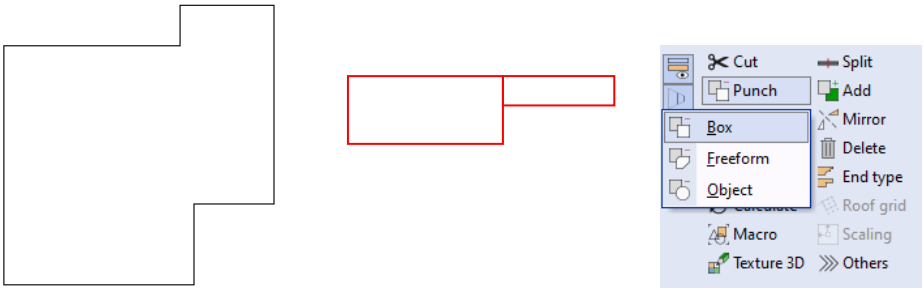
4.1.2 Box

A box generates a surface area through four connected lines. If edited the box behaves like a polygon. The lines are then reconnected and the surface is adapted.

Using this button  the box can directly be drawn as a polygon.



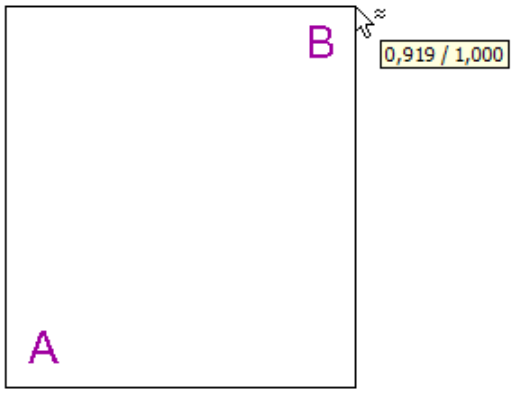
Example: ***Punch Box*** at right bottom corner and ***Add*** at the right top side.



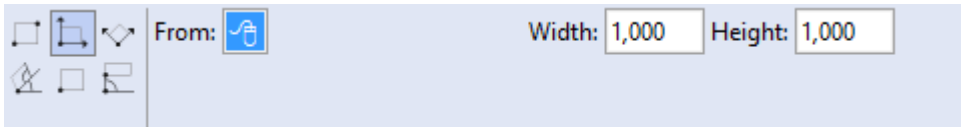
4.2. Additional option 1: Define component by two points

- Select insert point A with a left mouse click 

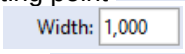
- Drag and click rectangle to B 



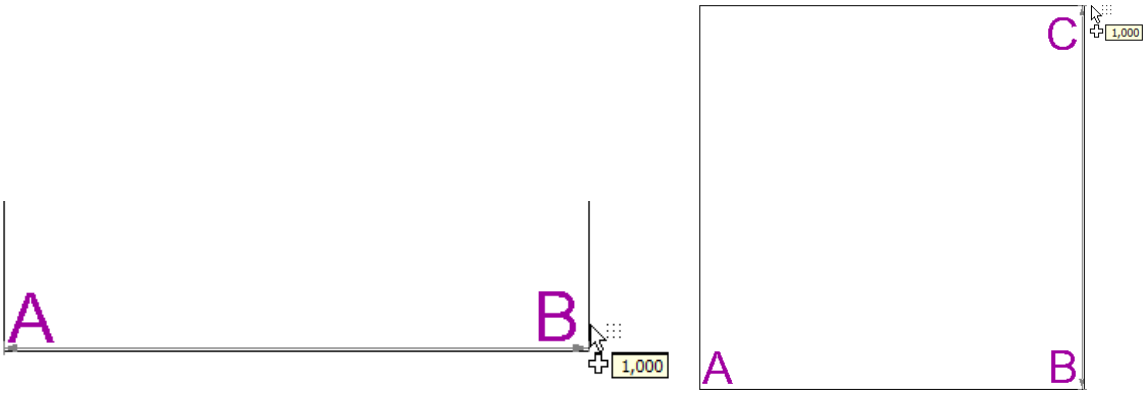
4.3. Additional option 2: Define component by width and height



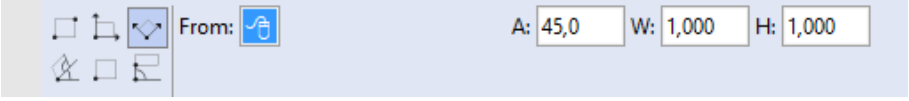
- Select a starting point 

- Select width 

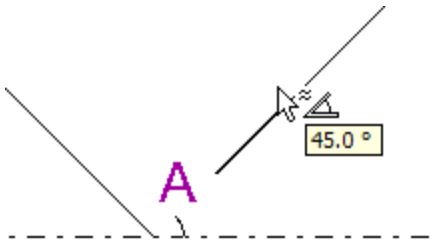
- Select height(C) 

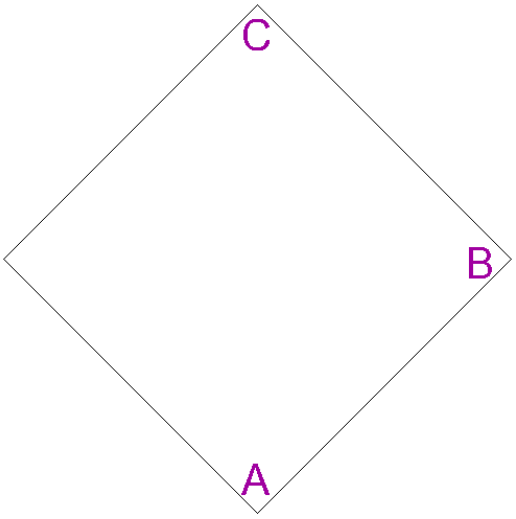


4.4. Additional option 3: Define component by angle, width and height



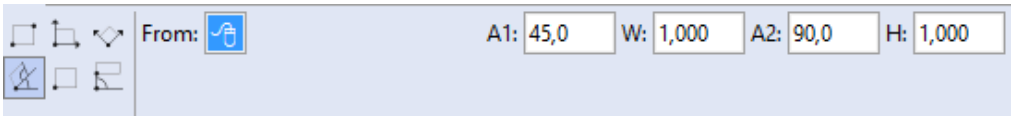
- Select a starting point 
- Select an angle 
- Select width (B) 
- Select height (C) 

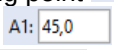
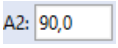


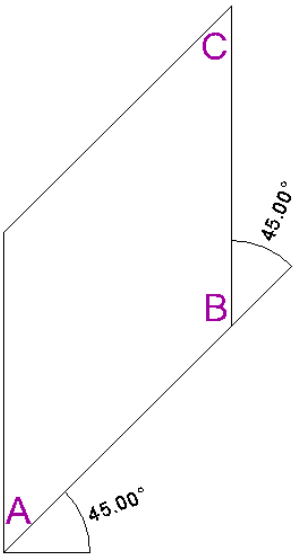


4.5. Additional Option 4: Define component by angle width angle height

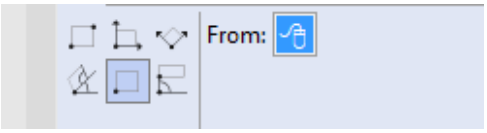
With this additional option you can create a parallelogram.



- Select a starting point 
- Select angle 1 
- Select width 
- Select angle 2 
- Select height 

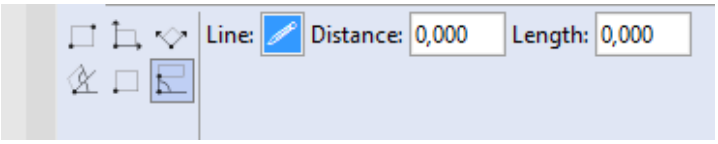


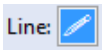
4.6. Additional option 5: Define component by one point

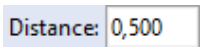


With this option, the same rectangle can be inserted several times. The last drawn rectangle will be inserted with one mouse click. The insertion point is the lower left corner.

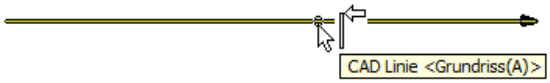
4.7. Additional option 6: Define component along a line



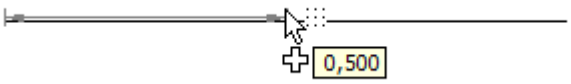
- Select a reference line 

- Distance from the start point of the reference point 

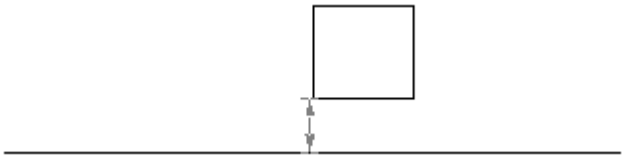
- Select length (distance to the reference line) 



.....step 1



.....step 2

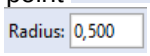


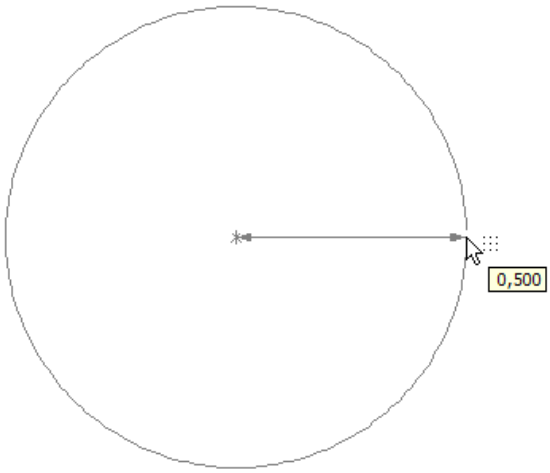
.....step 3

5. Circle

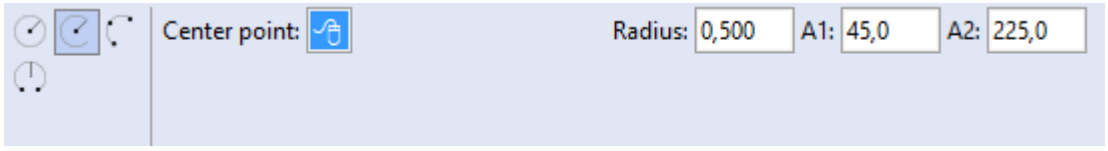
5.1. Additional option 1: Circle by center point and radius

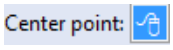
- Select centre point 

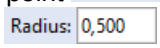
- Select radius 

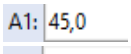


5.2. Additional option 2: Segment of circle by center point, radius and two angles



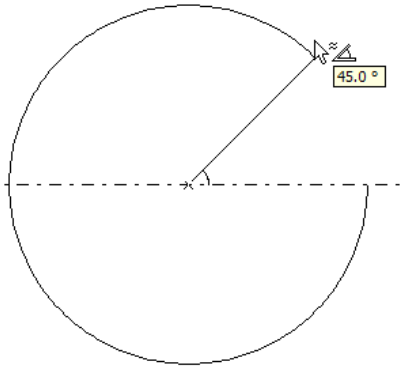
- Select center point 

- Select radius 

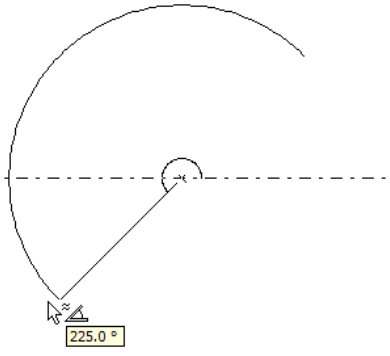
- Select angle 1 

- Select angle 2 

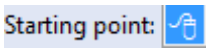
Angle 1:

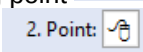


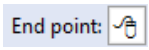
Angle 2:

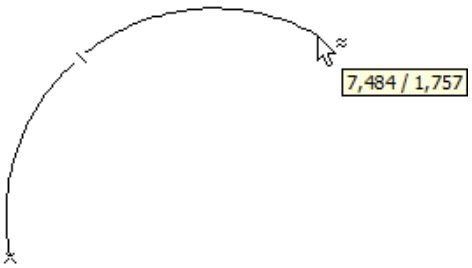


5.3. Additional option 3: Segment of the circle by 3 points

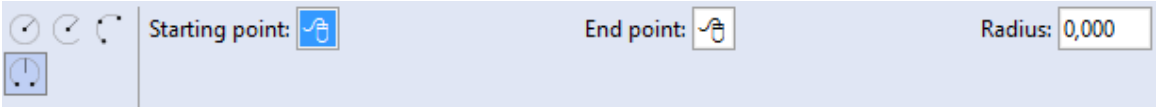
- Select starting point 

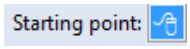
- Select point 2 

- Select end point 

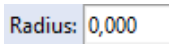


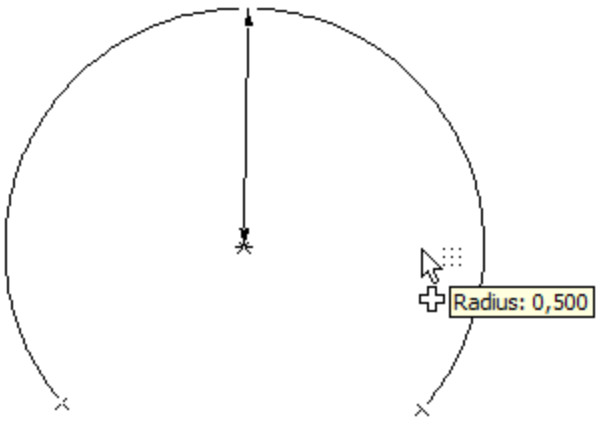
5.4. Additional option 4: Segment of the circle by two points and radius



- Select starting point 

- Select end point 

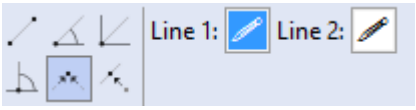
- Select radius 



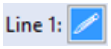
6. Place Point

To place a point, seven different additional drawing options are available. The first four options are the same as in drawing a line (see 1. Input of lines). The last three are extra options to place a point and are described below.

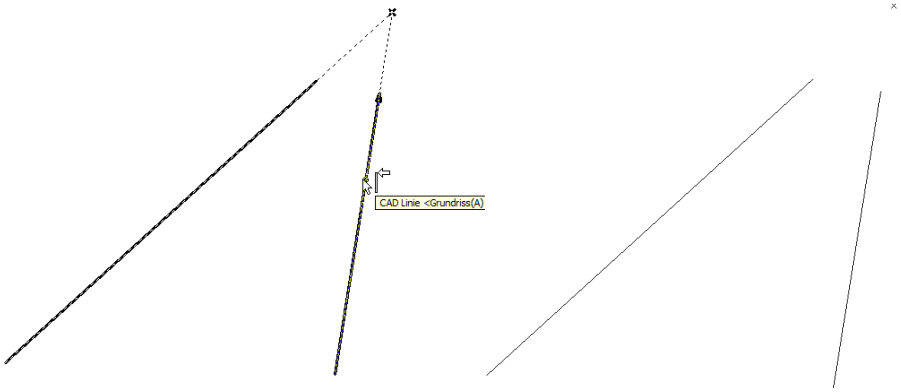
6.1. Additional option 5: Define point by point of intersection of two lines



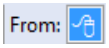
Simply select the two lines that will define the point if they would be lengthened. With this option the lines won't have to intersect to define the point

- Select line 1 

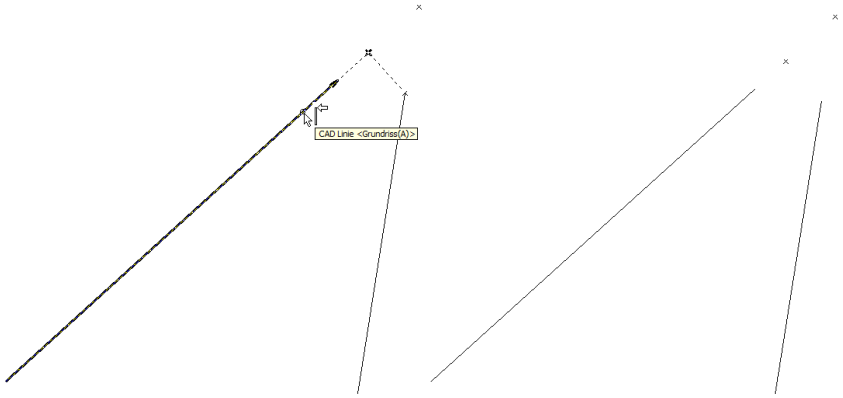
- Select line 2 



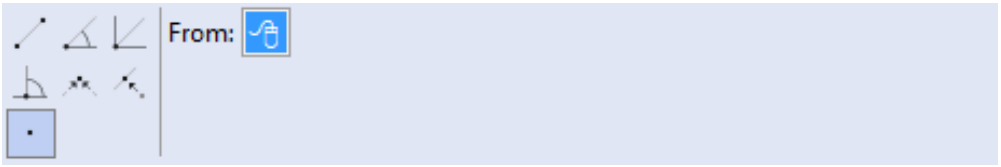
6.2. Additional option 6: Define point by projection on a line

- Select point which should be projected 

- Select a line on which the point should be projected 



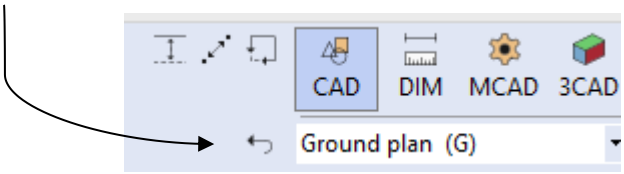
6.3. Additional option 7: Define point directly



A point is placed free by clicking with the left mouse button.

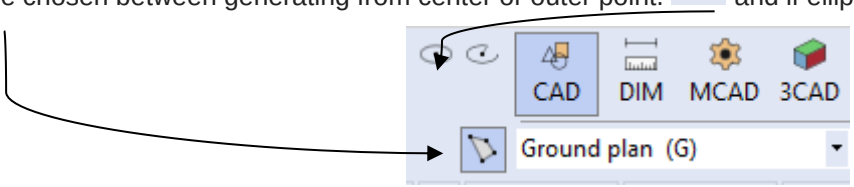
7. Polygon

A polygon is a number of line segments which create a surface area. The additional drawing options are the same as for the input of lines. The line segments always need do form a closed shape for a polygon to be generated. Single steps of the line segments can be reversed without completely deleting it.

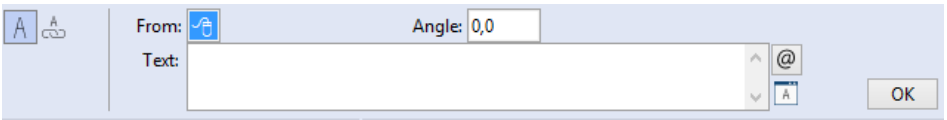


8. Ellipse

For drawing an ellipse same drawing options as those for rectangle or box are available (see 4). Further can be chosen between generating from center or outer point.  and if ellipse is directly generated as polygon.



9. CAD Text



- Select insert point for text field
- Select an angle for the text field
- Insert text
- Variable placeholders can be added using the  button.

The text field can be linked to a component  in order for the text to stay with the component even if component position is changed.

10. Graphic files

Graphics of all common formats can be imported into SEMA. Graphics will be converted into CAD polygons after import.

11. Further drawing input options

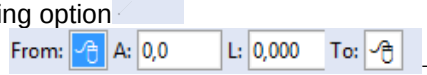
11.1. Move insert point

During input of 

or 

the insert (or end) point can be moved by pressing the space bar on the keyboard.

Example:

- Draw a line using the first drawing option 
- ***Space bar*** once: 

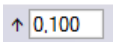
→ (Angle/length)

  Space bar twice: 

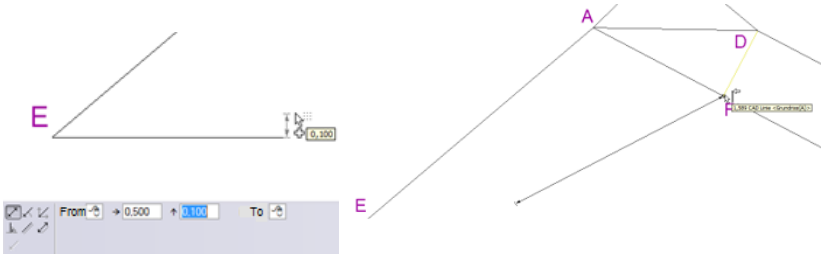
→ (Coordinates)

- Select point E with mouse 

- Select the horizontal distance to the start point E 

- Select the vertical distance to the start point E 

- Select point F with mouse click 

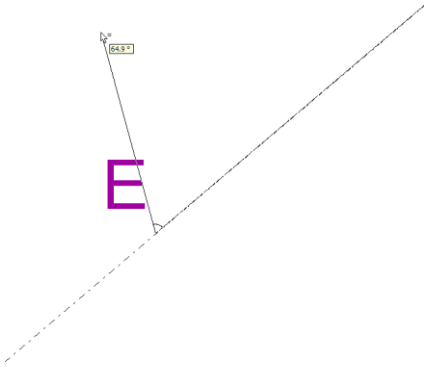


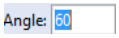
11.2. Change angle reference

Using **F6 key** and **space bar,** the reference line for an input with angular value can be changed.

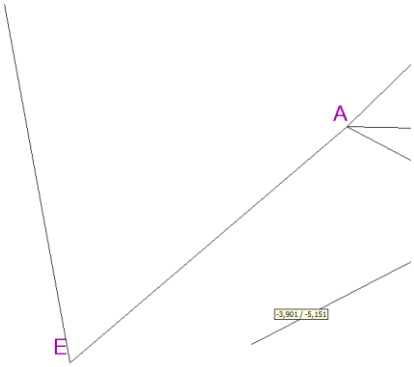
- Select ***Line*** and chose additional drawing option 2 
- Select E for the start point 

- ***F6***, angle reference can be changed by moving cursor near to the line which acts as new reference.



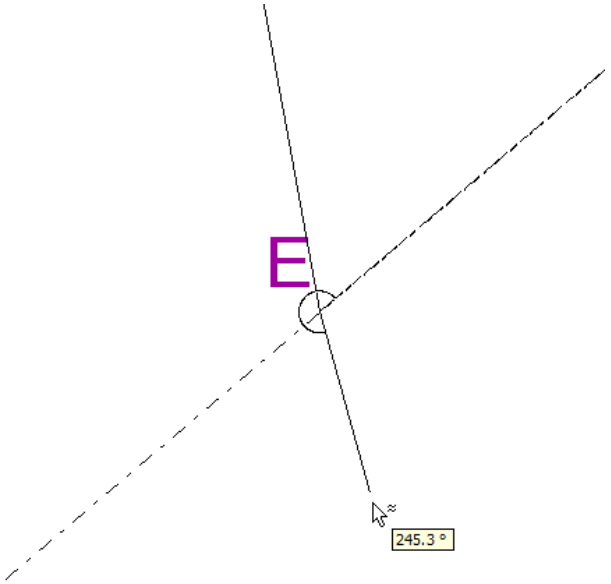
- Now the angle between line E-A and the new line can be entered 

- Select length 

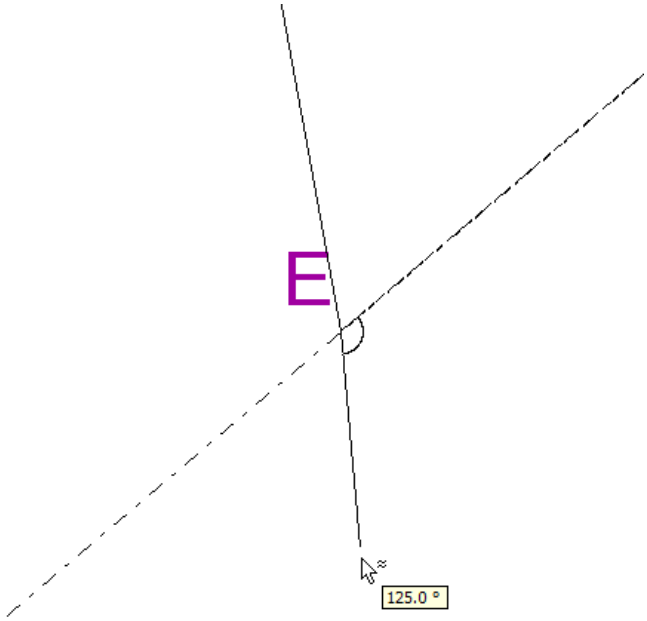


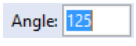
Example 2:

- Press ***Enter*** to return to the same function as last used.
- Select start point E
- ***F6*** to change angle reference
- Select the line between point E and point A near the point A as angle reference line



- ***Space bar*** (The direction of the angle changes)



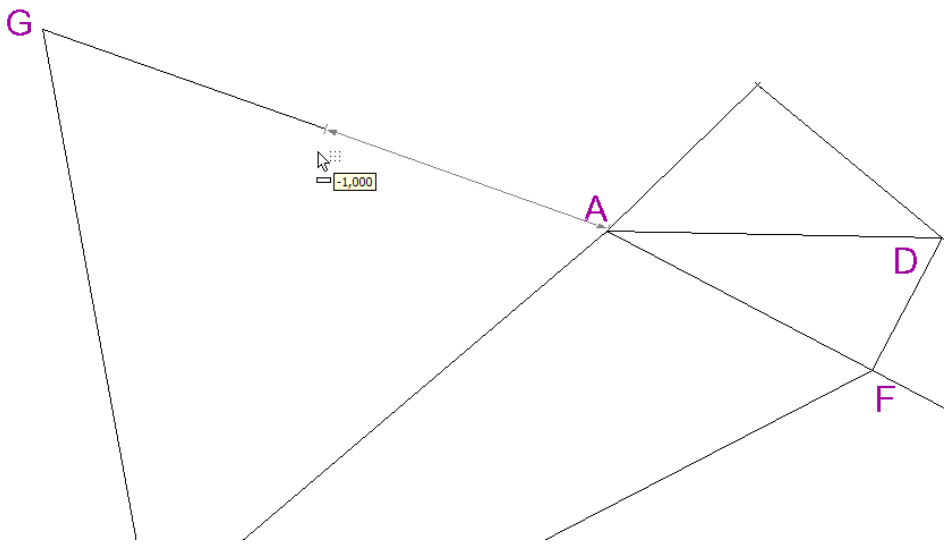
- Now the internal angle between the new line and the line E-A can be entered 

11.3. Change reference point for line length

Use the ***right mouse click*** to change the reference point for length

Example 1:

- Use ***Line*** and the second additional option 
- Select insert point A
- The reference point for length of line is usually the insert (start) point. A different point can be chosen with a ***right mouse*** click
- In this example, point A is selected as the length reference point with a right mouse click

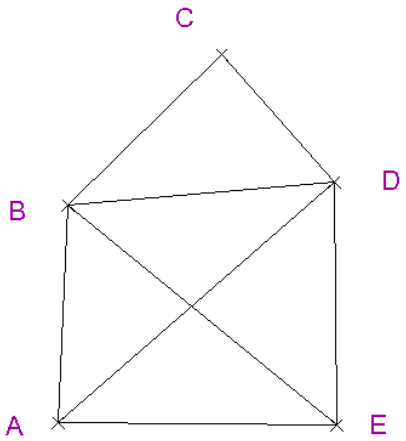


11.4. Connected lines

To draw several connected lines ***Enter*** can be used to start each new line at the endpoint of the last line draw.

Example:

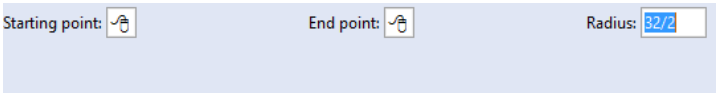
- Select ***Line*** and use first drawing option
- Select start point
- Select end point
- Press ***Enter*** and new line will automatically start at end of last line
- Select end point
- Press ***Enter***
- …



11.5. Calculator function in input fields

Each input field can be used like a calculator.

Example: If a circle is known to have a diameter of 32 the radius can be entered as 32/2 as shown below.

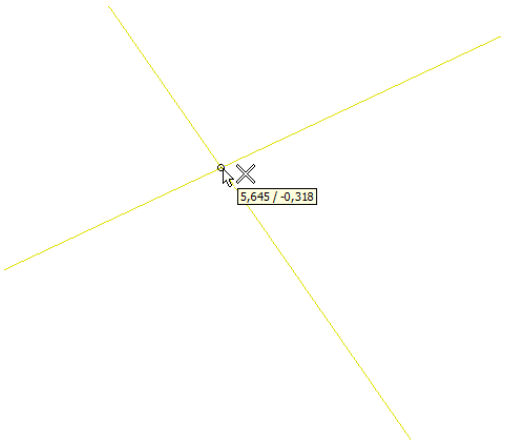


Note: brackets can also be used.

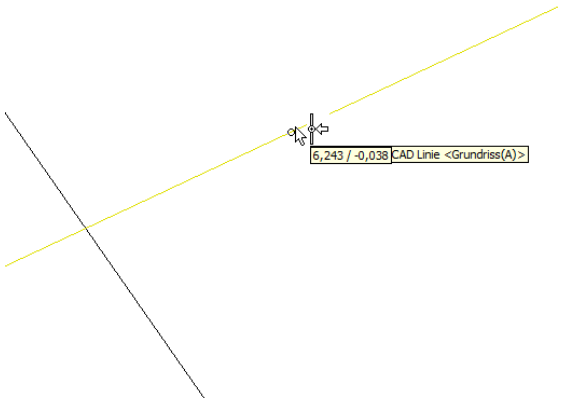
11.6. Mouse grab intersections or midpoints

To grab an intersection of two lines or the halfway point of a line with the mouse, hold down ***shift*** key and hover over point. Point can then be selected with mouse click. An icon on the cursor will indicate selection point.

Intersection:



Midpoint of line:



11.7. Zoom function

Hold down ***CTRL*** and click near required point to zoom in. Release ***CTRL*** and select point. Zoom goes back to previous setting and line can be drawn.