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MicroStation V8i Training Manual 2D Level 1

Twenty pages of Module 11 are shown below. The pages are typical for all Modules - they provide the Module title and set out the learning objectives. The suggested time for completion of the Module is given at the end of Page 11-3.

Please note the “Tool Tip” box on page 19; these are located throughout the Manual to emphasize a technique or to add specific points of information.

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SMARTLINE
Module Information

Prerequisites: Module 10 MicroStation - 2D

Introduction: SmartLine, designed for use with AccuDraw, automatically draws complex chains and shapes. A complex chain (also called a line string) is a connected series of line segments that act as one line, while a shape also consists of connected line segments but which return to the starting vertex to form a closed shape. SmartLine has options that connect or disconnect the line segments, draws lines or arcs in the same line string, and sharp, rounded, or chamfered vertices. You will typically use SmartLine when you need closed shapes (as for patterning), where it is advantageous to draw a connected line that contains arcs or chamfers (as for sidewalks or piping), or where a simple connected line string is needed.

Objective(s):
11.1 Recognize and adjust setting for SmartLine.
11.2 Recognize and apply sharp, rounded, and chamfered vertexes to closed shapes.
11.3 Recognize and apply dimensional, angle, and closed shape options.
11.4 Apply vertex types to line strings.
11.5 Recognize and apply arc segments to line strings and shapes.
11.6 Recognize and apply individual arc segments.

Time: This Module should be completed within 1.75 hours.

THIS SAMPLE STARTS ON PAGE 11-3 AND DISCUSSES THE SETUP AND USE OF SMARTLINES.
DISCUSSION:

Open your *Start-E* or *Start-M* drawing.

It is often extremely advantageous to draw a series of line segments that act together as a single line. In other words, a series of lines that are “grouped” into a *line string* or a *shape* and which can be *edited as one line*. It is also very useful to be able to draw a line string or shape that contains *arcs* and *rounded* or *chamfered vertices* and not have to change drawing tools to do so. It is, of course, entirely possible to draw these elements using a combination of lines, arcs, and blocks, and then use various editing tools to create the arcs and chamfers. *SmartLine* is designed to avoid this line and shape building process by drawing such elements in one operation.

First, let’s look at *SmartLine*’s settings box:

### 11.1 SETTING SMARTLINE OPTIONS

To open the settings box for *SmartLine*, simple start the *SmartLine* tool. Click on the *SmartLine* icon in the *Linear Task* tool box. Expand the Tool Settings window.

The *Tools Setting* box now shows the *SmartLine* options. *Click on each option* as they are described below:

<table>
<thead>
<tr>
<th>Tool Setting</th>
<th>Action</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Segment Type:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line</td>
<td>Draws line segments.</td>
<td><img src="example_line.png" alt="Line Example" /></td>
</tr>
<tr>
<td>Arc</td>
<td>Draws arc segments.</td>
<td><img src="example_arc.png" alt="Arc Example" /></td>
</tr>
</tbody>
</table>

*Line and arc segments can be combined to draw a complex chain.*
## Tool Setting Action Examples

### Vertex Type:

<table>
<thead>
<tr>
<th>Vertex Type</th>
<th>Action</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharp</td>
<td>Draws sharp corners.</td>
<td><img src="image" alt="Sharp Example" /></td>
</tr>
<tr>
<td>Rounded</td>
<td>Draws rounded corners to the radius set in the “Rounding Radius” box.</td>
<td><img src="image" alt="Rounded Example" /></td>
</tr>
<tr>
<td>Chamfered</td>
<td>Draws chamfered corners with the chamfer offset dimension set in the “Chamfer Offset” box.</td>
<td><img src="image" alt="Chamfered Example" /></td>
</tr>
</tbody>
</table>

### Join Elements

When **ON**, line segments are joined. When **OFF**, line segments are placed as individual elements (but can still be defined as a string for some editing operations).

### SmartLine Placement Settings:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rotate AccuDraw to segments</strong></td>
<td>By default, AccuDraw’s compass will rotate to line up with each segment when placed. When this switch is <strong>OFF</strong>, the compass remains aligned with the view axes.</td>
</tr>
<tr>
<td><strong>Always start in line mode</strong></td>
<td>When <strong>OFF</strong>, SmartLine will start in the mode last used.</td>
</tr>
</tbody>
</table>

Note: *AccuSnap* is designed to work closely with *SmartLines* and you will find that it will locate more tentative points on SmartLines than on regular lines, reducing the need to manually tentative-point.

### 11.2 DRAWING WITH SMARTLINE - VERTEX TYPES

Initially, drawing with SmartLine seems very similar to drawing with the *Place Line* tool. The differences occur when you use the options for vertex types. To get a general idea of how the tool works, start with some simple *shapes* and draw the following squares with *SmartLine* and *AccuDraw* active. In each case, draw the first side 1'-0" (300) long make use of the *distance recall* feature of AccuDraw to quickly draw the other three sides.
Unconnected Elements

Step 1  Select Lines and Sharp, with Join Elements OFF.
Step 2  Data-point to start the shape.
Step 3  Data-point each corner using distance recall.
Step 4  Snap to the starting point.
Step 5  Reset to stop SmartLine’s action.

Each element in the square is a separate entity. To prove this, click on each side with the Element Selection tool and note that the element handles only appear on one line.

Connected Elements

Step 1  Select Lines, Sharp, with Join Elements ON.
Step 2  Data-point to start the shape.
Step 3  Data-point each corner using distance recall.
Step 4  Snap to the starting point. Be sure that the Closed Element option is ON before you accept the tentative point.
Step 5  Reset to stop SmartLine’s action.

The square is a single element and a closed shape. Click on any side with the Element Selection tool and note that the element handles appear on all sides.

Rounded Corners

Step 1  Select Lines, Rounded, and Join Elements. Set the Rounded value to 3" (75)
Step 2  Data-point to start the shape.
Step 3  Data-point each corner using distance recall.
Step 4  Snap to the starting point.
Step 5  Reset to stop SmartLine’s action.

SmartLine automatically rounds each corner, including the starting corner.

Chamfered Corners

Step 1  Select Lines, Chamfered, and Join Elements. Accept the Chamfer value of 3" (75).
Step 2  Data-point to start the shape.
Step 3  Data-point each corner using distance recall.
Step 4  Snap to the starting point.
Step 5  Reset to stop SmartLine’s action.

SmartLine automatically chamfers each corner, including the starting corner.

Note that a vertex will default to a sharp corner if the rounding or chamfer value is too large for the line segment under construction.
11.3 SMARTLINE’S OPTIONS

Now let’s look at the options that are available during the drawing of a SmartLine shape when the join elements switch is on.

SETTINGS BOX OPTIONS - CLOSED SHAPES

You have already seen two of these in the extra part of the settings box that appeared when you Data-pointed or snapped to the starting point. To see these again set Vertex to Sharp, Join Element On, and start drawing another square. When you return to the starting point, locate a tentative point at the vertex but do not Data-point to accept the point. You can now see the additional options that are available at this part of the drawing process.

There are three options:

1. If Join Elements is ON, you can choose to close the shape by checking the Closed Element check box.
2. You can change the Area type for the shape. The default is Solid and you should not change this setting in this Course.
3. You can Fill (use the Opaque fill type) or Outline the shape with a color. This will apply a color to the entire inside of the shape. Feel free to play with this option, but remember to reset this option back to None when you are finished. We will look at Fill in more detail in Module 12. To see the fill color, turn Fill on in the View Attributes box (Ctrl-B).

When you have set the options, Data-point to accept the snap location and apply the settings.

“ON-THE-FLY” OPTIONS

As with most MicroStation tools, you can change the tool’s options on-the-fly. In SmartLine’s case this means switching between lines and arcs, changing the type and size of the corner options, or switching from joined elements to separate line segments.

To change the options during a drawing process you simply move your pointer to SmartLine’s settings box and make the changes. Please note though, that when you change a rounding or chamfer size value, you must press Enter to apply the new value.

Also, you might find it necessary to regain focus in AccuDraw’s window after entering a new value in the Tool Settings box. If this is the case, you should press the space bar or click in AccuDraw’s window.
Let’s deal with the type and size of corner options first.

Draw the shape at the right:

**Step 1**  Set SmartLine options to *Lines*, vertex *Rounded* with a 4” (100) radius, and *Join Elements On*.

**Step 2**  Data-point at the starting corner and toggle AccuDraw’s compass to *Rectangular*.

**Step 3**  Drag to the right and enter 2'-6" (750) in AccuDraw’s X-axis box.

**Step 4**  Data-point to accept the line segment.

**Step 5**  Drag upwards and enter 3'-6" (1070) in the Y-axis box.

At this point the 4” (100) radius has been created at the lower-right corner. If you now accept the upper-right corner you will also accept the 4” (100) radius at the lower-right corner.

**Step 6**  Data-point to accept the upper- and lower-right corner.

As you drag the line to the left you can see the 4” (100) radius again appearing at the upper-right corner. You can now change the vertex option to a chamfer.

**Step 7**  Change the Vertex Type to *Chamfer* and the value to 8" (200). Press *Enter* to apply the new value.

The upper-right corner now becomes a chamfered corner. *To confirm this change you must accept the location of the upper-left corner.*

**Step 8**  Still dragging to the left, enter 2'-0" (600) in the Y-axis box.

**Step 9**  Data-point to accept the upper-left corner and confirm the chamfer at the upper-right corner.

**Step 10**  Change SmartLine’s options to *Rounded* and 10" (250) radius, then press *Enter* to accept the new value.

**Step 11**  Snap to the starting point.

You have now both locked-in the rounded upper-left vertex and placed the final rounded vertex (which is the same as the upper-right corner).

In Step 11, if you wanted a different vertex at the starting point, you can tentative-point at the starting point (instead of snapping), and enter a new value or vertex type in the Tool Settings window. Data-point to accept the new setting and finish the string.

If you need to edit a vertex after placement, use the *Modify Element* tool. This procedure is discussed in Module 15, Section 15-2.
Seems confusing? The key to creating a sharp, rounded, or chamfered corner is that a vertex will not be “locked-in” until the next vertex is placed. This gives you the feeling that you always seem to be one corner “behind” in the drawing process. This is true, but the process allows you to change the options before actually accepting the vertex.

Three additional important points:

1. If you make a mistake in either the vertex or the segment length you can use Control-Z to undo previous segments. You can only do this during the drawing process, of course. If you use Control-Z after the shape is finished you will simply delete the whole shape.

2. If you turn Join Elements off before or during the drawing process then the final vertex (at the starting point) will default to a sharp vertex, and the shape will consist of individual elements.

3. Keep in mind that, in a continuing line string, you can only change the type or size of a vertex after accepting its location.

11.4 DRAWING LINE STRINGS - VERTEX TYPES

You can apply the vertex options to line strings as well as shapes. The same rules apply regarding “locking-in” the previous vertex and using either Enter to confirm a new value and the Space Bar to switch focus. A line string is “open”, of course, and only needs a Data-point and Reset to finish the line.

Try the following exercise. I have simplified the steps assuming you can use AccuDraw to enter all dimensions and can switch options in SmartLine’s settings window without prompting.
Step 1  Set *Vertex* to a *Chamfer* of 9" (225) with *Join Elements* on.
Step 2  *Data-point* the line start at *Point 1*.
Step 3  *Data-point* at *Point 2*.
Step 4  *Data-point* at *Point 3*.
Step 5  *Set vertex to sharp*.
Step 6  *Data-point* at *Point 4*.
Step 7  *Set vertex to rounded* and a 12" (300) radius.
Step 8  *Data-point* at *Point 5*.
Step 9  *Change* the rounding *radius* to 9" (225).
Step 10 *Space Bar* to focus in AccuDraw (if needed).
Step 11 *Data-point* at *Point 6*.
Step 12 *Change* the vertex to *sharp*.
Step 13 *Data-point* at *Point 7*.
Step 14 *Reset* to stop the tool.

This is relatively complex line to draw, but the combination of AccuDraw and SmartLine makes the job quite easy provided you take a little time to think ahead throughout the drawing process. To draw this line string without AccuDraw and SmartLine would involve the use of several drawing and editing tools.