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You are viewing sample pages from our textbook:

***MicroStation V8i Training Manual 2D Level 2***

The first nine pages of Module 10 are shown below. The first two 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 10-2.

The instruction you see is typical of the combined information and exercise approach used throughout all Modules.

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

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# **MICROSTATION V8i**

## **2D LEVEL 2**

### *Module*

# **10**

# **PATTERNING**

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## Module Information

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### Prerequisites:

Module 9 MicroStation - 2D Level 2

### Introduction:

Patterning or hatching is a very important part of the drafting process. It is used to add material or textural information to a drawing in the form of hatch lines or patterns of symbols. Every discipline uses patterns of some kind; engineering drawings show cut materials with hatches, surveying drawings show ground cover symbols, and geological drawings show rock material types as patterns. As you will see, MicroStation uses lines and cells to create hatches and patterns, and you will use the concepts discussed in the previous Module to create boundaries to contain the hatches and patterns.

### Objective(s):

- 10.1 Draw single-line hatches using the *Hatch Area* tool.
- 10.2 Draw double-line hatches using the *Place Crosshatch* tool.
- 10.3 Discuss the seven *Methods* of placing a pattern.
- 10.4 Place cell patterns using the *Pattern Area* tool.
- 10.5 Manipulate the level, color, weight, and display of patterns.
- 10.6 Place associative patterns and discuss their implications.
- 10.7 Delete patterns using the four pattern deletion tools.
- 10.8 Discuss methods of patterning around holes.
- 10.9 Use the *Show Pattern* and *Match Pattern Attributes* tools.
- 10.10 Discuss the options for the *Linear Pattern* tool.

### Time:

This Module should be completed within 4 hours.

# DISCUSSION:

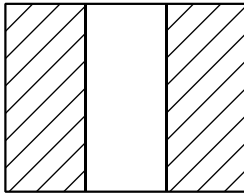
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MicroStation provides two basic methods of adding hatching or patterns to drawings:

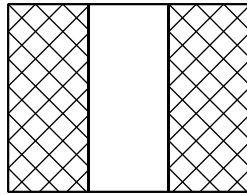
**Line Elements**      Simple *hatching* is achieved by applying either *single-line* (hatching) or *double-line* (crosshatching) elements to a defined area.

**Cells**      *Patterning* is achieved by applying a *pattern cell* to a defined area.

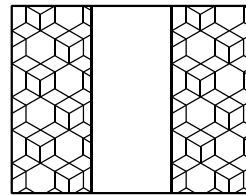
The three types of patterns look like this:



Single-Line Hatch



Cross Hatch



Pattern Cell

The terms *hatch* and *pattern* are essentially interchangeable, although *Patterning* is the official MicroStation term. In this Module I am generally using *hatch* to describe *line* patterns, and *pattern* to describe patterning with a *cell*.

For a hatch or a pattern to be successfully applied there are two statements that can be made:

Ideally, the *geometry* of the drawing elements should be as *accurate* as possible. Accuracy in this case means having the *vertices* of the enclosing elements *connected*. Nothing will stop the patterning process faster than a *gap* between enclosing elements!

For most of the hatching or patterning tools, MicroStation requires there to be *closed elements* present before a pattern will take place. This is particularly so if the pattern is to be *associative* (where the pattern is bound to the closed element). Depending on the method used, *you may need to create closed elements before starting the patterning process*.

Let's start the instruction with a simple single-line hatch, and then look at the process in greater depth :

## 10.1 SINGLE-LINE HATCHES

Start by drawing a *closed* shape:

**Step 1** Start the *Place Block* tool and draw a rectangle with dimensions of 3'-0" (900) high, by 2'-0" (600) wide.

**Step 2** Start the *Hatch Area* tool on the *Pattern* tool box.



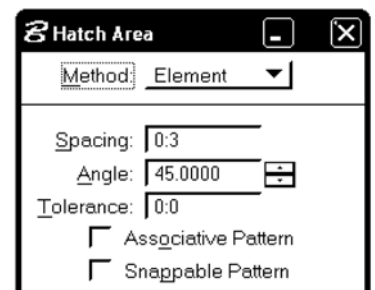
Look at the *Tool Settings* window. The options are:

<b>Spacing</b>	Sets the <i>spacing</i> of the hatch lines in <i>working units</i> .
<b>Angle</b>	Sets the <i>angle</i> of the hatch <i>lines</i> (standard counterclockwise rotation).
<b>Tolerance</b>	Controls how closely MicroStation draws hatch lines to curved boundaries. If you have a large hatch inside a curved boundary, setting a tolerance value will increase hatch speed.
<b>Associative Pattern</b>	If ON, associates the hatch to the boundary element. Associated hatches are edited if the boundary element is edited. E.g., if the boundary is stretched, so is the hatch.
<b>Snappable Pattern</b>	If On, allows snapping to the hatch lines. Normally this option is off since a dense hatch can interfere with snapping to elements near the hatch.
<b>Method</b>	A choice of seven methods of applying a hatch.
<b>Max. Gap</b>	If the <i>Flood</i> method of placing a hatch is selected, you can set a Max. Gap value that will allow MicroStation to "jump" a gap between vertices of bounding elements. MicroStation insets a line element to close the gap.

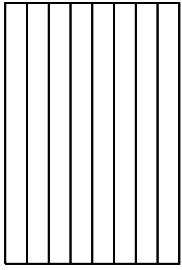
**Step 3** Set the option values to those shown in the illustration. The spacing is 3" (75).

You will use the *Element* method because the block you drew is a closed element. Follow the prompts in the *Status Line*:

**Step 4** *Data-point* to select the block.



The next prompt is to *Accept @pattern intersection point*. MicroStation is asking you to select a point through which a line of the hatch will be drawn. In other words, you control where the hatch is started:



**Step 5** Snap to the upper-left corner of the block.

This will force the hatch to start at this corner. Since you have set the spacing at 3" (75), the hatch will display as vertical lines that divide the width of the block perfectly.

**Step 6** Reset to stop the tool.

The spacing option requires some comment. Clearly, you can control the spacing value to best advantage. For example, if you were designing a deck and you wanted to see the effects of placing 6" (140) planks at different angles and starting points, it is very easy to set suitable values and place several plank layouts in copies of the deck outline. Similarly, if you are hatching a machine part and the material hatching symbol requires that the hatch spacing be 1/8" (3), you can control the spacing value so that the hatch will *plot* at 1/8" (3) at whatever plot scale you are using.

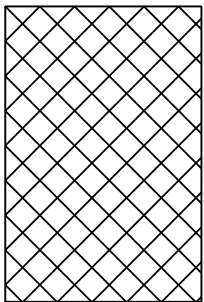
On your own, *repeat* this hatch placement process, changing the *spacing* and *angle* options and data-pointing in other locations to locate the hatch. Don't change any other options yet.

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## 10.2 CROSSHATCHES

Crosshatches are the same as single-line hatches except that you are offered *two* spacing and angle settings:

**Step 1** Start the *Place Crosshatch* tool. 



The *Tool Settings* window now offers the option of setting spacing and angle for the *second set* of hatch lines.

**Step 2** Set values of 3" (75) and 135° for the *second* hatch settings (leave the first hatch settings as they were before).

**Step 3** Data-point to select the block.

**Step 4** Snap to the upper-left corner to define a point through which the hatching must pass.

**Step 5** Reset to stop the tool.

### TOOL TIP !

If you set the second spacing and angle values to *zero* in the second options box, MicroStation will automatically place the second set of hatch lines at *right-angles* to the first hatch lines and at the *same* spacing.

On your own, try placing more crosshatches at different spacings and angles to see the effects.

**TOOL TIP !**

Hatches and crosshatches are placed as *graphic groups*. This allows you to manipulate the hatch as *individual lines* if *Graphic Group Lock* is OFF. If *Graphic Group Lock* is ON the hatch can be manipulated as a group.

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### 10.3 PATTERNING METHODS

Take a closer look at the *Method* option for placing patterns:

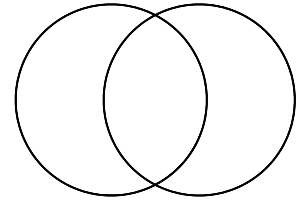
Method	Action
<b>Element</b>	Places a pattern inside a <i>closed</i> element, shape, or complex shape. This is the easiest method to use, provided a closed element already exists (or has already been created for this purpose).
<b>Fence</b>	Places a pattern inside the boundary of a <i>fence</i> . The fence can be of any shape.
<b>Intersection Union Difference</b>	<i>Boolean</i> tools that place a pattern in the shape created by the Boolean operation. Refer to Module 9 for Boolean operations. The <i>Difference</i> method is particularly useful when patterning around holes (discussed later).
<b>Flood</b>	Places a pattern inside an area enclosed by <i>individual elements</i> . Use this method if a closed element or shape is not available. The Max. Gap option will jump a gap between elements up to the value set.
<b>Points</b>	Places a pattern inside an area defined by a series of <i>data points</i> .

You can easily experiment with the *Fence* and *Points* methods. With the *Fence* method, place a fence before starting the tool. With the *Points* method you simply *data-point* to define the vertices of the boundary. To *close* the boundary, press the *Reset* button and MicroStation will automatically snap back to the *first point* you placed. Try both methods yourself.

To practice the three Boolean methods and the Flood method you need two new elements. Do the following:

**Step 1** Draw the two circles as shown. Make them both 1'-6" (450) radius.

**Step 2** In the *Place Hatch* tool set the *Spacing* to 2" (50) and the *Angle* to 45°.



Start with the *Intersection* method:

**Step 3** Set the *Method* to *Intersection*.

Follow the prompts:

**Step 4** *Data-point* on one of the circles.

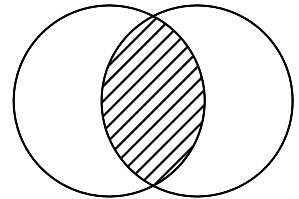
**Step 5** *Data-point* on the second circle.

Both circles should now be highlighted.

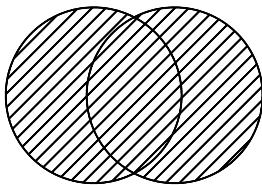
**Step 6** *Data-point* to accept the two selections (a line of the hatch will be drawn through this data point).

**Step 7** *Reset* to draw the hatch and stop the tool.

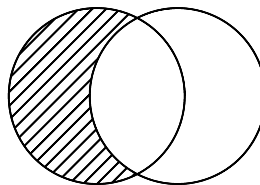
The hatch lines will display in the *intersecting* portion of the two circles.



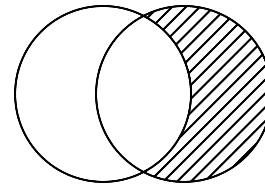
Try the same procedure with the *Union* and *Difference* methods. You should find the hatches to be similar to those shown below. There are two possible combinations generated by the *Difference* method, depending on the order in which you pick the two circles.



Union Method



Difference Method  
Left-Right Picks

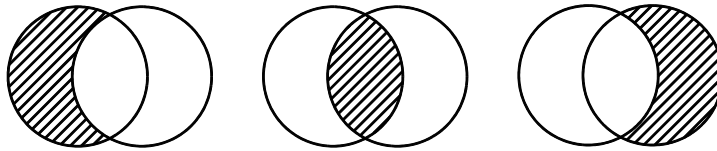


Difference Method  
Right-Left Picks

To apply the *Flood* method you simply ta-point in the area where you want the hatch to be drawn. Remember that if the geometry is not closed you will see an error message on the Status Line. You can then connect all element vertices or set a Max. Gap value. There are three possible hatch locations using the *Flood* method as shown below.

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Flood Method

**TOOL TIP !**

When using the Flood method, it is a good idea to zoom-in to the area to be patterned. This reduces the chances of MicroStation trying to pattern other than the area you have selected. However, be aware that MicroStation prefers that the *entire area* to be patterned is *visible* in a view. If not, the area may not be patterned.