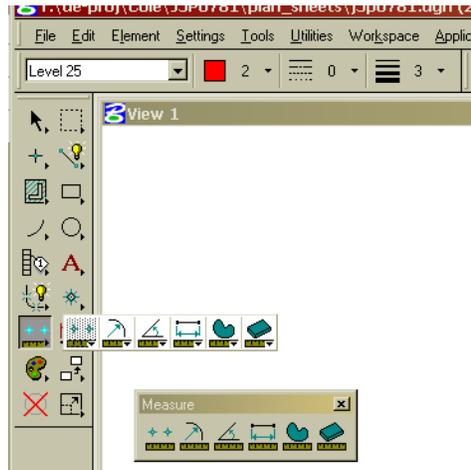


## 5.0 Measuring Elements

Through the use of the Measure tool box Microstation gives the user the ability to gather measurement information about certain elements without making any changes to the active file. This can be extremely useful when checking the accuracy of a design file or referencing information about an element in a design file for use elsewhere.



Through the use of these tools along with MicroStation's ability to snap to specific points in a design file, a user can obtain precise measurements.

### Snapping

Snapping is MicroStation's way of "grabbing" precise points and using those points to help create or modify geometry, or to gain accurate information about geometry.

MicroStation employs a number of different snap modes that can be used to define what points will be found when snapping to an element. These modes can be accessed from the Settings drop down menu at the top of the MicroStation screen or from the Snap Mode portion of the Status bar at the bottom of the screen.

A Snap Mode button bar is also available that can be docked or left floating on the screen at any spot convenient to the user and this will allow quick access to any of the snap modes. The default snap mode is the Keypoint snap. To change to a different snap mode for a single step during a process simply left click once on any of the other available snap modes. To make a different snap mode the default, double click that desired snap mode icon.

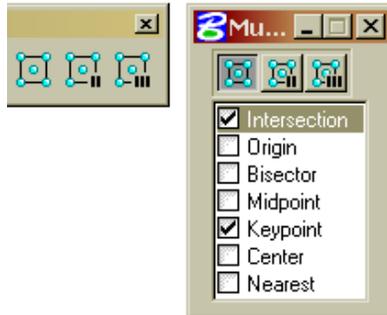


 The most commonly used snap mode is the Keypoint snap. This snap mode recognizes endpoints and midpoints on lines or arcs, and center points and quadrant points on circles.

 The second most commonly used snap mode is the intersection snap. This snap mode is used to find the intersection of two elements even if that intersection is an extended intersection.

The remaining modes will be use less frequently and are each covered in the contents of the MicroStation help files.

The last three snap modes are MultiSnap modes and can be set up to utilize more than one snap mode at the same time. To set any of these up simply right click over one of the three MultiSnap icons and choose Properties from the available pop up menu. A MultiSnap dialog box will appear. Within this dialog box choose the snap modes that you want to utilize and then close the MultiSnap dialog box.



The easiest method of snapping to elements or points in a design file is to use the AccuSnap function in MicroStation. Accusnap incorporates a number of convenient features into an intelligent, “on the fly” process.

Accusnap defaults to “on” when MicroStation is started, but can be toggled on or off with the first icon on the Snap Mode button bar.



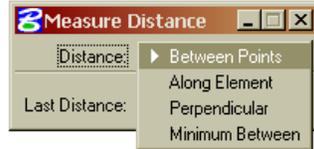
When using any MicroStation functions such as the Measure tools, AccuSnap will automatically recognize any available elements that the cursor is placed over and find the closest prospective snap point. The element will highlight and the prospective snap point will be indicated with a crosshair and the snap mode icon. If the user moves the mouse cursor close enough to the prospective snap point the crosshair becomes a yellow “X” and now is a tentative snap. To snap to this point the user must simply left click one time.

A snap can also be placed by positioning the cursor close to the desired point and clicking the middle mouse button one time to find the tentative snap. Once the tentative snap point is found using this method, then the user must left click once to accept the snap.

## 5.1 Measure Distance



The Measure Distance tool provides the MicroStation user with a tool for “point to point” measurements. This tool employs 4 different methods to aid the user depending on how the distance needs to be taken.



### ➤ **Between Points**

To measure the cumulative distance from an origin or between points.

1. Select the Measure Distance tool.
2. In the Tool Settings window, set Distance to Between Points.
3. Snap or enter a data point to identify the origin (the point from which to measure).
4. Snap or data point to establish a second point.

*The distance between that point and the origin is displayed in the dialog box.*

5. Enter another point(s).  
*The cumulative distance from the origin is displayed.*

### ➤ **Along Element**

Along an element from an origin point. Elements included in this list are lines, line strings, arcs, ellipses, complex chains, and complex shapes.

To measure the distance along an element

1. Select the Measure Distance tool.
2. In the Tool Settings window, set Distance to Along Element.
3. Snap to identify the origin of measure along the element (the point from which to measure).
4. Snap to define a point along the element.

*The distance from the origin along the element is displayed in the dialog box.*

If the element is closed, this data point defines the direction (clockwise or counter-clockwise) in which measurements are made.

5. Establish additional point(s).  
*The distance along the element from the origin is displayed.*

### ➤ **Perpendicular**

Measures perpendicular distances between an element and either another element or a Data Point.

To measure perpendicular distance from an element

1. Select the Measure Distance tool.
2. In the Tool Settings window, set Distance to Perpendicular.
3. Identify the element.
4. Enter a data point.

*The perpendicular distance between the element and this point is displayed in the dialog box.*

A temporary "line" is displayed as a visual aid but is not placed in the design.

5. Enter another data point(s) to define other perpendicular measurements.
6. If the element is a line string, shape, curve, complex chain, or complex shape, the distance is measured perpendicular to the segment identified in step 2.

➤ **Minimum Between**

Measures the minimum distance between two elements.

To measure the minimum distance between elements

1. Select the Measure Distance tool.
2. In the Tool Settings window, set Distance to Minimum Between.
3. Identify the first element.
4. Identify the second element.
5. Accept the elements.

*The minimum distance between the elements is displayed in the dialog box.*

A temporary "line" is displayed as a visual aid but is not placed in the design.

## 5.2 Measure Radius



This tool allows you to measure the Radius of a selected arc, or circle (ellipse).

Used to measure:

- The radius of a circle or circular arc.
- The radius of a cone or cylinder.
- The primary and secondary axes of an ellipse or elliptical arc.
- The radius of a circular segment or axes of an elliptical segment of a complex chain or complex shape.

To measure an element's radius:

1. Select the Measure Radius tool.
2. Identify the element or segment.

*The measurement is displayed in the dialog box.*

## 5.3 Measure Angle Between Lines



Used to measure the angle between two lines or segments of a line string, shape, or multi-line. If the identified lines do not intersect, an intersection point is computed to serve as the vertex of the measured angle.

To measure the angle between two lines:

1. Select the Measure Angle Between Lines tool.
2. Identify the first line.
3. Identify the second line.
4. Accept the lines.

*The angle measurement is displayed in the dialog box.*

## 5.4 Measure Length



Used to measure the length of an element(s) and to analyze mass properties. For a closed element or a surface, the length of the perimeter or wireframe geometry is measured.

## 5.5 Measure Area

Measure Area is used to measure area and perimeter, in addition, it may be used to measure mass properties.

The Measure Area tool also gives you the ability to determine what method to use in calculating the area. The two main methods used are Flood and Points. The other methods are described in detail in the MicroStation Help contents.

### ➤ Flood

Requires no polygon or complex shape to calculate area.

To measure the area enclosed by elements that touch or whose endpoints are within the Maximum Gap

1. (Optional) Select the elements.
2. Select the Measure Area tool.
3. In the Tool Settings window, set Method to Flood.
4. Enter a data point in the area enclosed by the bounding elements.
5. Accept the elements.

*The area and perimeter in master units are displayed in the dialog box. If Mass Properties is on, the mass properties analysis is displayed in the Mass Properties window.*

### ➤ Points

Determines area by points selected. These can be *DATA* points only or Tentative snap for accuracy.

To measure an area defined by data points

1. Select the Measure Area tool.
2. In the Tool Settings window, set Method to Points.
3. Enter a data point to define each vertex of an imaginary shape that encloses the area. The imaginary shape is dynamically displayed.
4. When done, Reset.

*The area and perimeter in master units are displayed in the dialog box. If Mass Properties is on, the mass properties analysis is displayed in the Mass Properties window.*