

Orthographic & Multi-view Projection



This week you will learn orthographic and multi-view projection and sketching 2-D geometry . The steps to follow are:

- Projections (ISO-E & ISO-A)
- Multi-view drawings
- Projection views (Auxiliary, Detailed etc.)
- Sketching 2-D Geometry

Construction lines

Center lines

View projection

Line precedence

Hidden lines

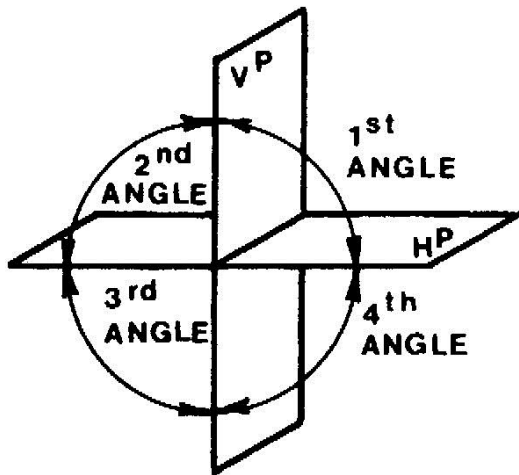
Adjusting linetype scale



Orthographic & Multi-view Projection

Orthographic Projection

Orthographic projection is a method of producing a number of separate two-dimensional inter-related views, which are mutually at right angles to each other. Using this projection, even the most complex shape can be fully described.



Orthographic projection is based on two principal planes — one horizontal (**HP**) and one vertical (**VP**) — intersecting each other



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Multi-view Projection

The goal in engineering graphics, whether it is freehand sketching or CAD, is to represent a physical object. Objects can be shown as *3-D projections* or *Multiview projections*.

Multi-view (multiplanar) projection is a method by which the exact shape of an object can be represented by two or more separate views produced on projection planes that are at right angles to each other.

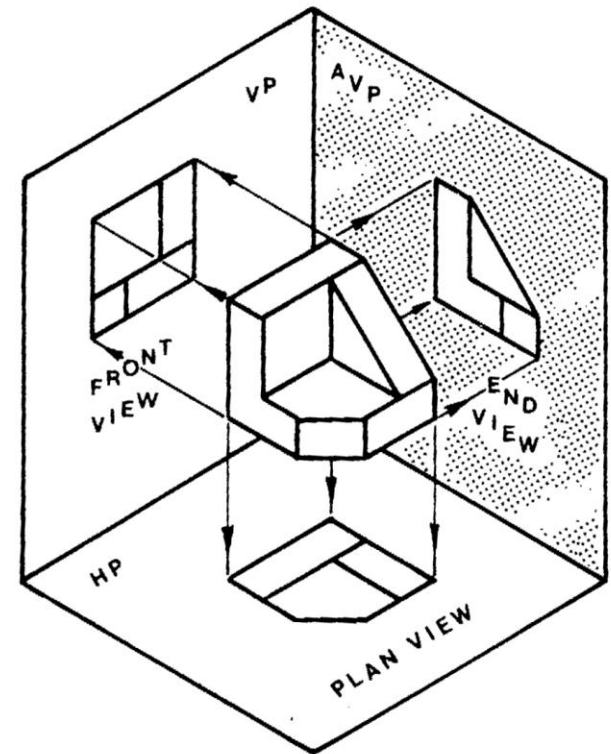
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First Angle Projection (ISO-E)



In first-angle projection, an object is positioned in the space of the first-angle quadrant between two planes.

A view of the object is projected by drawing parallel projecting lines, or projectors, from the object to the vertical principal plane (VP).

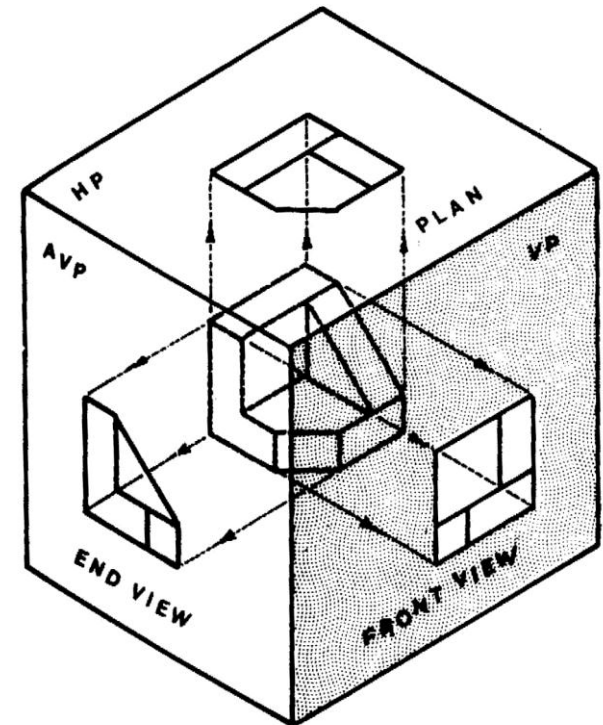


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Third Angle Projection (ISO-A)



In third-angle projection, an object is positioned in the space of the third-angle quadrant between two principal planes.





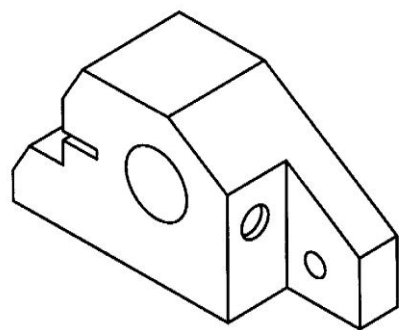
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Multi-view Drawing

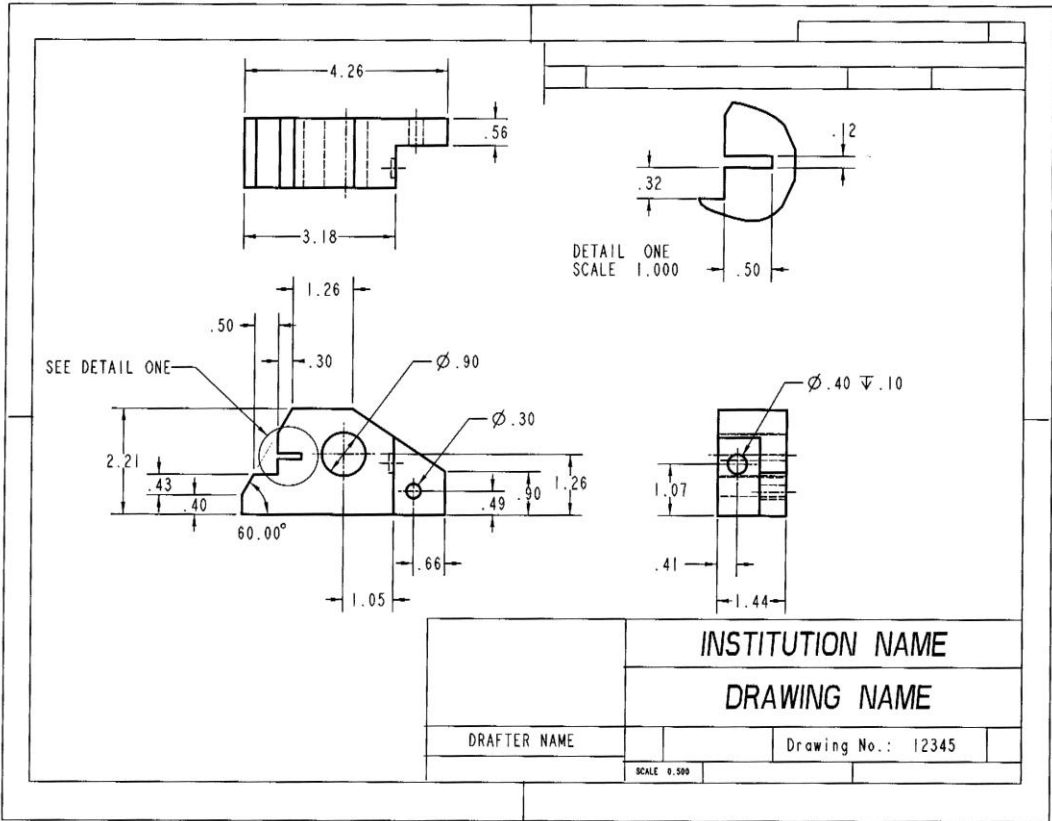
- Multiview drawing is classified as a parallel projection technique, because the lines of sight used to view the object are parallel
- The standard means of multiview projection in engineering graphics is what we have referred to earlier as the *orthographic projection*.
- Enough views are generated to capture all the important features of the object.
- Orienting and selecting the front view when creating a multiview drawing of a design, the selection and orientation of the front view is an important first step.

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Multi-view Drawing



3-D Model





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Projection Views

The projection view is an orthographic projection from a general view or from an existing view.

Projection views follow normal lines of projection according to conventional drafting standards. As an example, a projection view is used to create right-side view off an existing front view.

Projection views become child views of the view from which they are projected.

-  Auxiliary Views
-  Detailed Views
-  Revolved Views
-  Half Views

-  Partial Views
-  Broken Views
-  Single-Surface Views



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Auxiliary Views: **Auxiliary Views** are used to project a view when normal lines of projection will not work. They are used to show the true size of a surface that cannot be shown from one of the six primary views. Auxiliary views are projected from a selected edge or axis.

Partial Views: It is not necessary to document an entire view when only a small portion of a feature needs to be detailed. The partial view option allows a selected small portion of a view to be created. The area to be revealed is enclosed in a sketched spline. Partial views can be used with general, projection, and auxiliary views only.

Detailed Views: Often, features are too small to describe fully with a standard projection view. In such a case, it is common practice to enlarge portions of a drawing to allow for more accurate detailing.

Broken Views: As with partial and half views, in many views, it is not necessary to show the entire ends of an object. Broken views are used often with long, consistent cross sections. With a broken view, multiple horizontal or vertical breaks can be used if necessary.

Revolved Views: **Revolved Views** are used to show the cross section of a part or feature. A cross section is required and can be retrieved or constructed from within the Revolve option. A revolved view can be either a full view or a partial view. In addition to view types such as general, projection, and auxiliary, drawing mode provides the option of controlling the visibility of selected portions of a view. The following view visibility options are available.

Single-Surface Views: **Single-Surface Views** is a projection of an individual part surface. They may be used with any view type except detailed and revolved. When creating a single-surface view, only the selected surface is revealed.

Half Views: Often, it is not necessary to show an entire model in a view. A good example is a symmetrical object. Half view removes the portion of a model on one side of a selected datum plane or planar surface. Half views can be used with general, projection, and auxiliary views only.



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Sketching 2-D Geometry

Construction lines



Construction lines have been used throughout the history of drafting. As the name implies, these lines are used as aids for the purpose of constructing parts of a drawing. Construction lines are generally removed when the drawing is finished.

- ◆ Making geometric constructions, such as bisecting angles or finding the center of a triangle.
- ◆ Projecting features from one view to the next in an orthographic projection for multiview drawing in mechanical drafting.
- ◆ Projecting between elevations in an architectural drawing.
- ◆ Establishing the projection of a bearing wall or partition in an architectural or structural layout.
- ◆ Creating temporary intersections for the use of object snaps.

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Drawing Construction Lines between Two Points



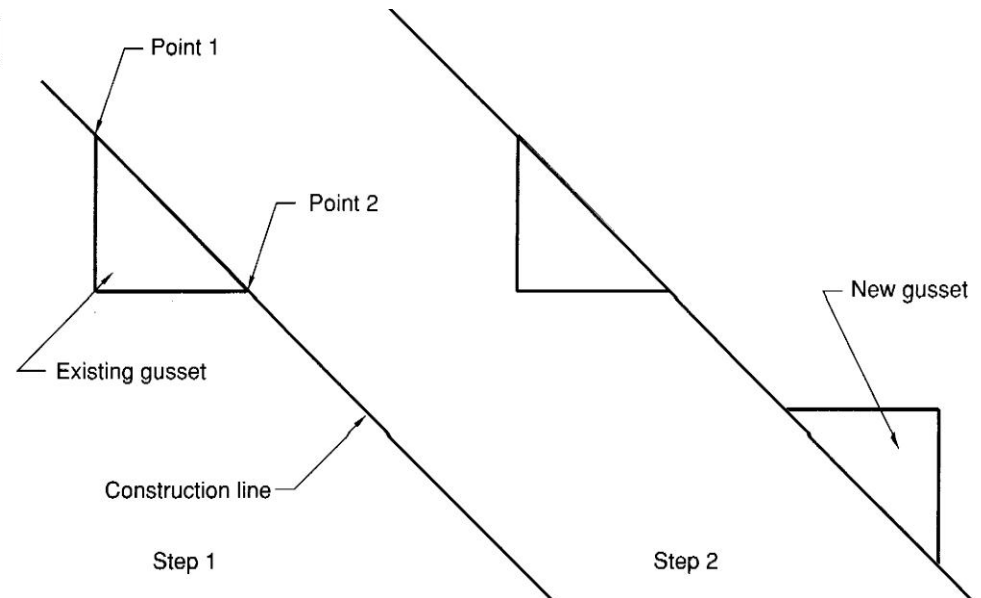
Command: XLINE 

Specify a point or [HorNer/Ang/Bisect/offset]: *<pick point 1>*

Specify through point: *<pick point 2>*

Specify through point: 

Command:



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Drawing Horizontal and Vertical Construction Lines



Command: **XLINE** 

Specify a point or [HorNer/Ang/Bisectloffset]: **V** 

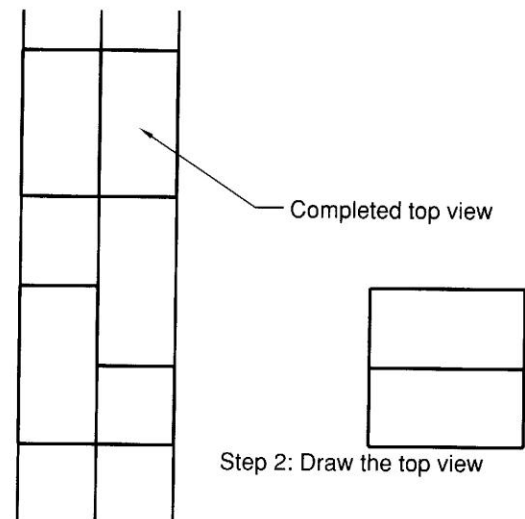
Specify through point: *<pick point 1>*

Specify through point: *<pick point 2>*

Specify through point: *<pick point 3>*

Specify through point: 

Command:

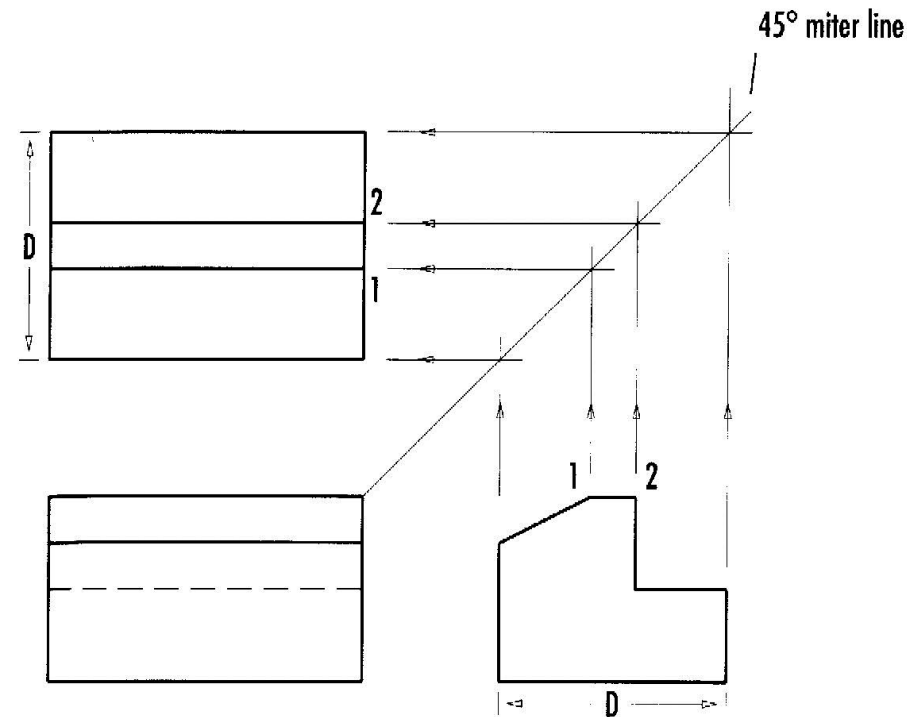


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View Projection



You can project information from the top view to the side view and vice versa by using a 45 degree **miter line**. You can draw the miter line anywhere above the side view and to the right of the top view, but it is often drawn from the top right corner of the front view





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Hidden Lines



You should follow at least three general practices when drawing hidden lines to help prevent confusion and to make the drawing easier to read.

clearly show intersections using intersecting line segments

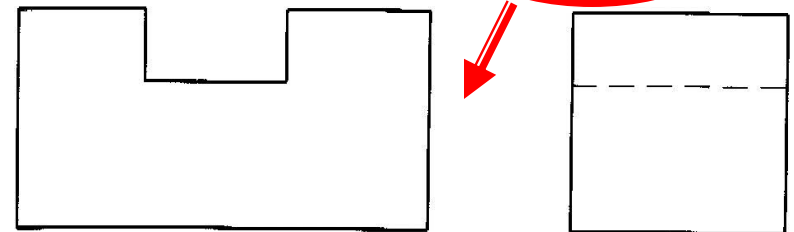
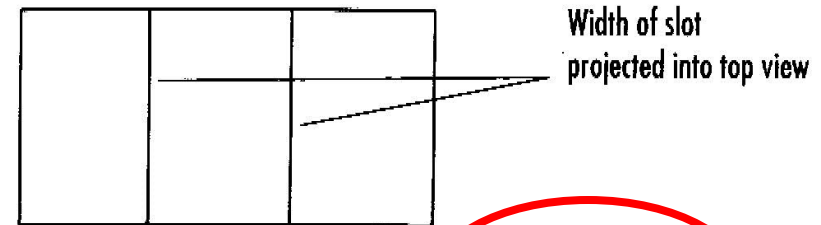
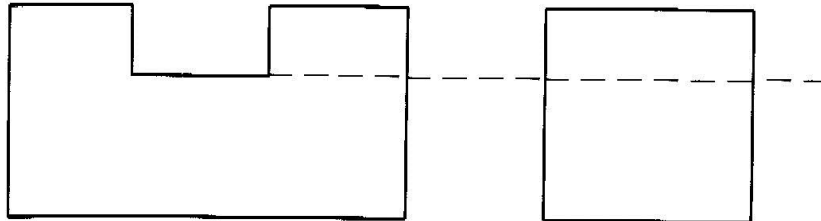
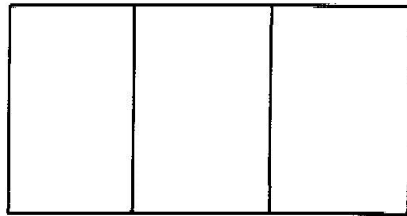
clearly show corners, using intersecting line segments

leave a noticeable gap between aligned continuous lines and hidden lines

Hidden lines are usually drawn in a **different color** than the one used for the continuous object lines. This practice helps distinguish the different types of lines and makes them easier to interpret.

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Hidden Lines





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Centerlines

You will draw the centerlines for the circle. Center lines for holes must be included in all views. A centermark and four lines extending beyond the four quadrant points are used to define the center point of a hole in its circular view.

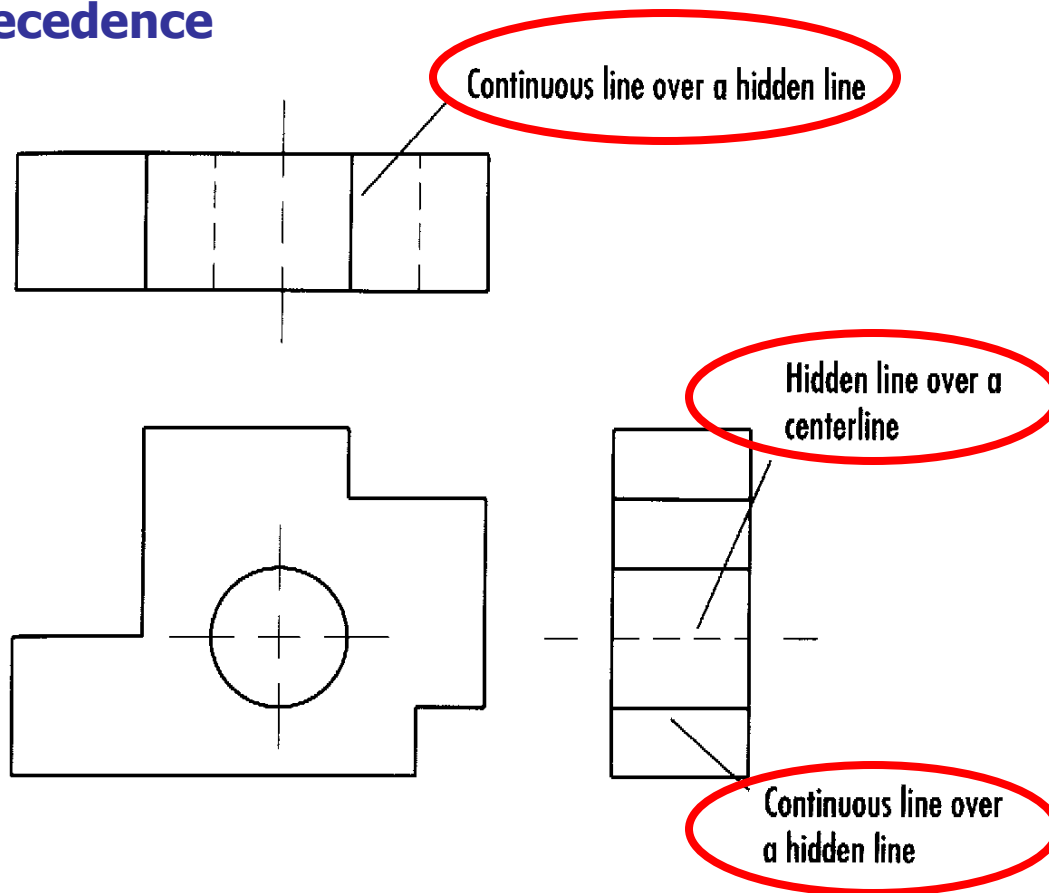


Line Precedence

Different types of lines often align with each other within the same view. The rule is that continuous lines take precedence over hidden lines, and hidden lines take precedence over centerlines. If you show the short end segments were a centerline would extend, be sure to leave a gap.

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Line Precedence

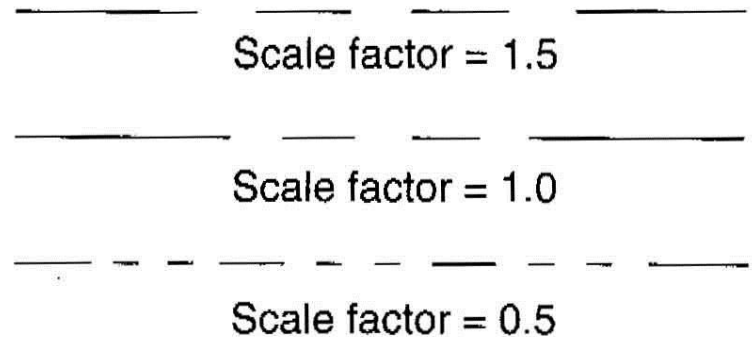


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Adjusting Linetype Scale



The linetype scale determines the relative length of dashes in linetypes such as hidden and center lines. Setting a linetype scale ensures that the lines you draw are represented properly on the screen and when the drawing is plotted.



Command : **LTSCALE**

Enter new linetype scale factor <1.000> : **0.5**

Regenerating model.

Command :