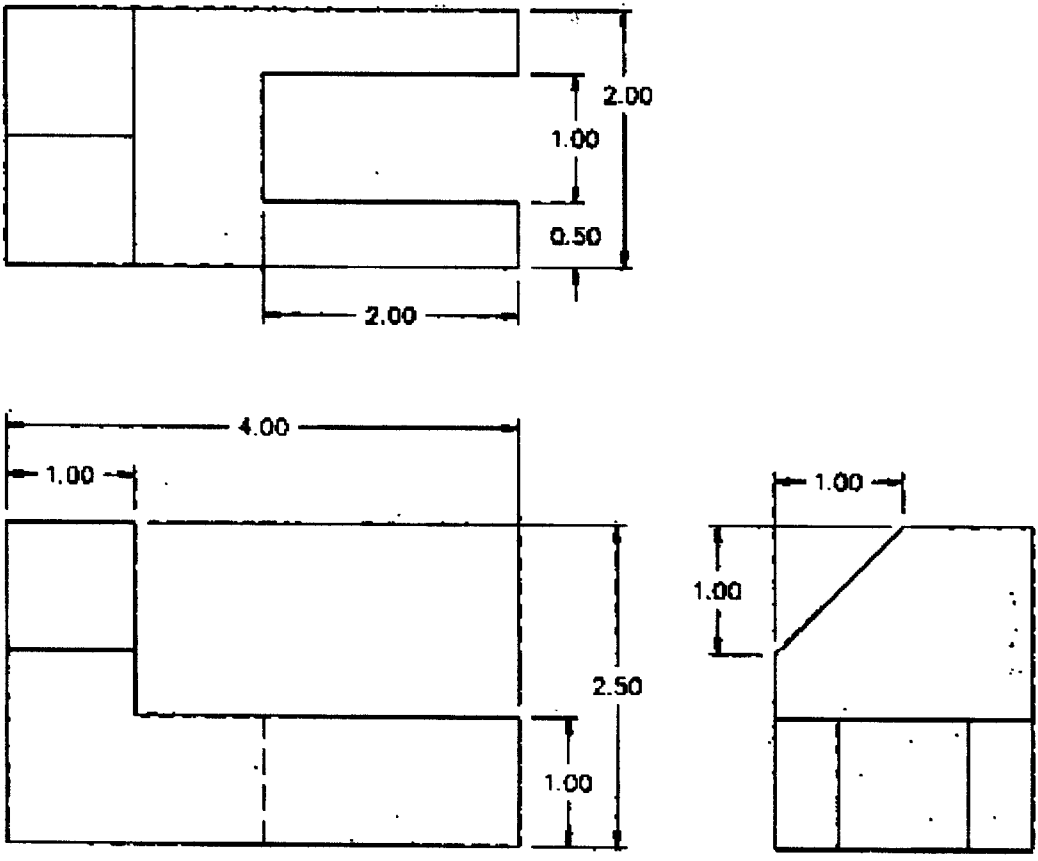
Guide.Dwg



Purpose:

This tutorial is designed to produce a 3D solid model of the Guide from the information supplied in the orthographic drawing.

System settings

Use the Units command to change the number of decimal places past 0 from 4 to 2. Keep the current limits settings to 0,0 for the lower left corner and to 12,9 for the upper right corner. Set the snap to a value of 0.5 units.

Layers

Special layers do not have to be created for this tutorial.

Suggested commands:

Begin this tutorial by constructing solid primitives of all components of the Guide using the Box and Wedge commands. Move the components into position and begin merging solids using the Solunion. To form the rectangular hole, move that solid box into position and use Solsub command to subtract the rectangle from solid, thus forming the hole. Do the same procedure for the wedge. Use the Solmesh command to surface the solid. Perform a hidden line removal and view the solid.

Dimensioning

Dimensions do not have to be added to this problem.

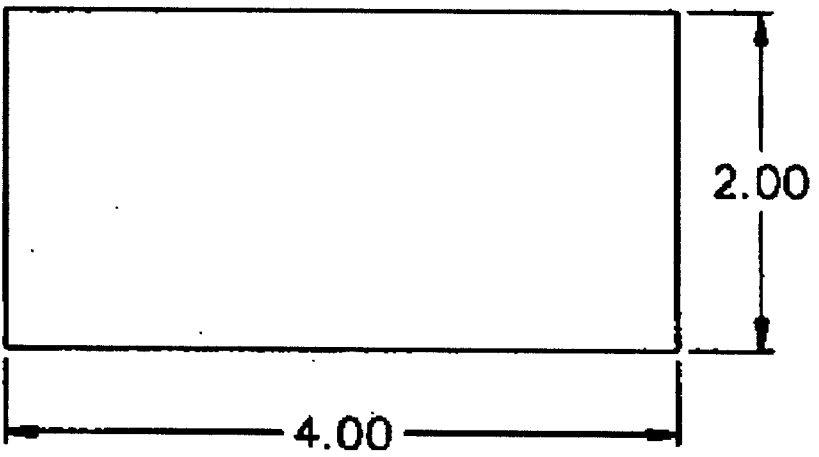
Plotting

This tutorial exercise may be plotted on "B" size paper (11"x17"). Plot the objet to a scale value of 1=1 to produce a scale plot.

Step # 1

Begin this tutorial by constructing a solid box 4 units long by 2 units wide and 1 unit in height using the Box command. Begin this box at absolute coordinate 4,5.5. This slab will represent the base of the guide.

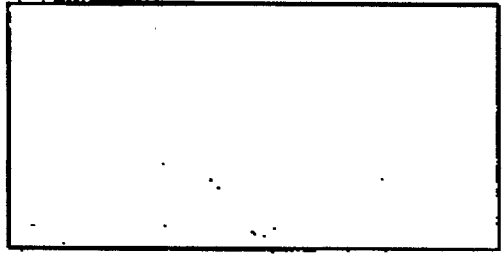
Command: **Box**
Baseplane/Center/<Corner of the box> **4,5.5**
Cube/Length/<Other corner>: **L**
Length: **4**
Width: **2**
Height: **1**

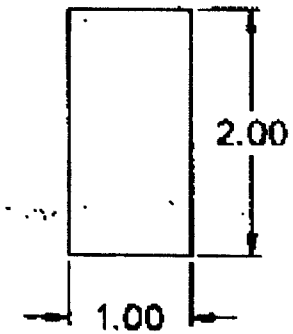


Step #2

Construct a solid box 1 unit long by 2 units wide and 1.5 units in height using the Box command. Begin this box at absolute coordinate 2,1.5. This slab will represent the vertical column of the guide.

Command: **Box**
Baseplane/Center/<Corner of the box> **2,1.5**
Cube/Length/<Other corner>: **L**
Length: **1**
Width: **2**
Height: **1.5**

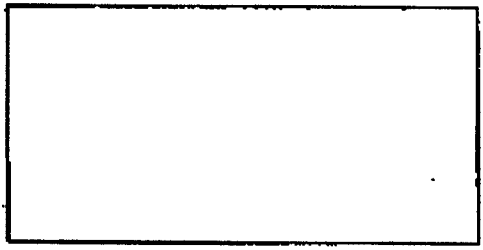


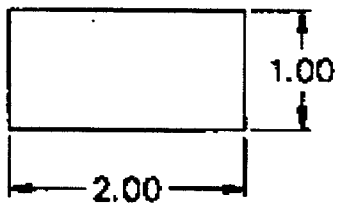


Step #3

Construct a solid box 2 units long by 1 unit wide and 1 unit in height using the Box command. Begin this box at absolute coordinate 5.5,1.5. This slab will represent the rectangular hole made into the slab that will be subtracted at a later time.

Command: **Box**
Baseplane/Center/<Corner of the box> **5.5,1.5**
Cube/Length/<Other corner>: **L**
Length: **2**
Width: **1**
Height: **1**

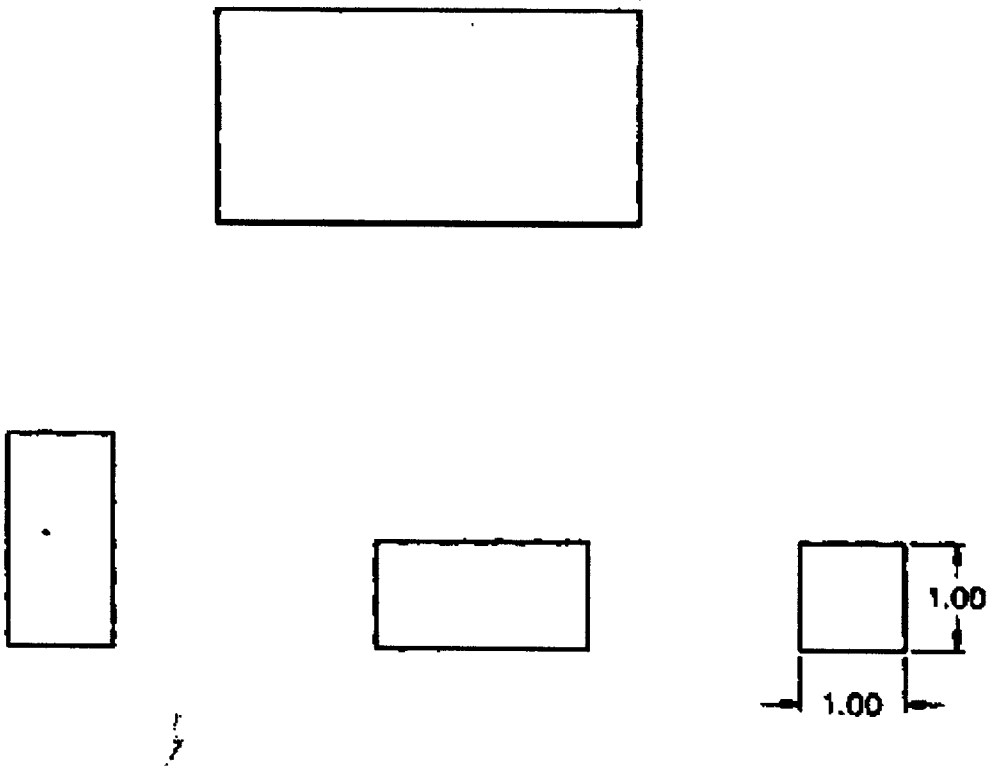




Step #4

Use the Wedge command to draw a wedge 1 unit in length, 1 unit wide and 1 unit in height. Begin this primitive at absolute coordinate 9.5,2. This wedge will be subtracted from the vertical column to form the inclined surface.

Command: **Wedge**
Baseplane/<Center of wedge> **9.5,2**
Length/<Other corner>: **L**
Length: **1**
Width: **1**
Height: **1**

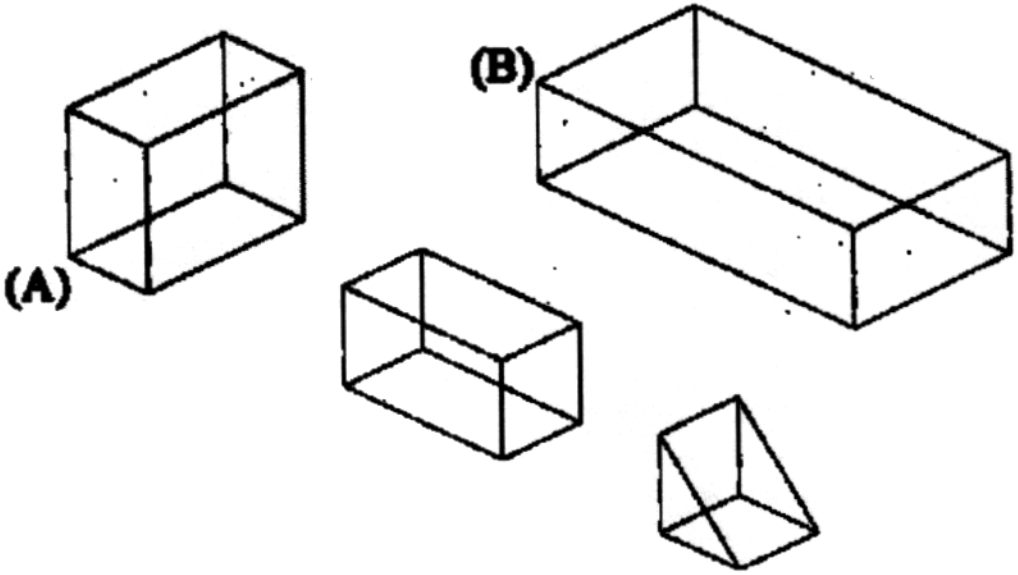


Step #5

Use the Vpoint command to view the 4 solid primitives in 3D. Use a new viewpoint of 1,-1,0.75. Then use the Move command to move the vertical column at "A" to the top of the base at "B".

Command: **Vpoint**
Rotate/<View point><0,0,1>: **1,-1,0.75**

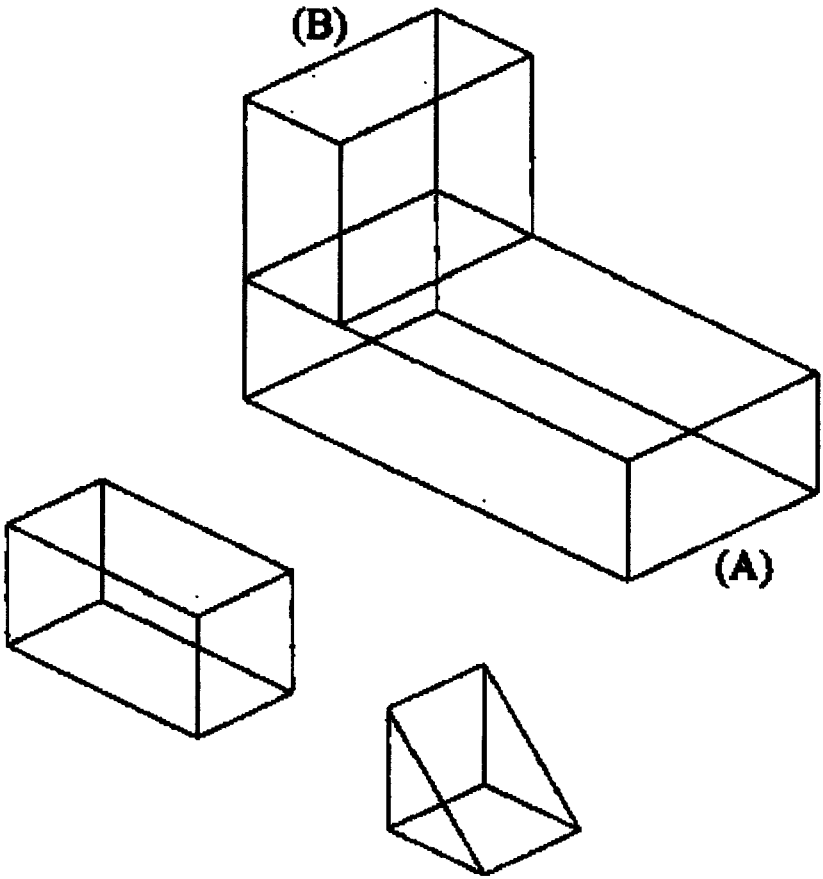
Command: **Move**
Select objects: *(select the solid box at "A")*
Select objects: *(Strike enter to continue)*
Base point or displacement: **Endp**
of (*Select the endpoint of the solid at "A"*)
Second point or displacement: **Endp**
of (*Select the endpoint of the solid at "B"*)



Step #6

Use the Union command to join the base and the vertical column into one entity

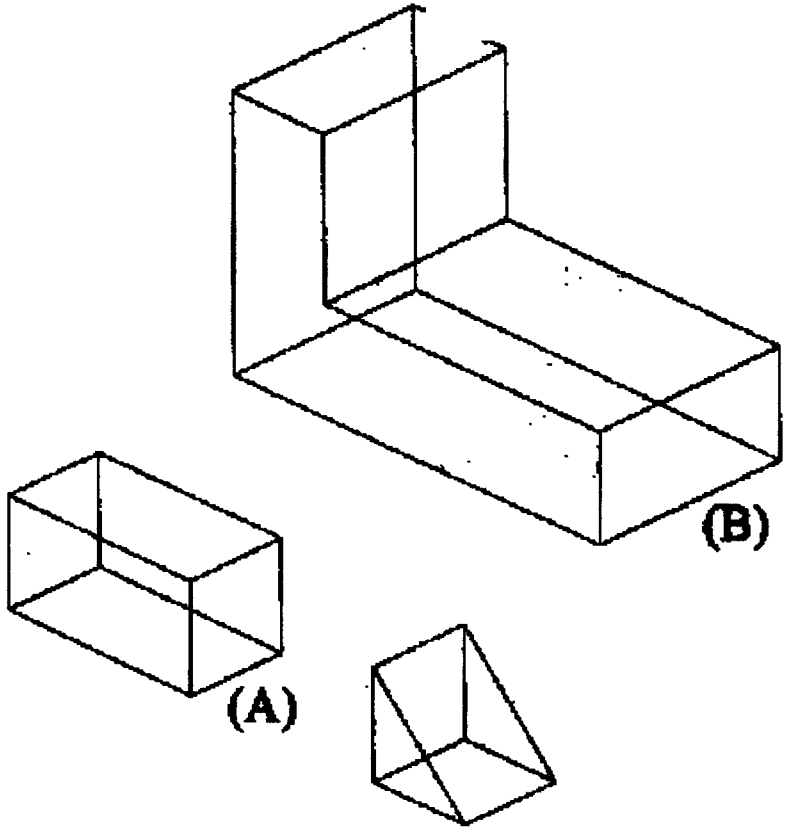
Command: **Union**
Select objects *(select the base at "A and the column at "B")*
Select objects *(Strike enter to perform the union)*



Step #7

Use the Move command to position the rectangle from its midpoint at "A" to the midpoint of the base at "B". In a moment, the small rectangle will be subtracted forming the rectangular hole in the base.

Command: **Move**
Select objects: *(select the rectangle at "A")*
Select objects: *(Strike enter to continue)*
Base point or displacement: **Mid**
of (*Select the midpoint of the rectangle at "A"*)
Second point or displacement: **Mid**
of (*Select the midpoint of the base at "B"*)

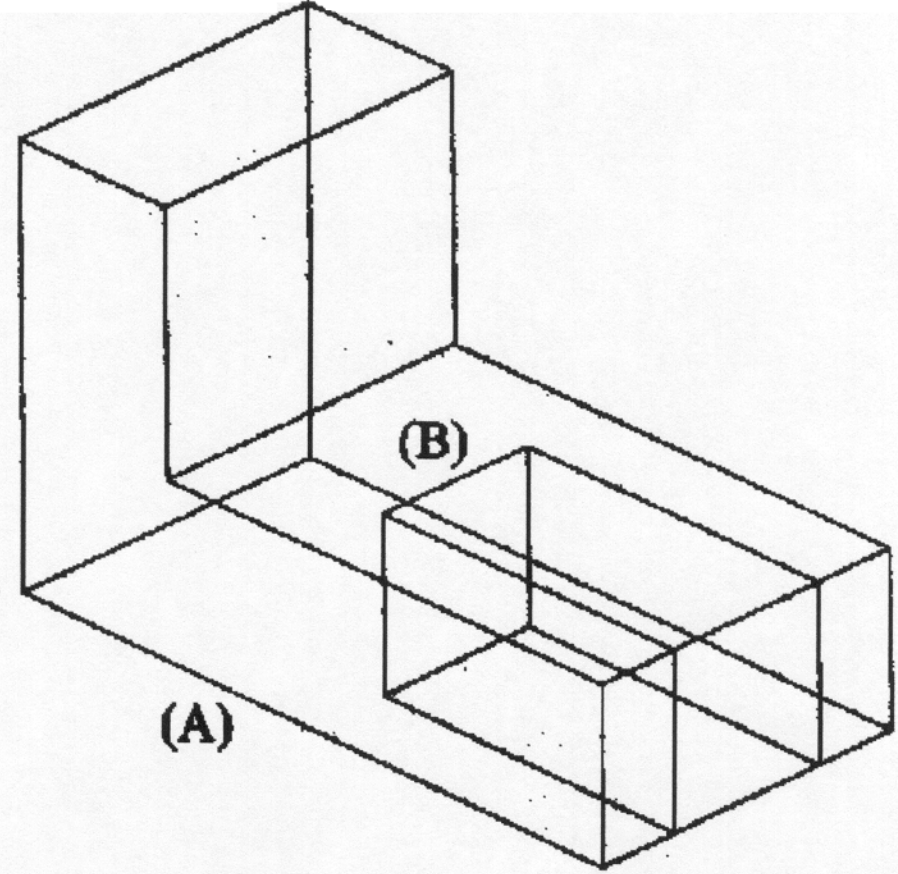


Step #8

Use the Subtract command to subtract the small rectangle from the base of the solid.

Command: **Subtract**
Source objects...
Select objects: *(select the solid at "A")*
Select objects: *(Strike enter to continue)*
Objects to subtract from them...
Select objects: *(select the small rectangle at "B")*
Select objects: *(Strike enter to begin the subtraction process)*

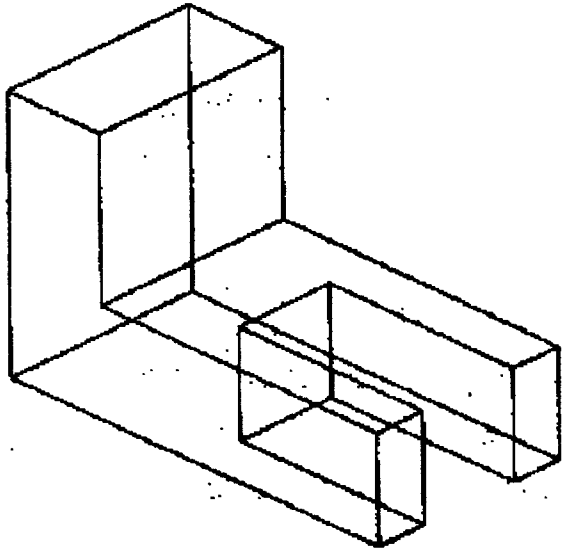
Phase I – Boundary evaluation begins.
Phase II – Tesselation computation begins.
Updating AME database.

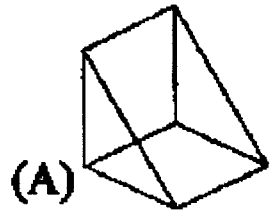


Step #9

Use the Rotate command to revolve the wedge at an angle of 90 degrees. This will begin preparing the wedge to be inserted onto the vertical column before subtracting.

Command: **Rotate**
Select objects: *(select the wedge)*
Select objects: *(Strike Enter to continue)*
Base point: **Endp**
Of: (*Select the endpoint of the wedge at "A"*)
<Rotation angle>/Reference: **90**



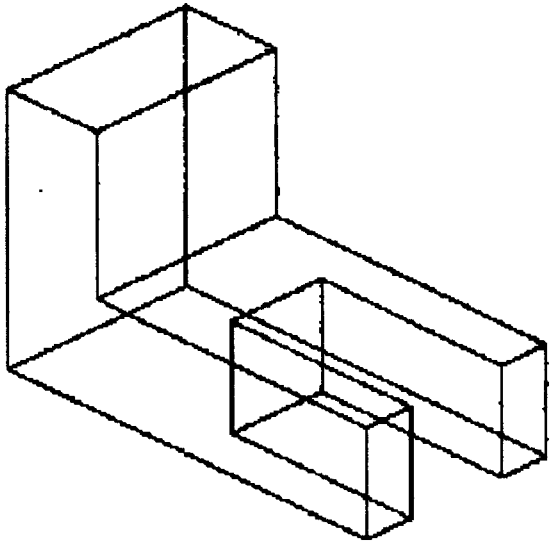


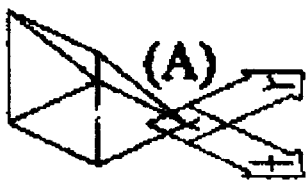
Step # 10

Move the coordinate system icon to a new origin located on the wedge

Command: **UCS**
Origin/Zaxis/3point/Entity/View/X/Y/Z/Prev/restore/Save/Del/?/<World> **Or**
Origin point<0,0,0> **Endp**
Of *(select the endpoint of the wedge at "A")*

Command: **Ucsicon**
ON/OFF/All/Noorigin/ORigin/<ON> **Or**



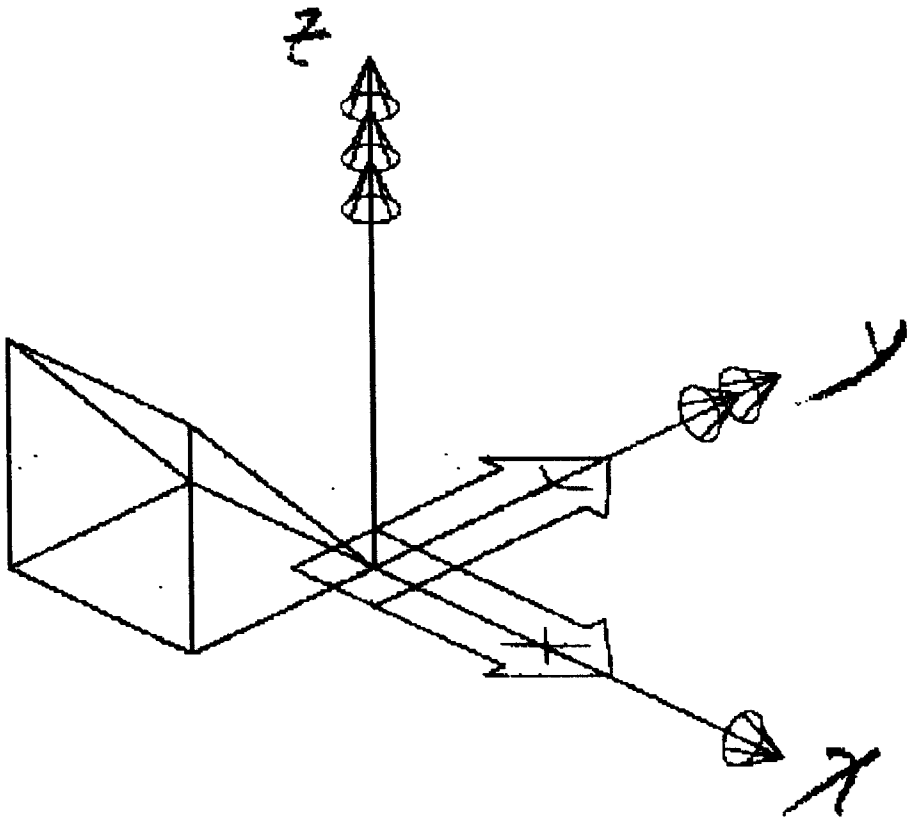


Step # 11

The wedge needs to be rotated 90 degrees about the X axis before being placed into position and subtracted from the main solid. Use 3drotate command to accomplish this. once in the command, a new icon appears: it is Motion Coordinate System (MCS). This icon shows the orientation of the X, Y and Z axes. For the motion description, type "RX-90" which will rotate the wedge 90 degrees in clockwise direction about X axis.

Command: ~~3Drotate~~ rotate3D
Select objects: *(select the wedge... a new icon appears)*
Select objects: *(Strike Enter to continue)*
?/<Motion description>: ~~RX-90~~ X
?/<Motion description>: *(Strike Enter to exit this command)*

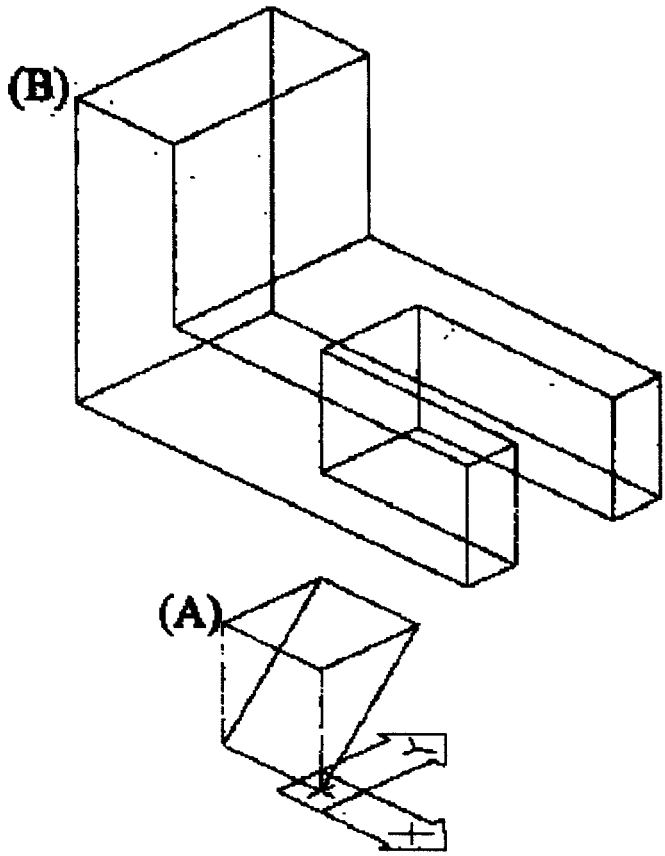
90



Step #12

Use the Move command to move the wedge from its endpoint at "A" to the endpoint of the vertical column at "B".

Command: **Move**
Select objects: *(select the wedge)*
Select objects: *(Strike enter to continue)*
Base point or displacement: **Endp**
of (*Select the endpoint of the wedge at "A"*)
Second point or displacement: **Endp**
of (*Select the endpoint of the vertical column at "B"*)

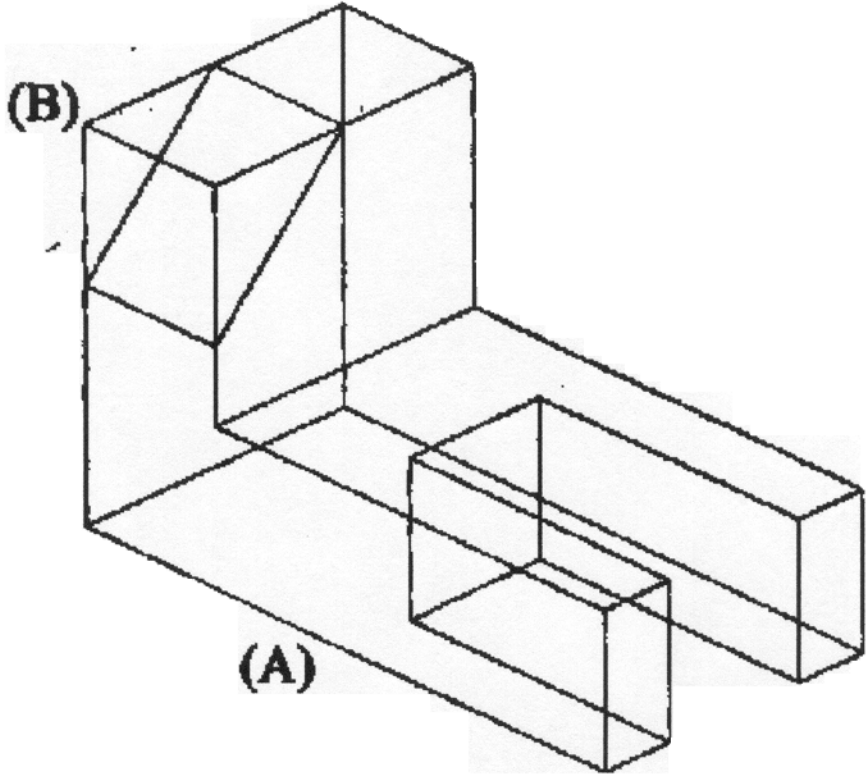


Step #13

Use the Subtract command to subtract the wedge from the main solid.

Command: **Subtract**
Source objects...
Select objects: *(select the solid at "A")*
Select objects: *(Strike enter to continue)*
Objects to subtract from them...
Select objects: *(select the wedge at "B")*
Select objects: *(Strike enter to begin the subtraction process)*

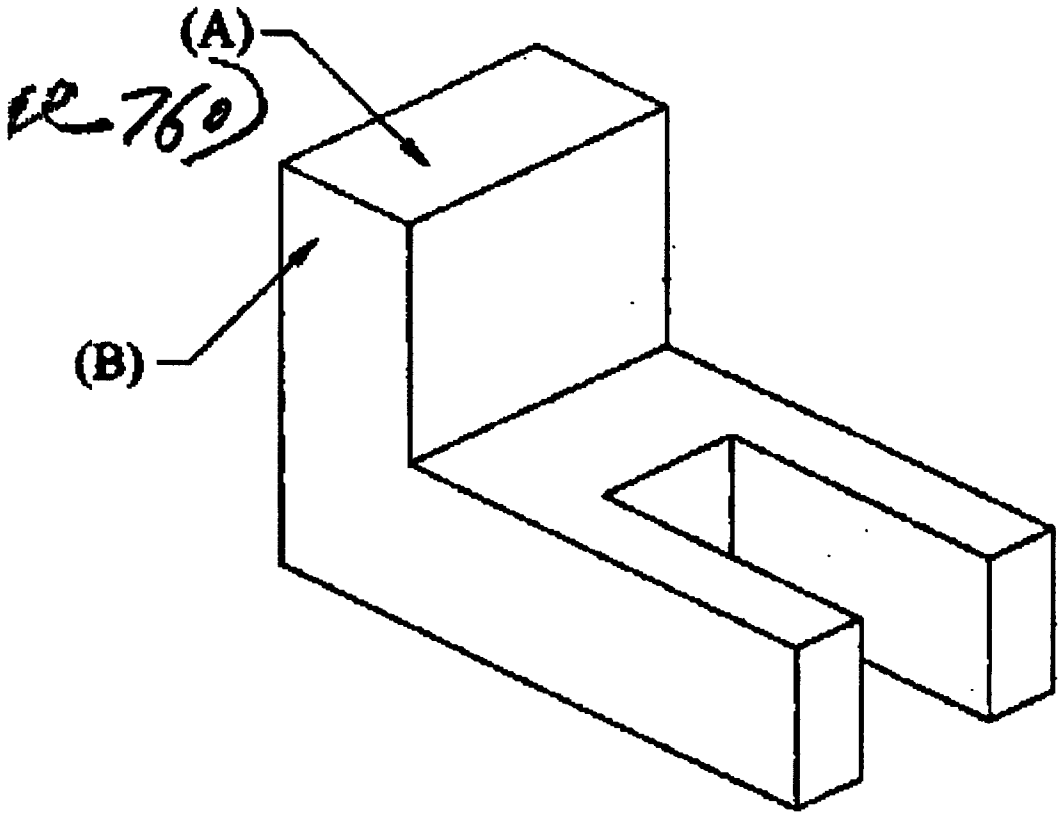
Phase I – Boundary evaluation begins.
Phase II – Tesselation computation begins.
Updating AME database.



Step #14

An alternate method of creating the inclined surface is to use the Chamfer command to chamfer the vertical column.

Command: **Chamfer**
Select base surface: *(Select an edge along surface "A")*
<OK>/Next: *(If surface "A highlights, strike enter to continue; if another surface highlights, type "N" for next surface and step through until the surface "A" is highlighted)*
Pick edges of this surface to be chamfered (press enter when done): (*Select the line at "B"and strike enter)*
Enter the distance along base surface:<0.00>: **0.2**
Enter the distance along adjacent surface:<0.2>: (*strike Enter)*



Step #15

Using the Hide command perform a hidden line removal on all surfaces of the object. Th results are illustrated at right.

Command: **Hide**

Step #16

To view the surfaces of the model the system variable Splframe may expose all the surface created by the Solmesh command. By default, this variable is Off. If set On, all the surfaces needed to surface the model are displayed. Before showing surfaces, a screen generation must be made to upgrade the drawing database. The same is true when turning the variable off.

Command: **Splframe**

Current value <0>: New value: **1**

Command: **Regen**

Step #17

Use the Shade command to view the model as a shaded image. Remember, the screen will momentarily go blank as the system calculates the hidden line removal formula along with the shading in the current color of the model. Use the Mslide command to document the image for later use.

Command; **Shade**
Regenerating screen.
Shading xx% done.