Lesson 13 Patterns and Weldments

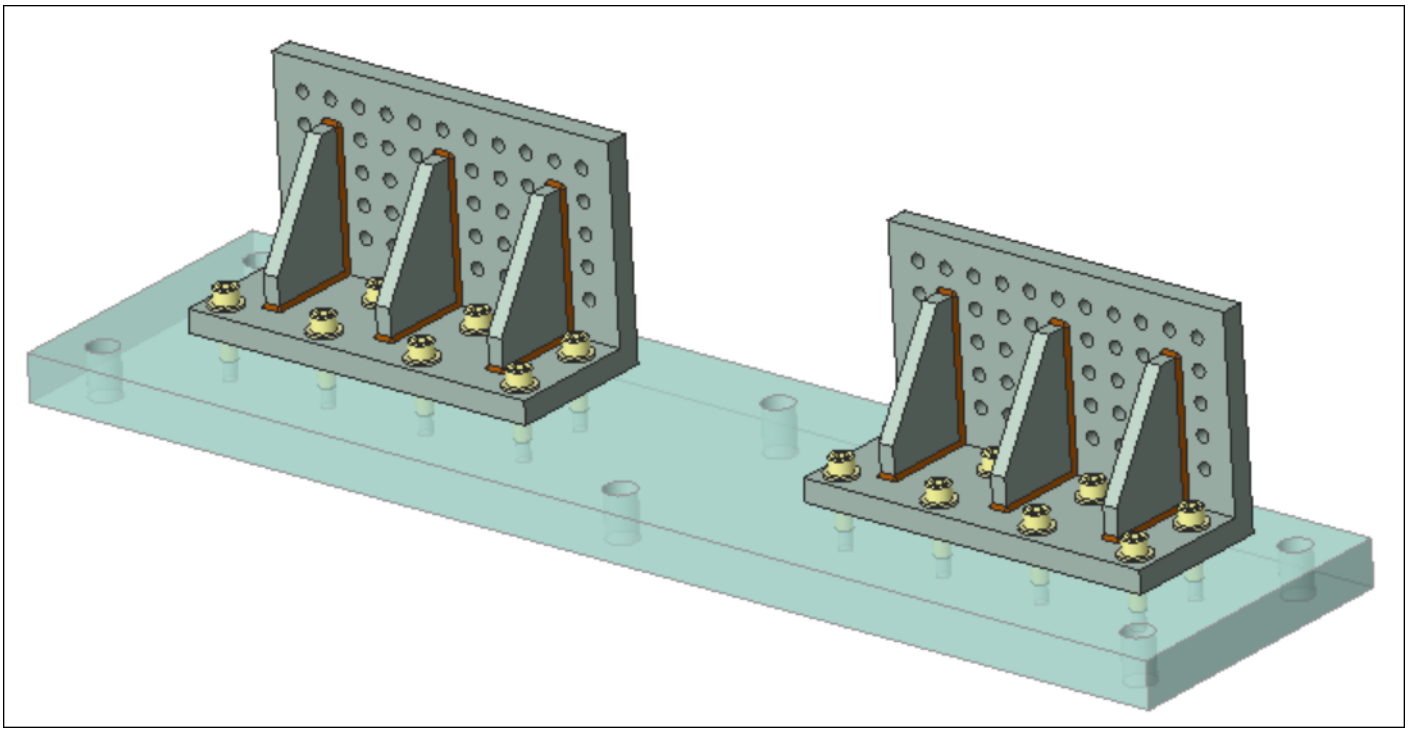


Figure 13.1 Mounting System Weldment

OBJECTIVES

- Create **directional patterns** and **dimensional patterns**
- **Pattern components** on an assembly
- Insert multiple standard parts using a **reference pattern**
- Use **fill** to pattern a feature
- Insert **welds** on a model
- Utilize the **Screw** and **Dowel Tools**

REFERENCES AND RESOURCES

For **Resources** go to **www.cad-resources.com** > click on the PTC Creo Parametric 3.0 Book cover

- Lesson Lecture
- Book Projects PDF
- Project Lectures
- Quick Reference Card
- Configuration Options

Patterns and Weldments

Creating a pattern is a quick way to reproduce a feature, or a component in an assembly (Fig. 13.1). A pattern is parametrically controlled. Therefore, you can modify a pattern by changing pattern parameters, such as the number of instances, spacing between instances, and original feature dimensions. Modifying patterns is more efficient than modifying individual features. In a pattern, when you change dimensions of the original feature, Creo Parametric 3.0 automatically updates the whole pattern. This lesson will introduce you to variations of the **Pattern Tool**, and introduce the **Welding** application.

Mounting Bracket

For Lessons 13-18, step-by-step commands are sometimes limited to new software commands introduced or enhanced in that lesson. You are expected to do many of the modeling using commands and practices mastered from Lessons 1-12 without repeated detailed explanations. The Mounting Bracket will be the first component (Fig. 13.2).

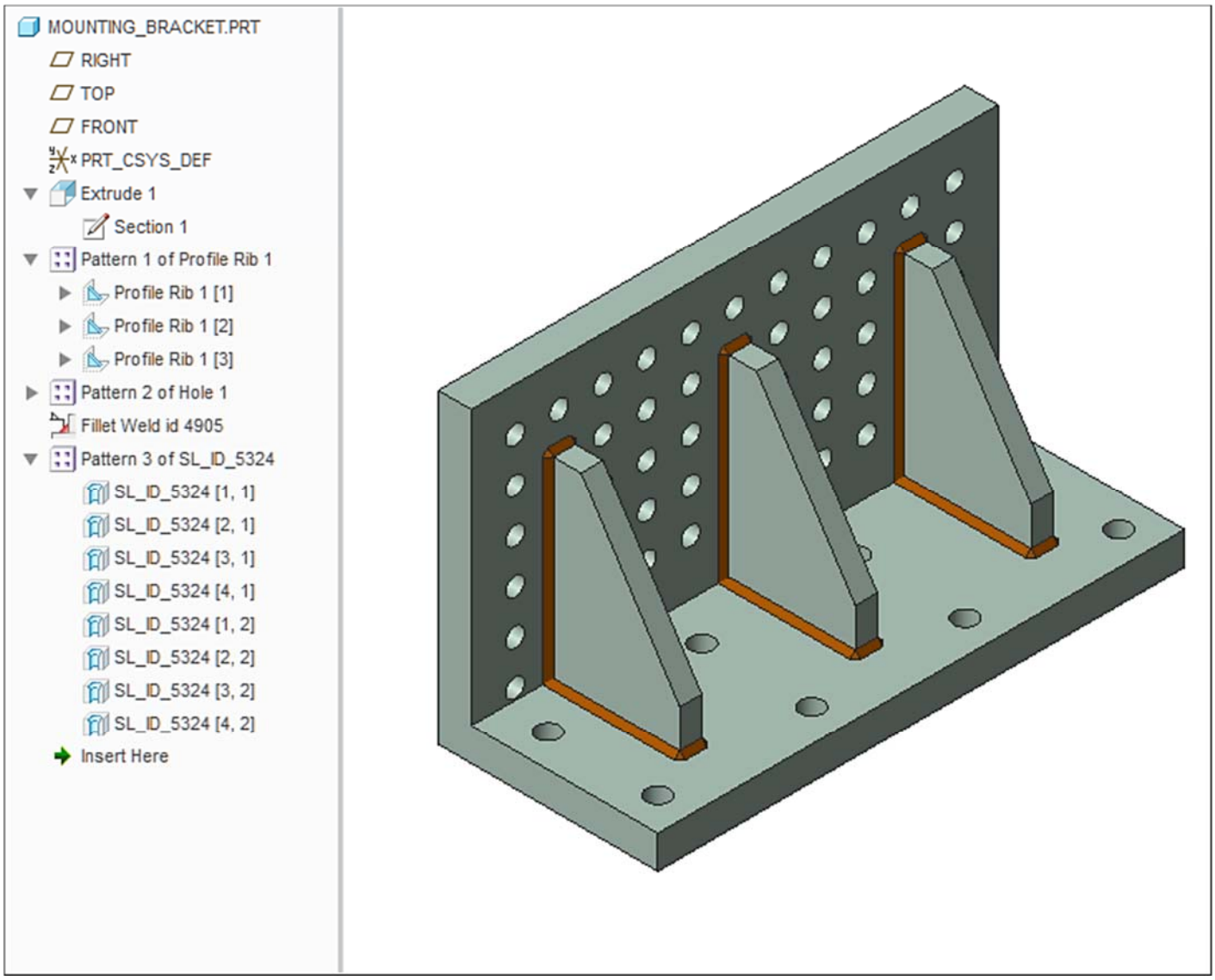


Figure 13.2 Mounting Bracket

Lesson 13 Steps

Start a new part. Press: **Ctrl+N** > **mounting_bracket** > **OK** > **File** > **Prepare** > **Model Properties** > Units **change** > Inch lbm Second (Creo Parametric Default) > **Close** > **Close** > Extrude > in the Graphics Window, press **RMB** > **Define Internal Sketch** > select datum **FRONT** > **Sketch** > > sketch and dimension the L-shaped section [Fig. 13.3(a)] > > modify the depth to **12** > **Ctrl+D** [Fig. 13.3(b)] > > > **OK** > change the color and make isometric the default model view

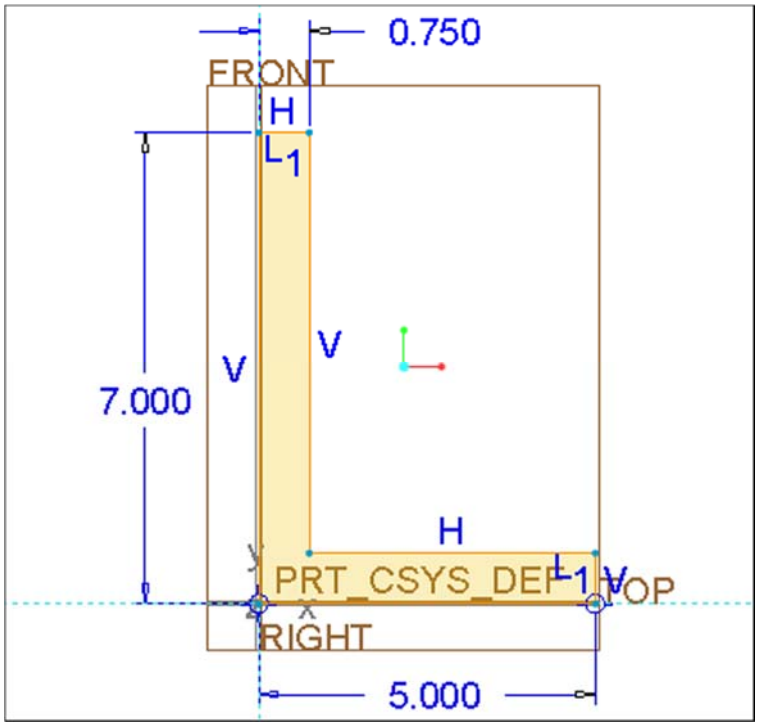


Figure 13.3(a) Sketch the L-shaped Section

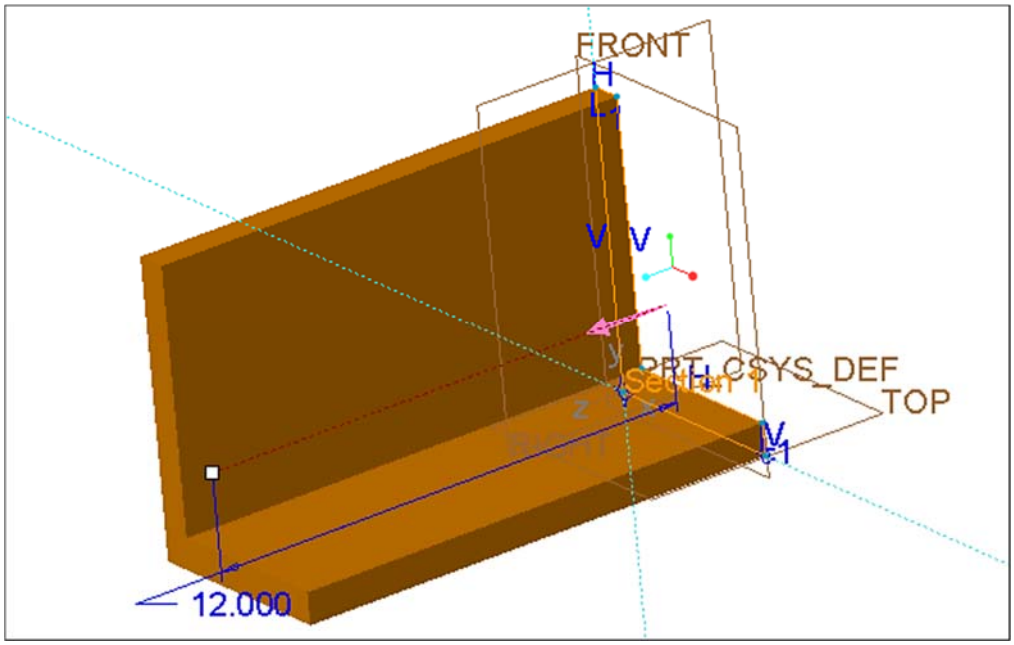
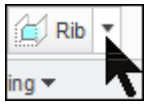
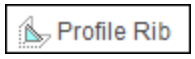


Figure 13.3(b) Mounting Bracket will be **12.00** inches in Depth

Click: 

> 

> 

>  > select datum **FRONT** > double-click in the **Offset Translation** field > **2.00** [Fig. 13.3(c)] > **Enter** > **OK** >  **Resumes the previously paused tool** >  > add the references and sketch and dimension the open section [Fig. 13.3(d)] > **Ctrl+D** >  > modify the rib thickness to **0.5** [Fig. 13.3(d)] > **Enter** [Fig. 13.3(e)] > **Enter** > **Ctrl+S**

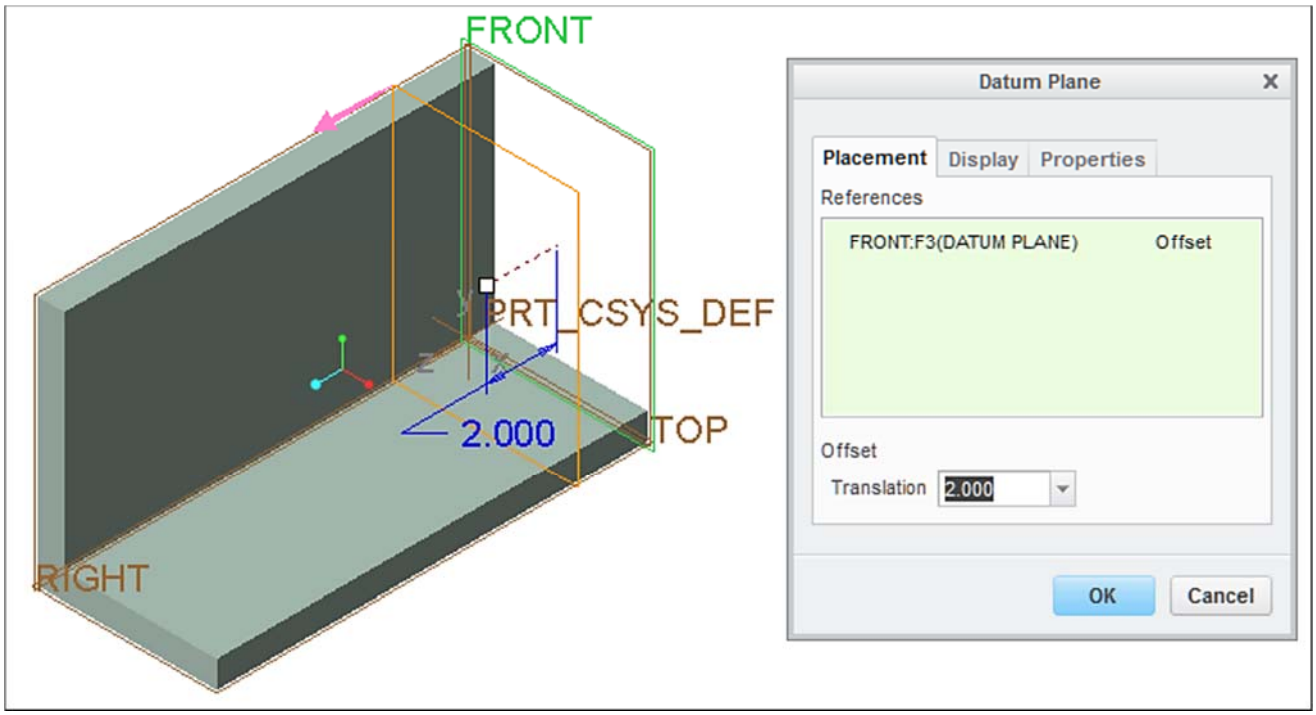


Figure 13.3(c) Offset Datum Plane (Note that you can also double-click on the value in the Graphics Window)

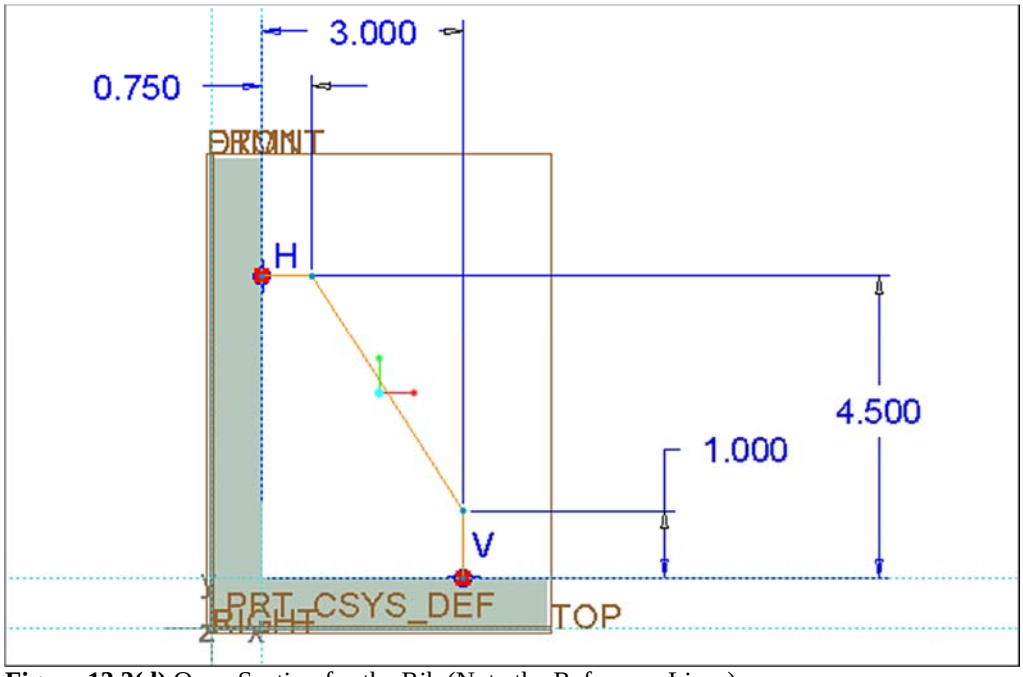


Figure 13.3(d) Open Section for the Rib (Note the Reference Lines)

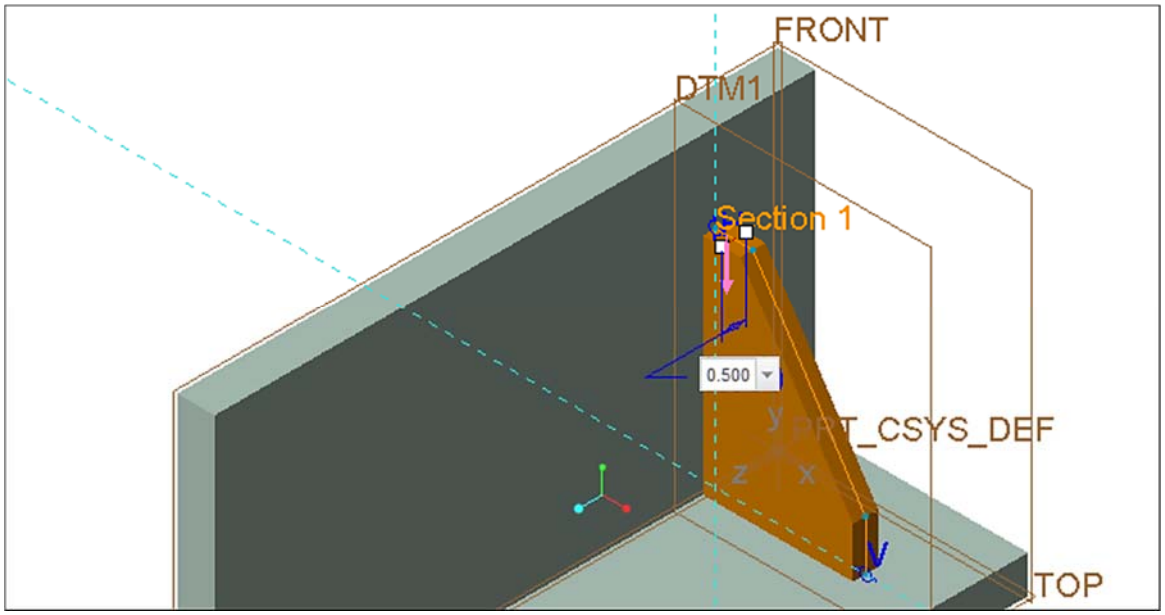


Figure 13.3(e) Rib Preview

With the rib still selected, press: **RMB** > **Pattern** > ▼ > **Dimension** > **Dimensions** tab > in the Graphics Window, select **2.00** > *type* **4.00** > **Enter** > *left of* 1 item(s), *type* **3** > **Enter** [Fig. 13.3(f)] > ✔ > **Ctrl+S**

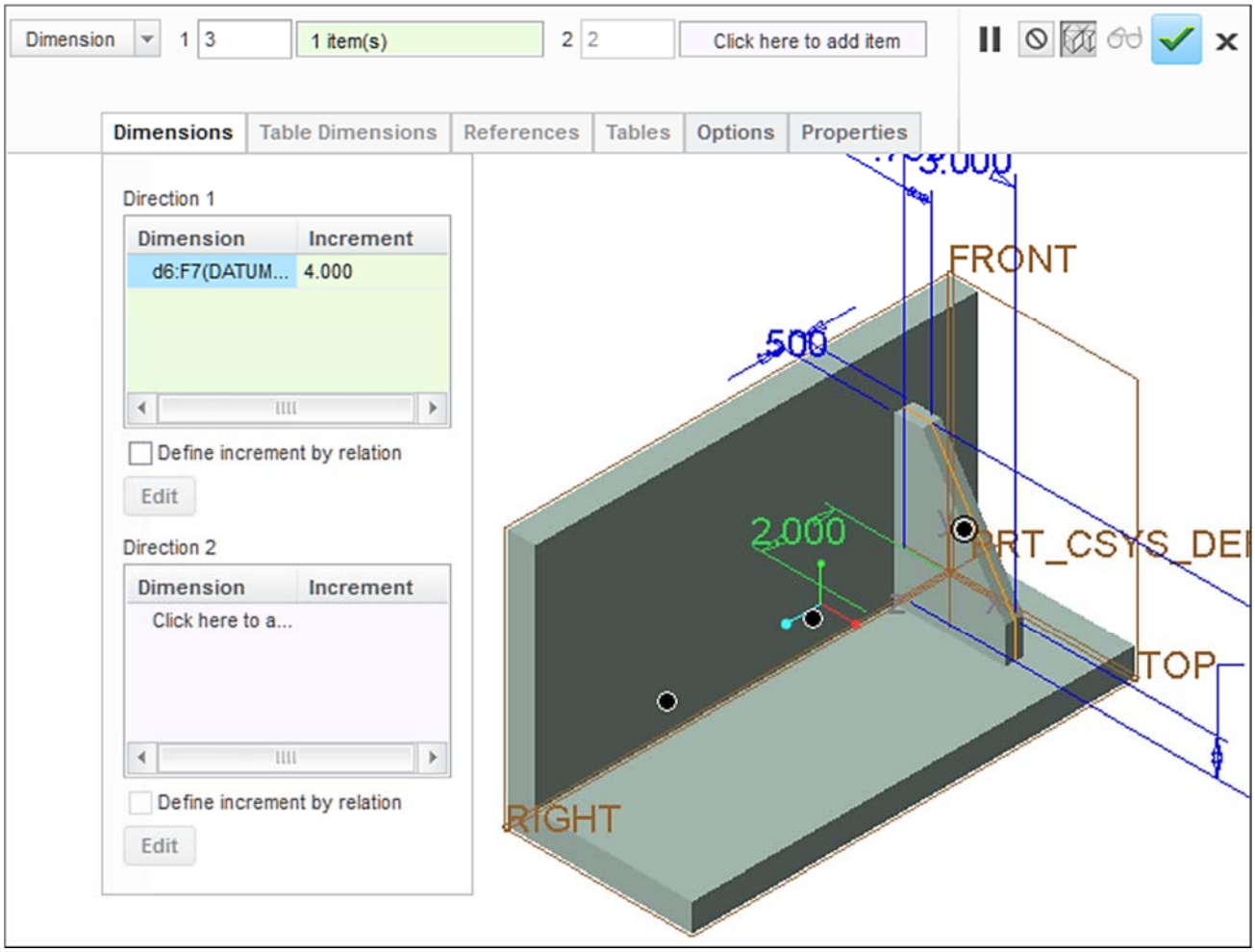


Figure 13.3(f) Dimensional Pattern

Click: Hole > add the **.500-13** hole per the Placement [Fis. 13.3(g)] and Shape requirements [Fig. 13.3(h)] > > **Ctrl+D** > **Ctrl+S**

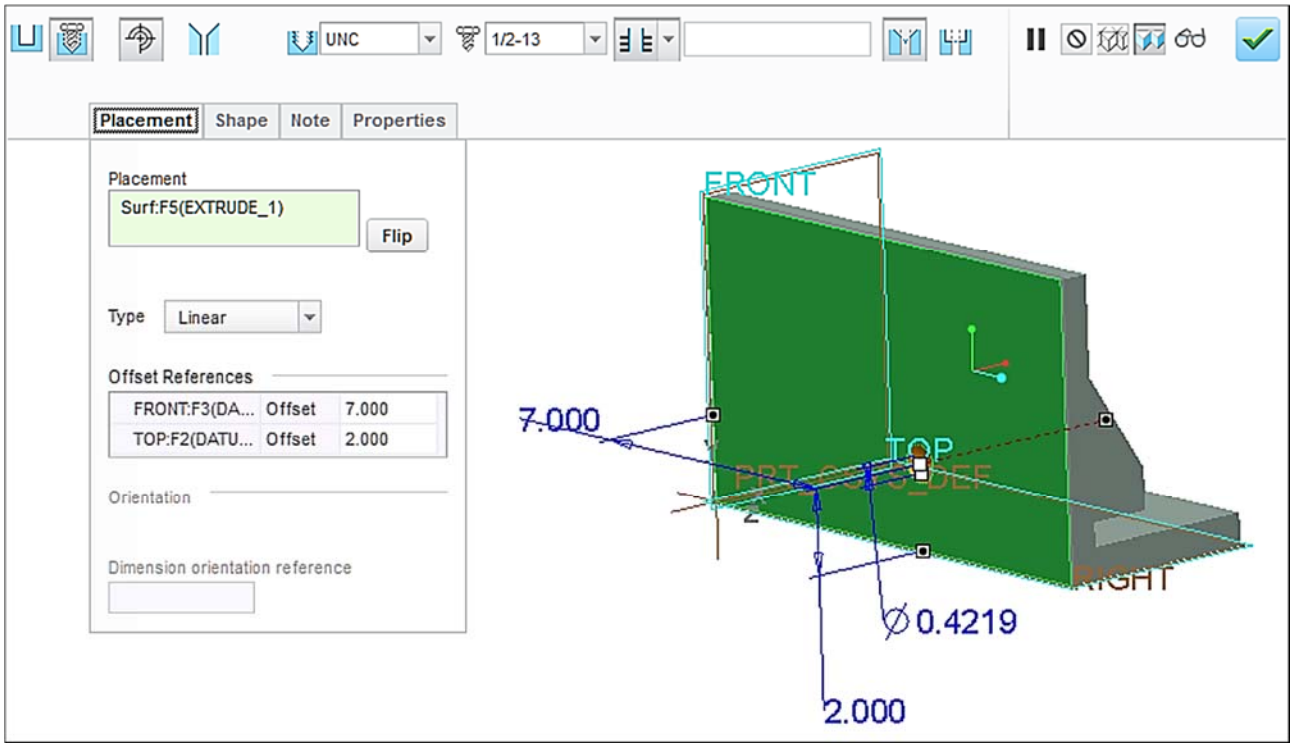


Figure 13.3(g) 7.00 from Datum FRONT and **3.00** from Datum TOP

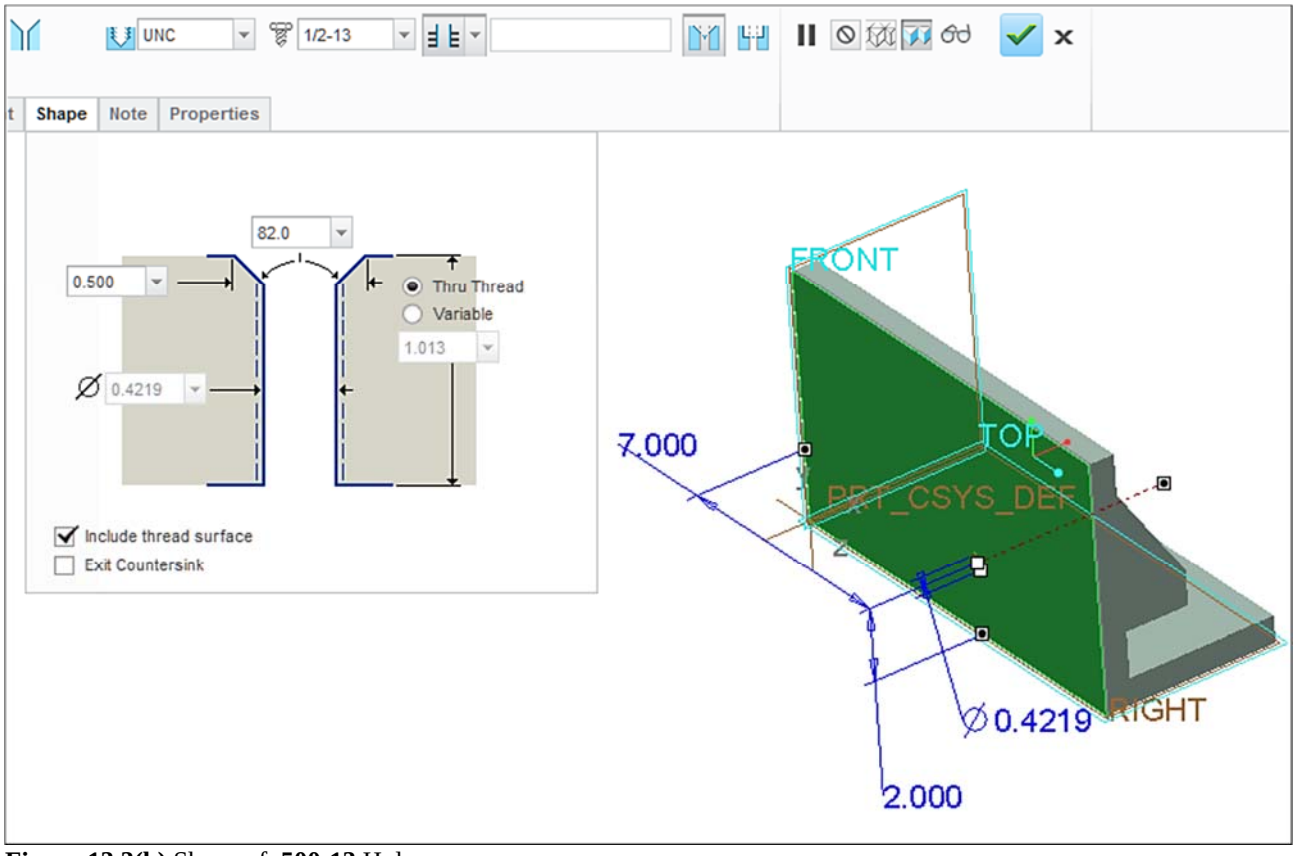
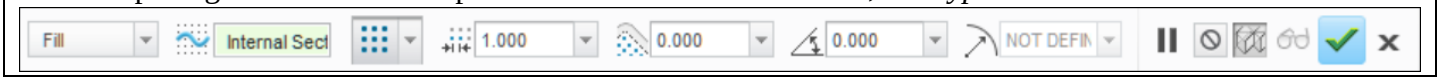


Figure 13.3(h) Shape of **.500-13** Hole

With the hole still selected (highlighted), press: **RMB** > **Pattern** >  > **Fill** > **References** tab > **Define** > select datum **Right** > click on the direction arrow to flip > Orientation **Top** > **Sketch** >  >  **Offset** > **Loop** > select the face (now facing you) > *type* **-.3875** [Fig. 13.3(i)] >  [Fig. 13.3(j)] > **Close** >  > Sets the spacing between pattern member centers, *type* **1.00** > **Enter** >



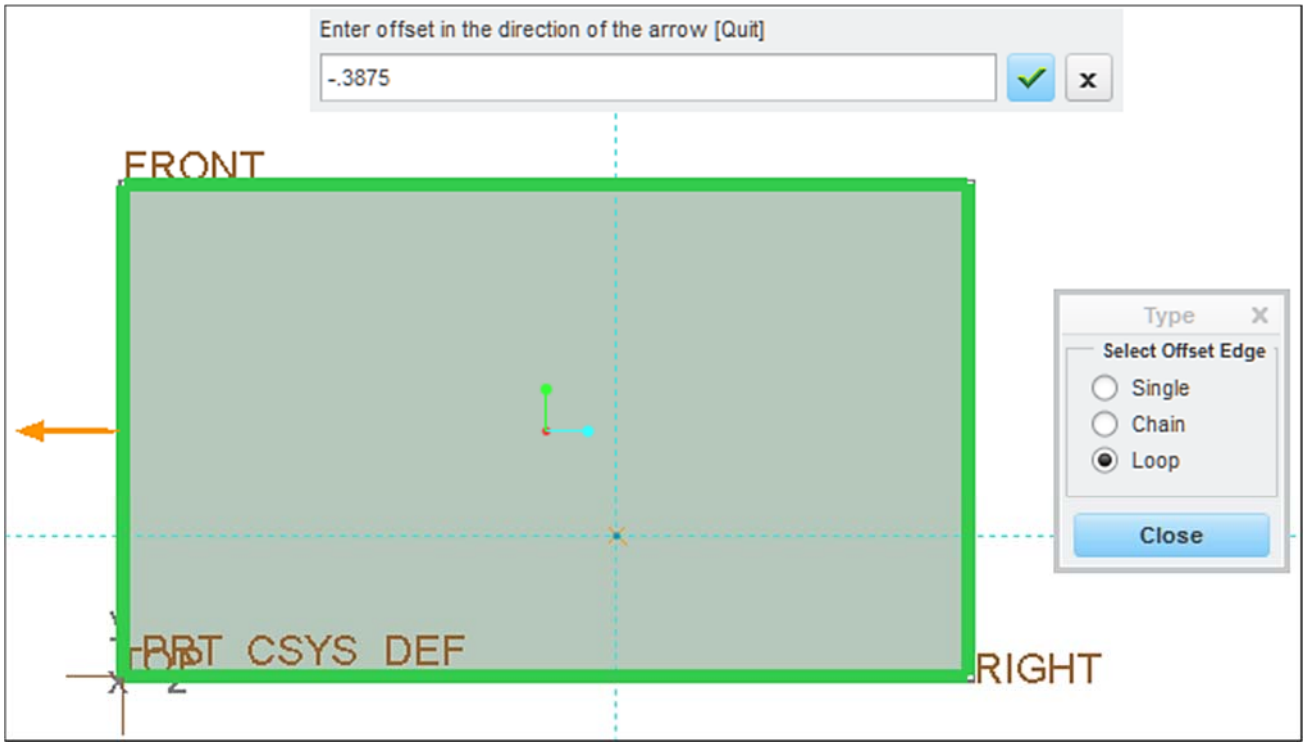


Figure 13.3(i) Offset **-.3875**

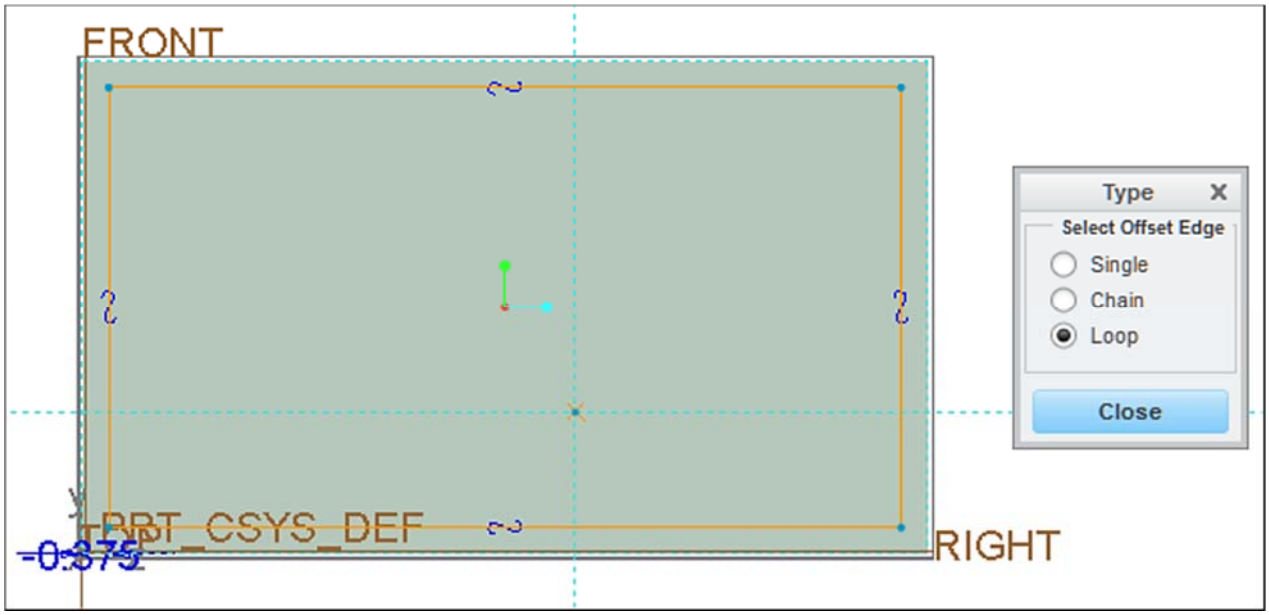


Figure 13.3(j) Offset Loop

Click:  >  to toggle *off* the unwanted instances [Fig. 13.3(k)] > **Ctrl+D** >  [Fig. 13.3(l)] > 

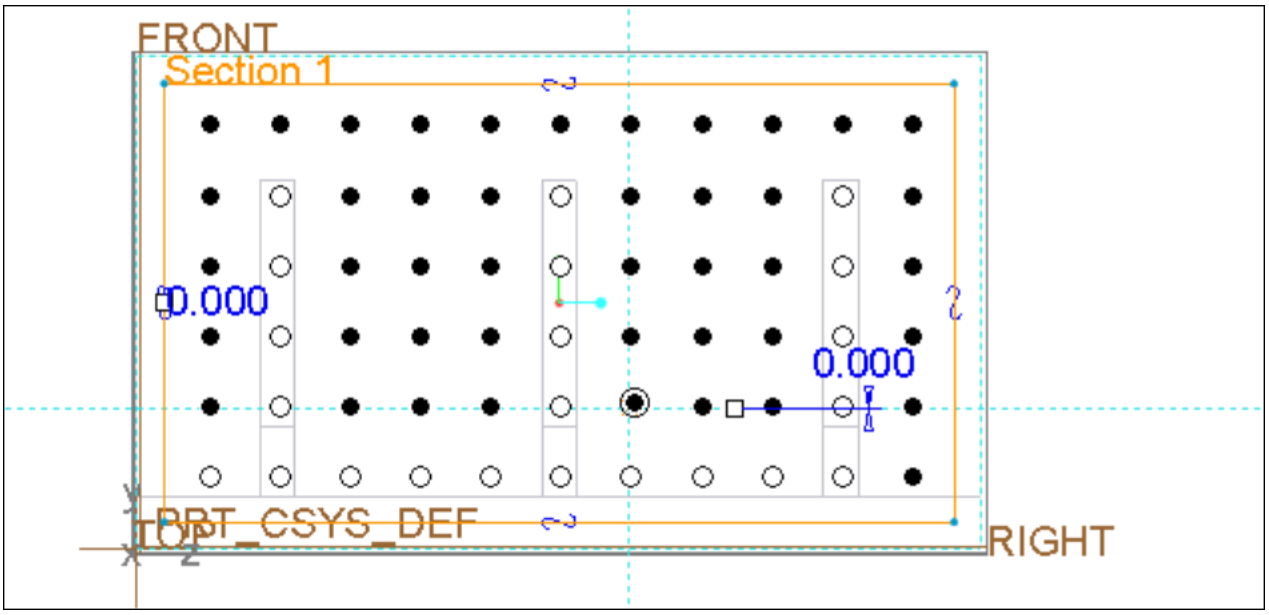


Figure 13.3(k) Toggle Off Unwanted Instances of the Pattern

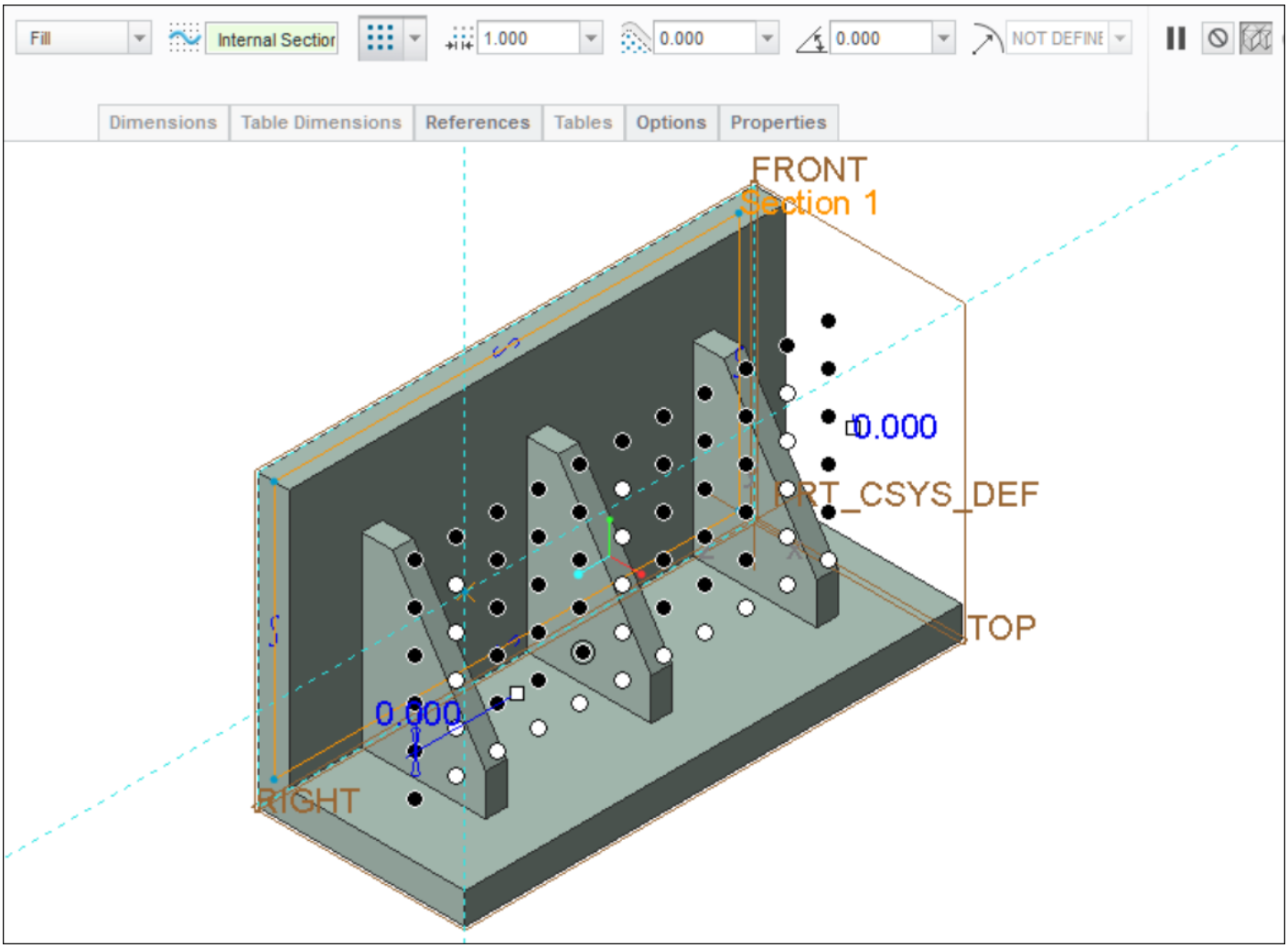
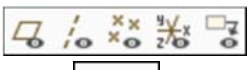
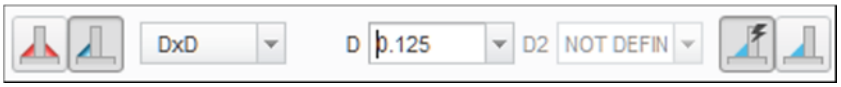


Figure 13.3(l) Pattern Preview

Click: **View** tab  >  all *off* > **Applications** tab > **LMB** in the Graphics Window >  >  >  > **Location** tab > select the surface as **Side 1** [Fig. 13.4(a)] > press **RMB** > **Side 2**

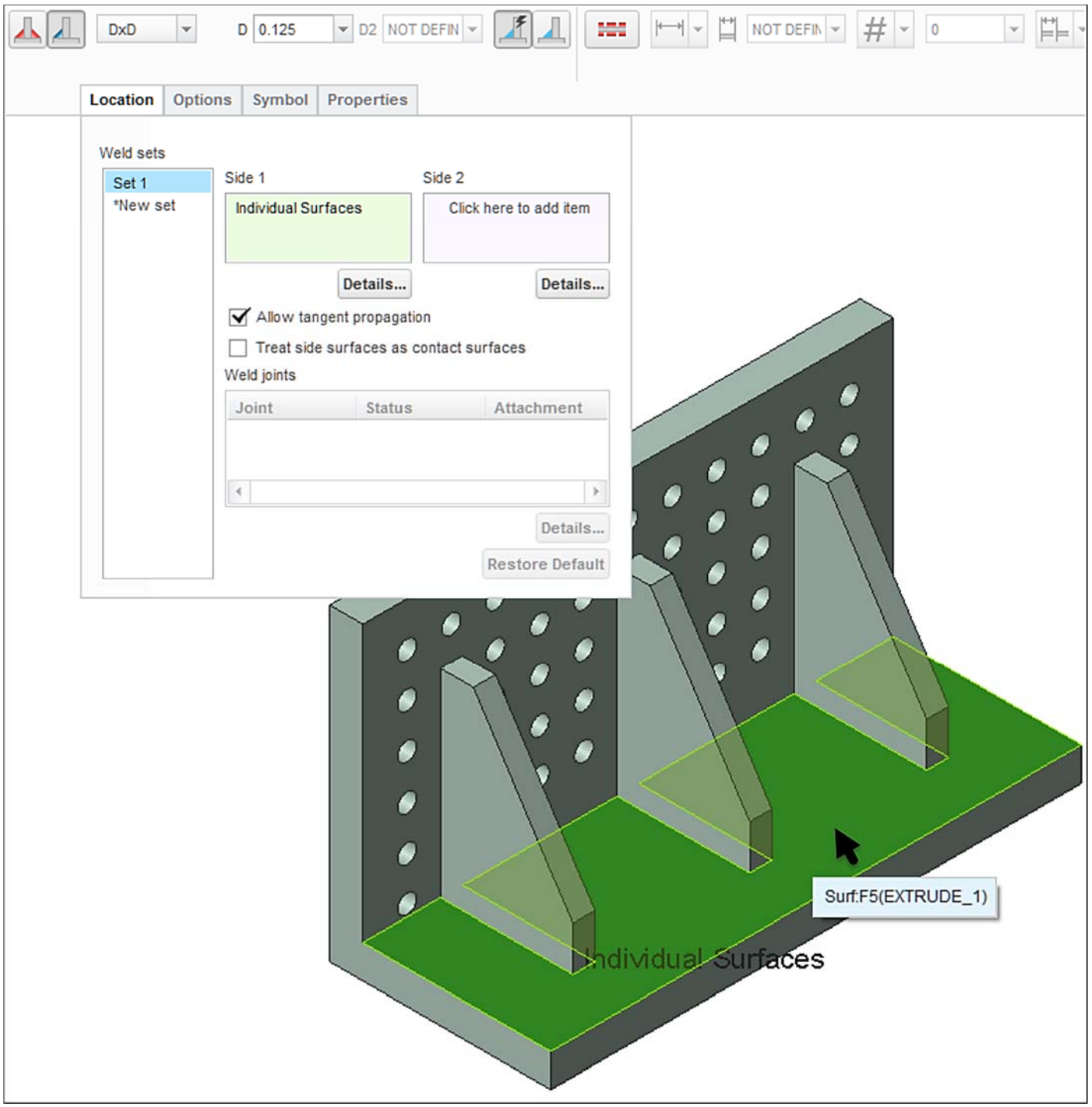


Figure 13.4(a) Select Side 1 of the Weld Set 1

Press and hold the **Ctrl** key and select the vertical surfaces of the ribs > release the **Ctrl** key > **RMB** > **New Set** [Fig. 13.4(b)]

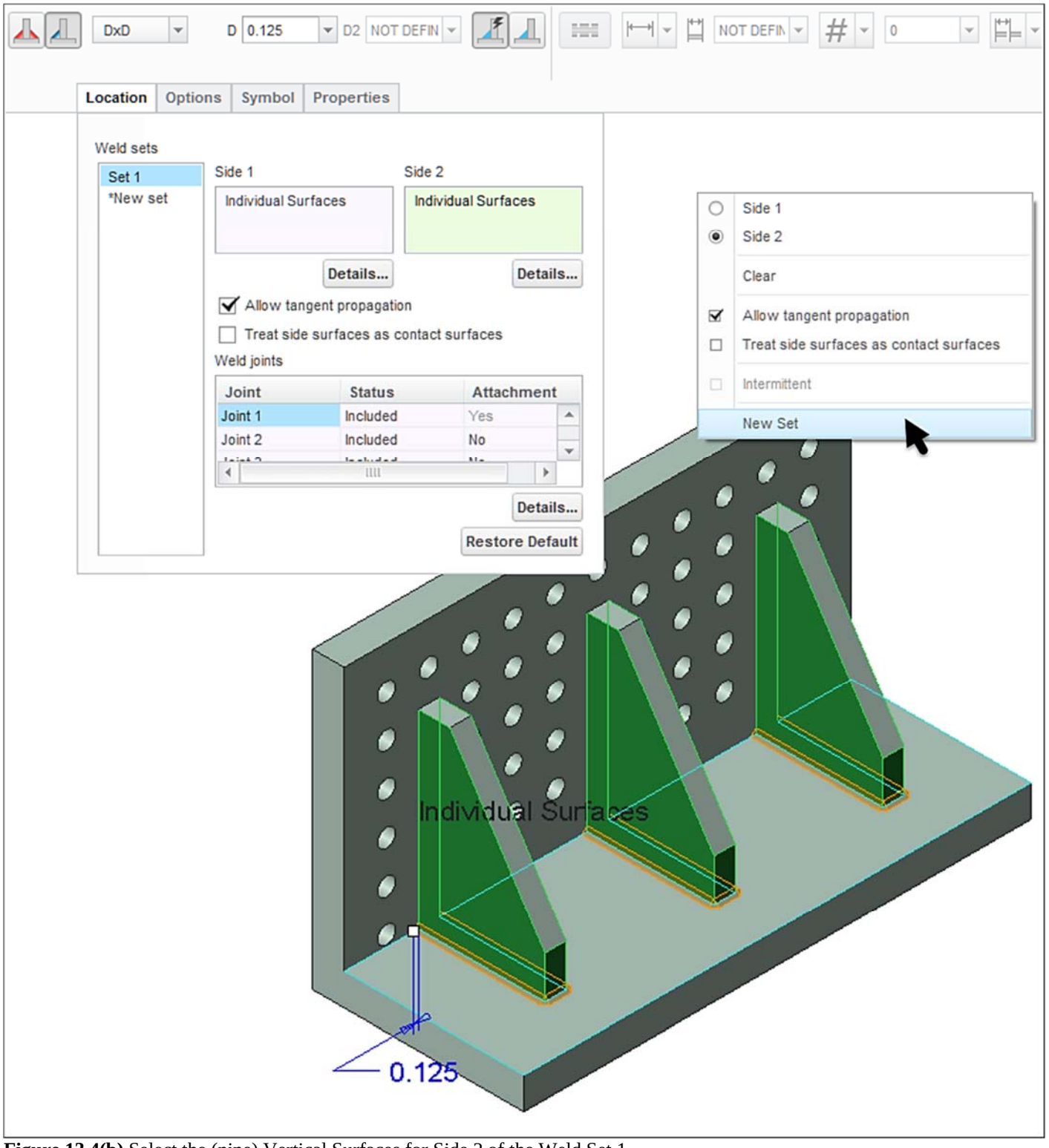


Figure 13.4(b) Select the (nine) Vertical Surfaces for Side 2 of the Weld Set 1

Press: **RMB > Side 1 >** select the vertical surface as **Side 1** [Fig. 13.4(c)] > press **RMB > Side 2**

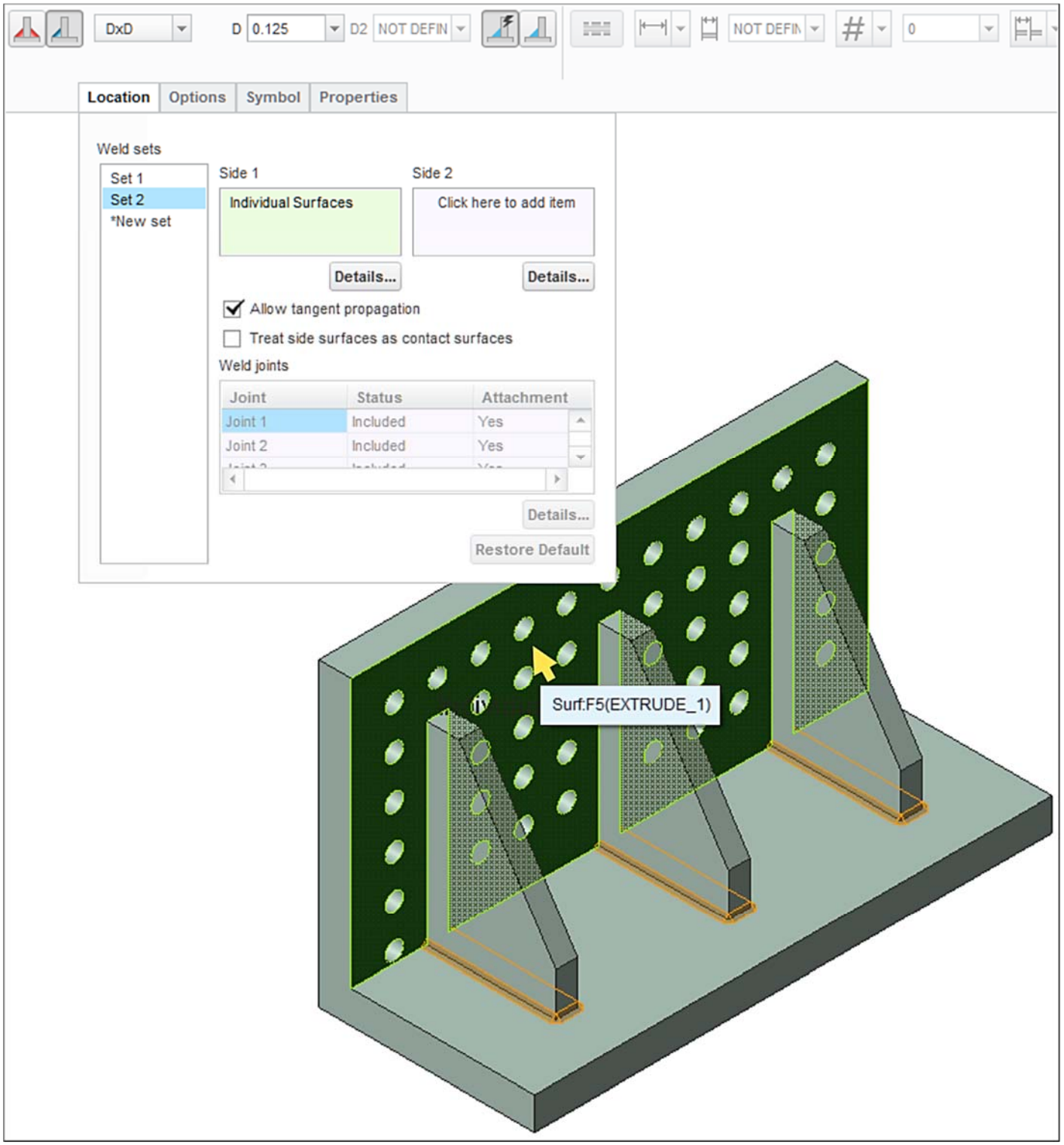


Figure 13.4(c) Select Side 1 of the Weld Set 2

Press and hold the **Ctrl** key and select the surfaces of the ribs > release the **Ctrl** key > *on* [Fig. 13.4(d)] > >

If you select the wrong item, select the appropriate Set # > select the appropriate Details button > place the pointer over the item in the appropriate dialog box > RMB > Remove > Ctrl key > select another surface.

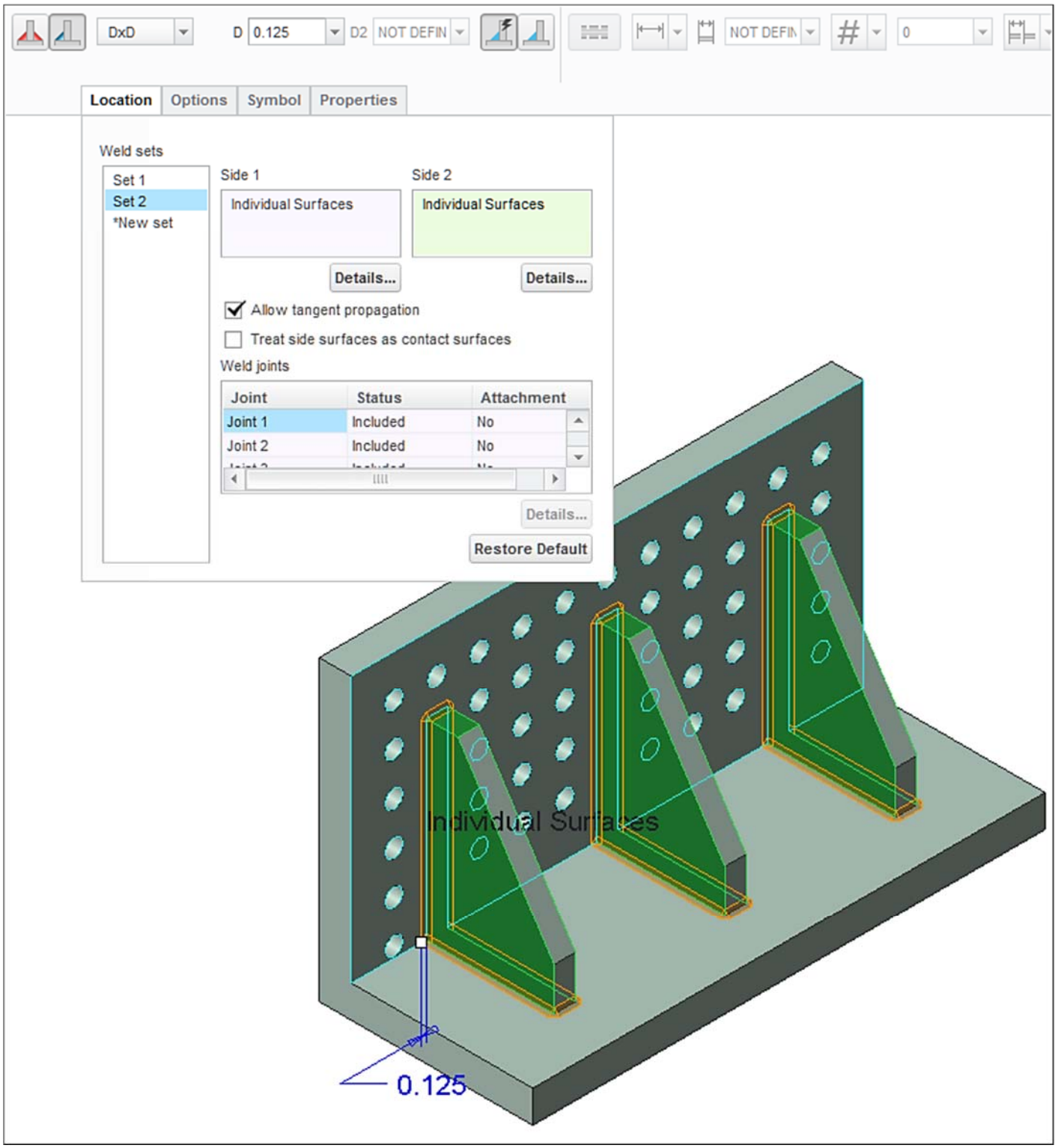


Figure 13.4(d) Select the (nine) Surfaces for Side 2 of the Weld Set 2

Click: [Fig. 13.4(e)] > **LMB** to deselect > Close (from the Welding Ribbon) > **File** > **Manage File** > **Delete Old Versions** > **Yes** > **Close**

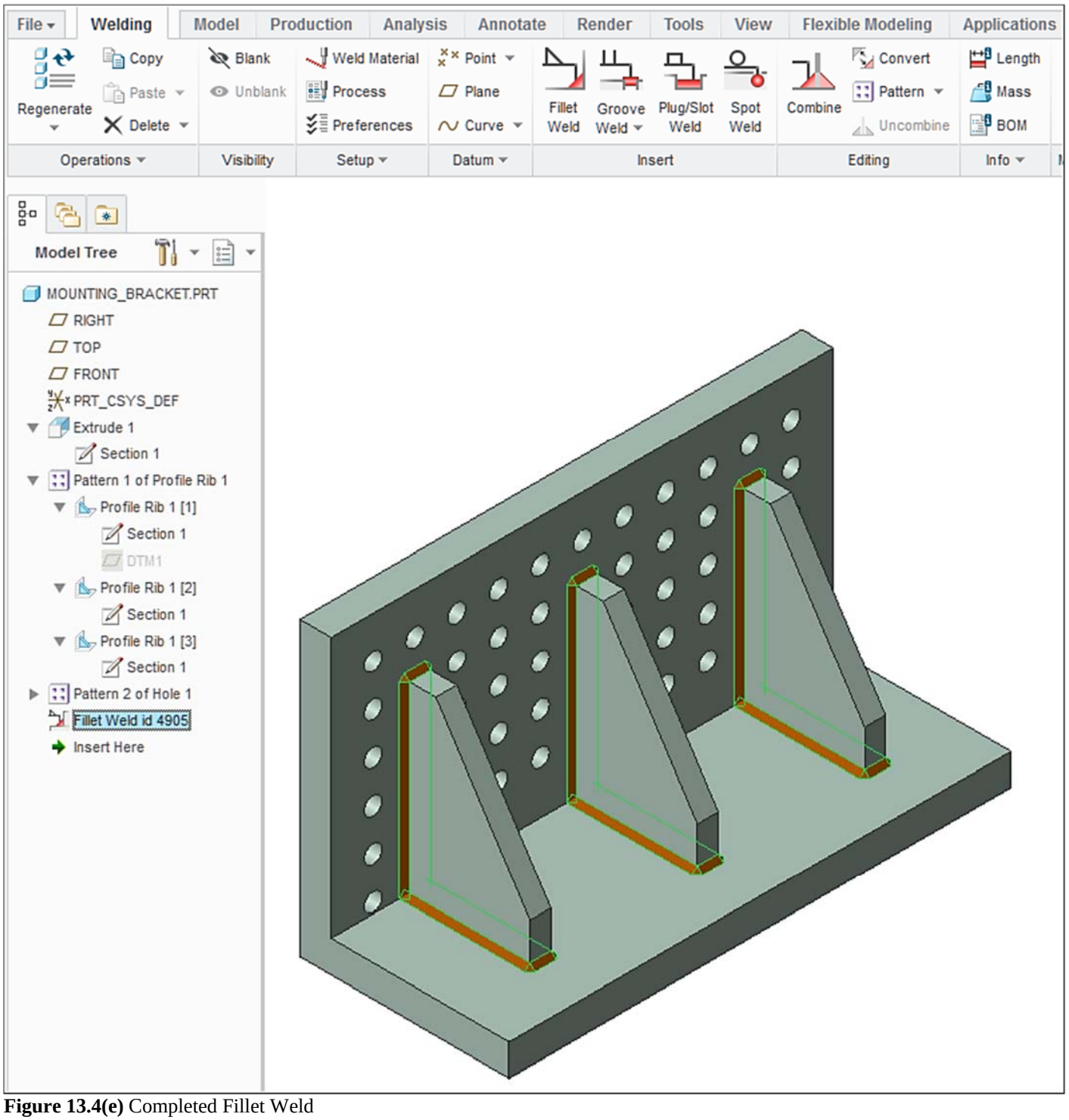


Figure 13.4(e) Completed Fillet Weld

Base Plate

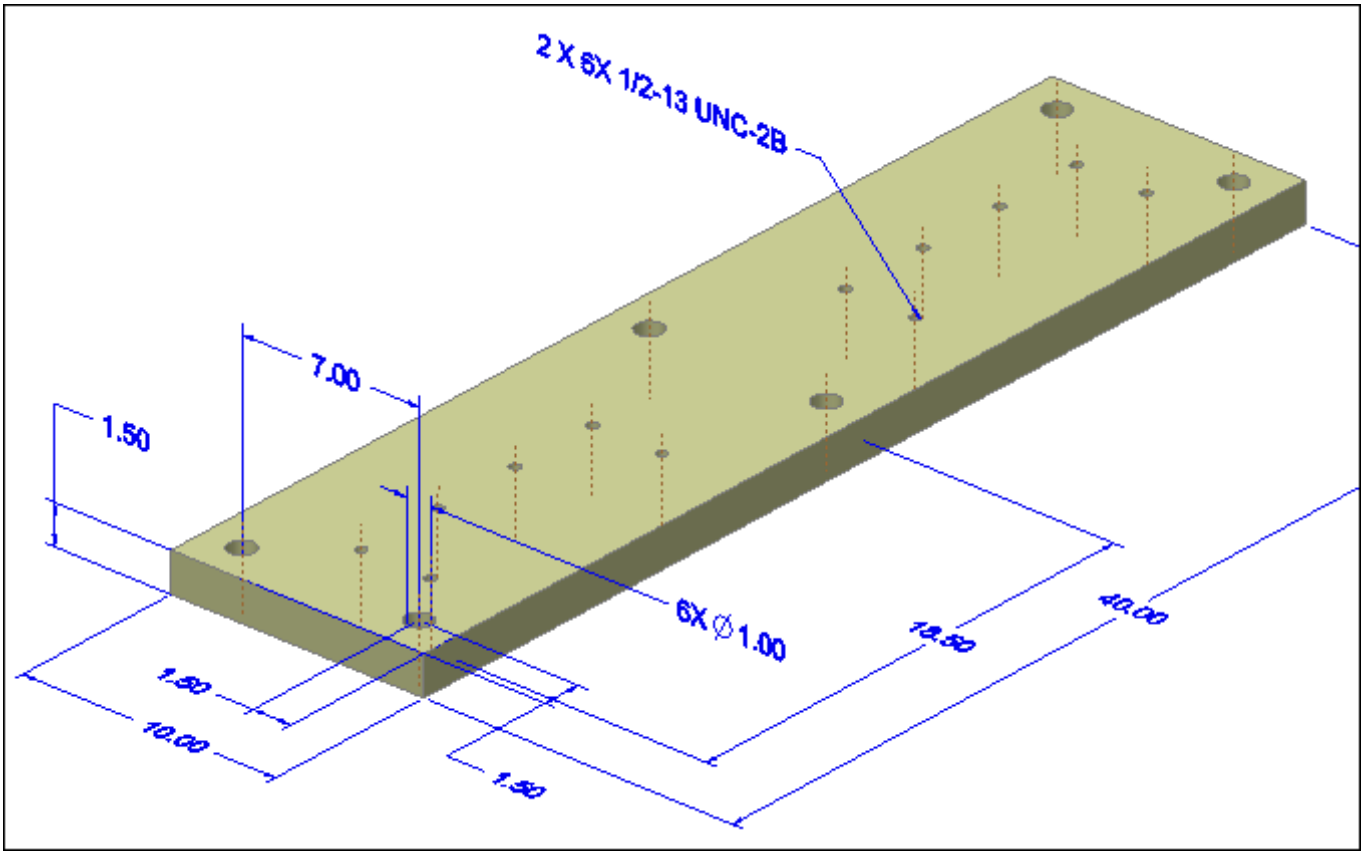


Figure 13.5(a) Base Plate

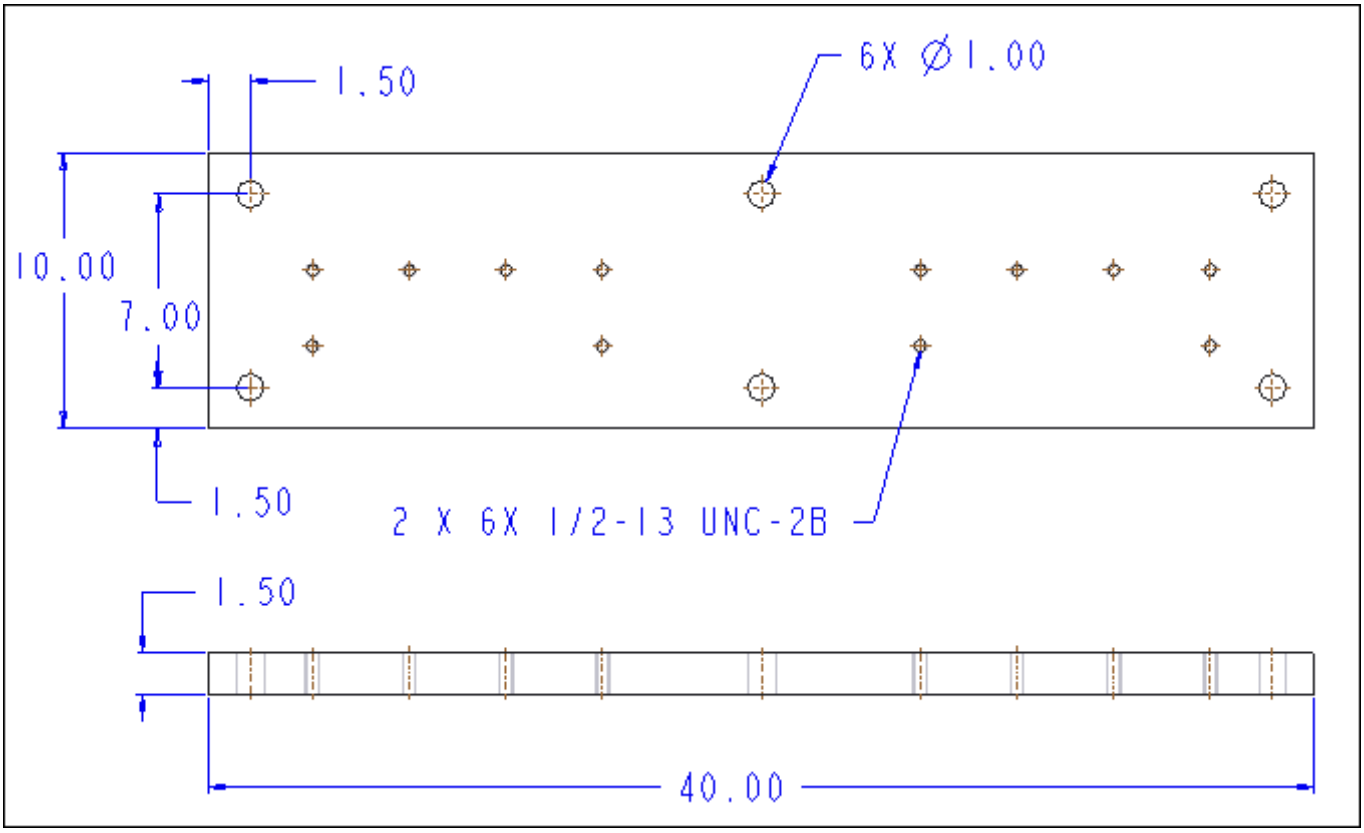


Figure 13.5(b) Base Plate Detail

Base Plate dimensions [Figs. 13.5(a-b)]. Press: **Ctrl+N** > *type* **base_plate** > **OK** > **File** > **Options** > **Customize Ribbon** > **Import/Export** > **Import customization file** > select your previously saved **.ui** file from Lesson 2 (creo_parametric_customization.ui) > **Open** > **Import Mode Customizations** > **Configuration Editor** > **Import/Export** > **Import configuration file** > select your previously saved file from Lesson 2 (**CREO_textbook.pro**) > **Open** > **OK** > **No** > **View** tab > all *on* > select datum **TOP** > **Model** tab > Extrude > > Center Rectangle > sketch and dimension the rectangular section [Fig. 13.5(c)] > spin the part > > modify the depth to **1.50** inches [Fig. 13.5(d)] > **Enter** > in the Graphics Window, **MMB** > **LMB** to deselect > **Ctrl+D** > **Ctrl+S** > **OK**

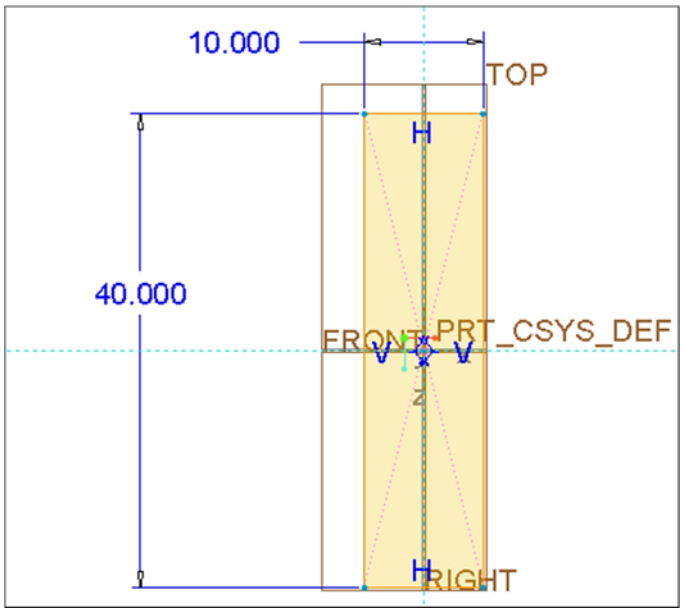


Figure 13.5(c) Sketch the Rectangular-shaped Section

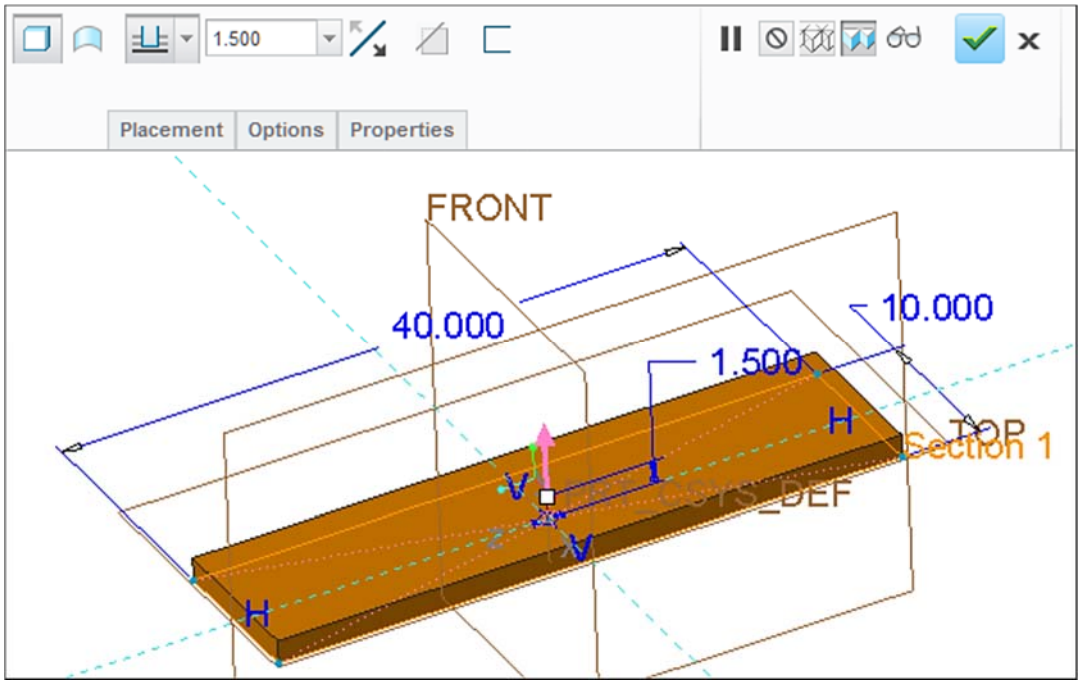


Figure 13.5(d) Depth of **1.50**

Click: Hole > create the hole as per the Placement and Shape requirements [Figs. 13.5(e-g)] > 

> > **Ctrl+D** > **Save**

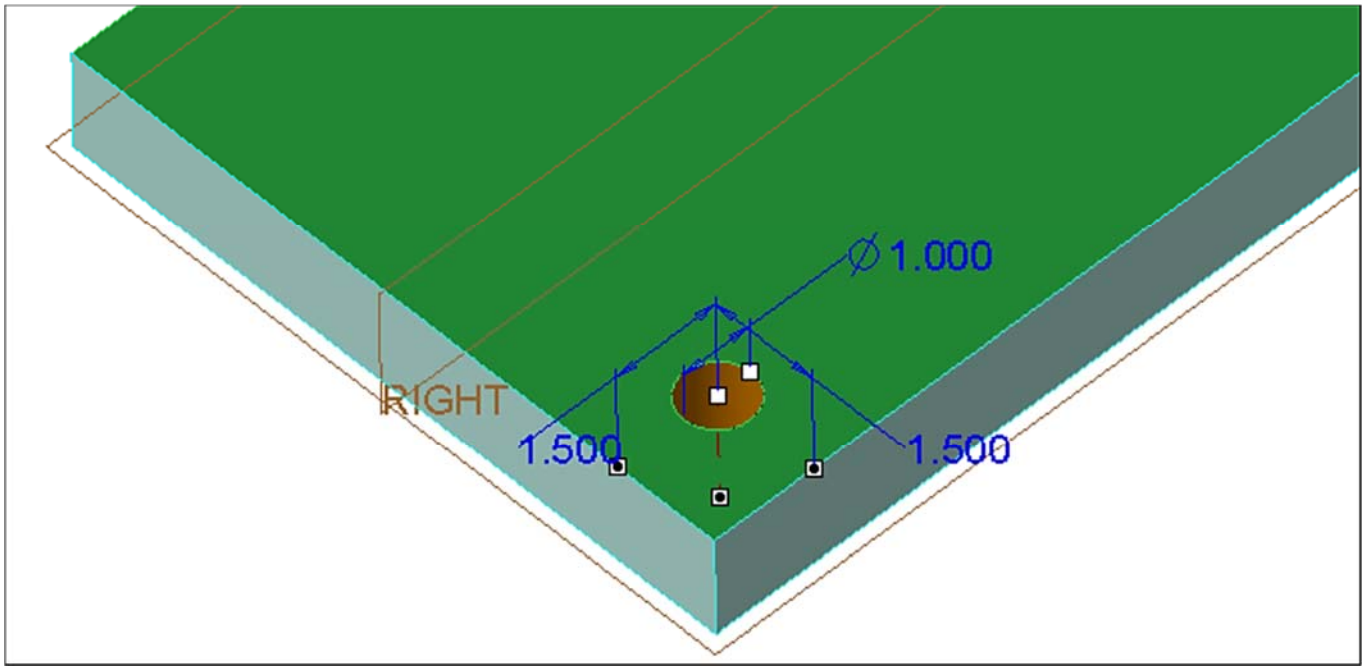


Figure 13.5(e) 1.00 Diameter Hole

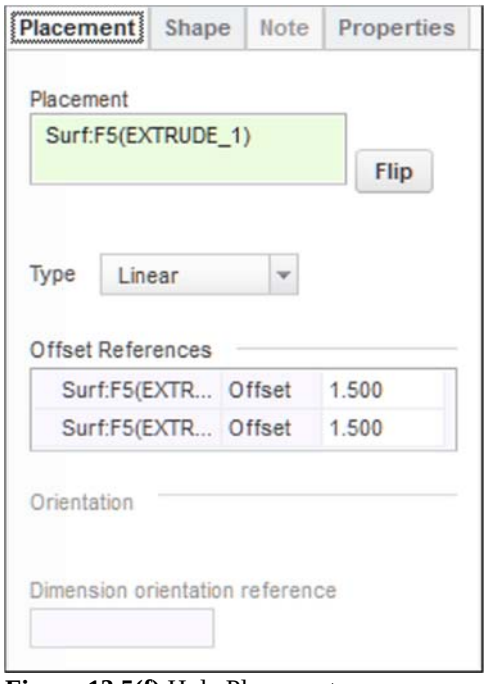


Figure 13.5(f) Hole Placement

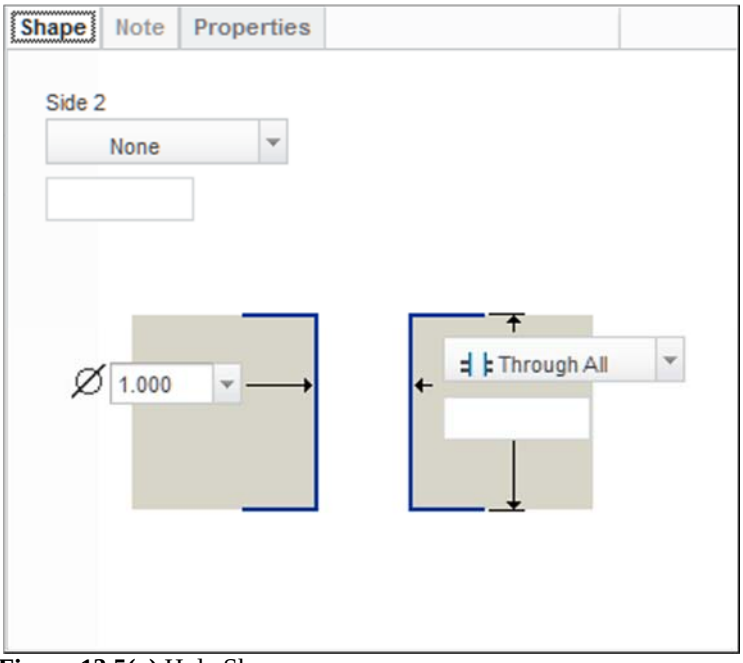


Figure 13.5(g) Hole Shape

With the hole still selected, press: **RMB** > **Pattern** [Fig. 13.5(h)] >  > **Direction** > select two reference direction surfaces [Fig. 13.5(i)] >  > **Annotate** tab > in the Model Tree, expand the Pattern > select the Extrude, Pattern and Hole features > **Show Annotations** >  tab >  > **OK** > move the dimensions as needed

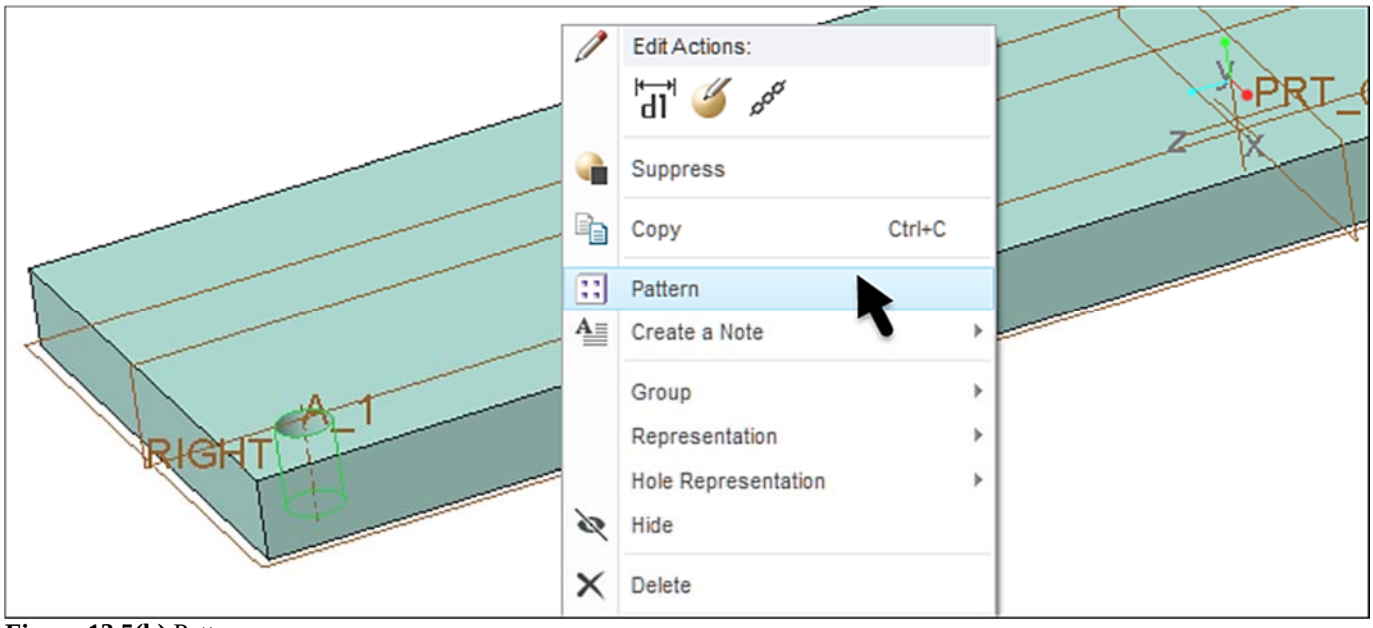


Figure 13.5(h) Pattern

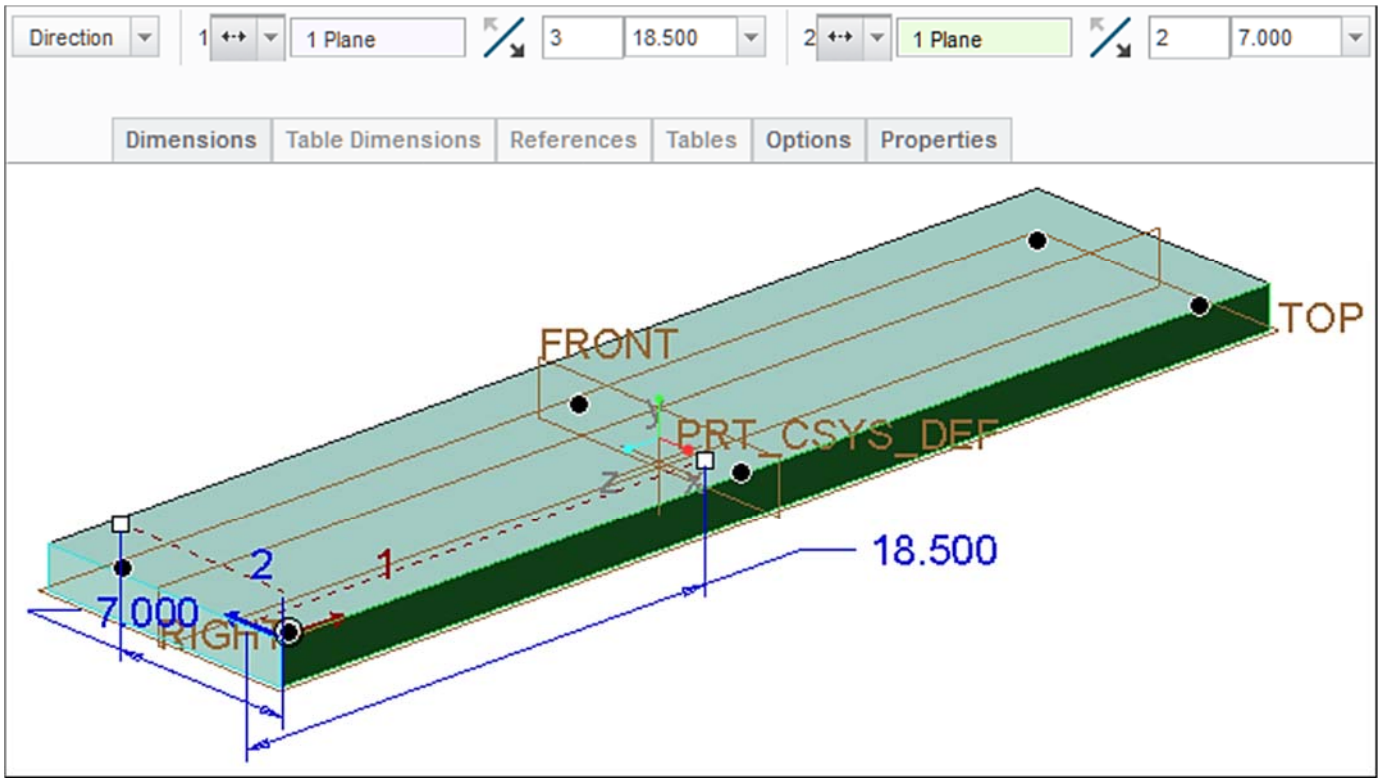


Figure 13.5(i) Pattern Preview

Click: **LMB** to deselect > select the **1.00** diameter dimension > press **RMB** > **Properties** > **Display** tab > Prefix 6X ∅ [Fig. 13.5(j)] > **Move** > pick a new position > **OK** [Fig. 13.5(k)] > **LMB** to deselect > **Model** tab > **Ctrl+D** > **Ctrl+S** > **File** > **Close**

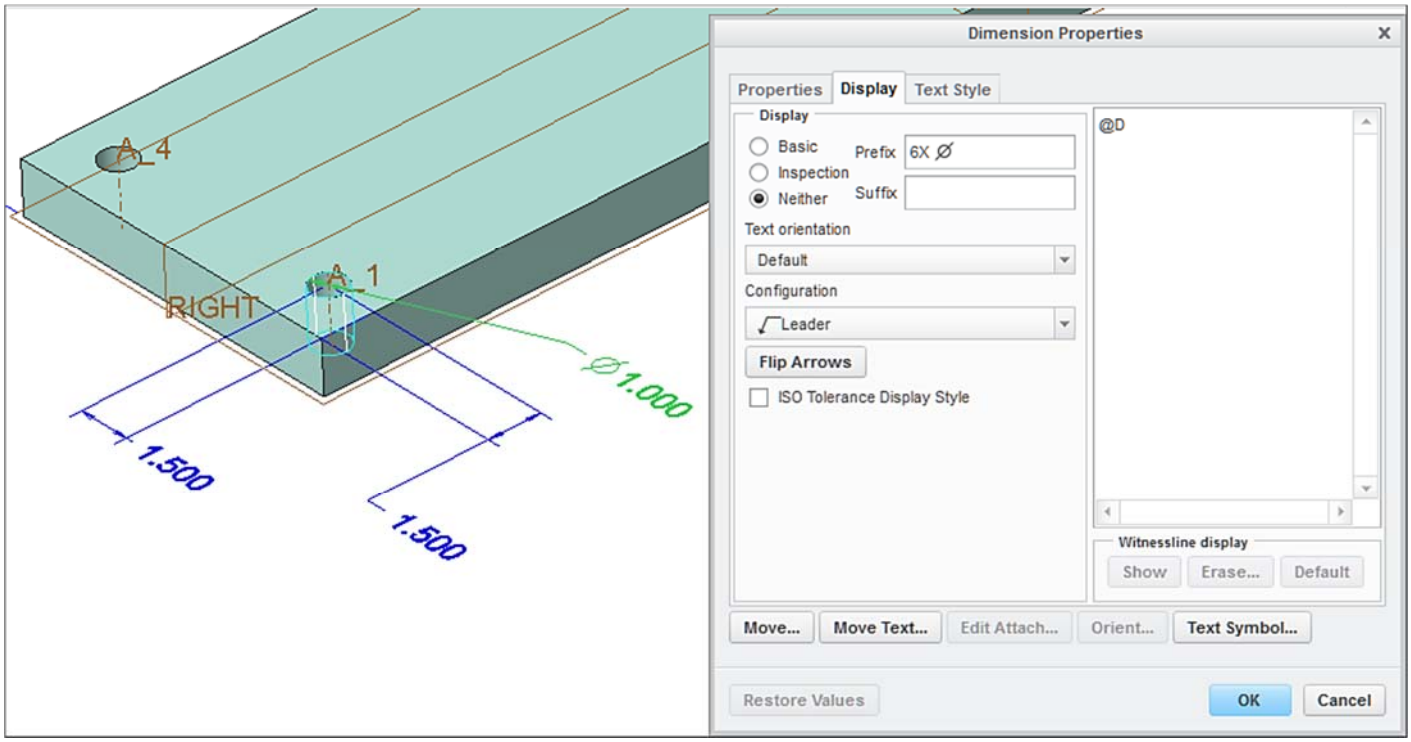


Figure 13.5(j) Dimension Properties, Display Tab

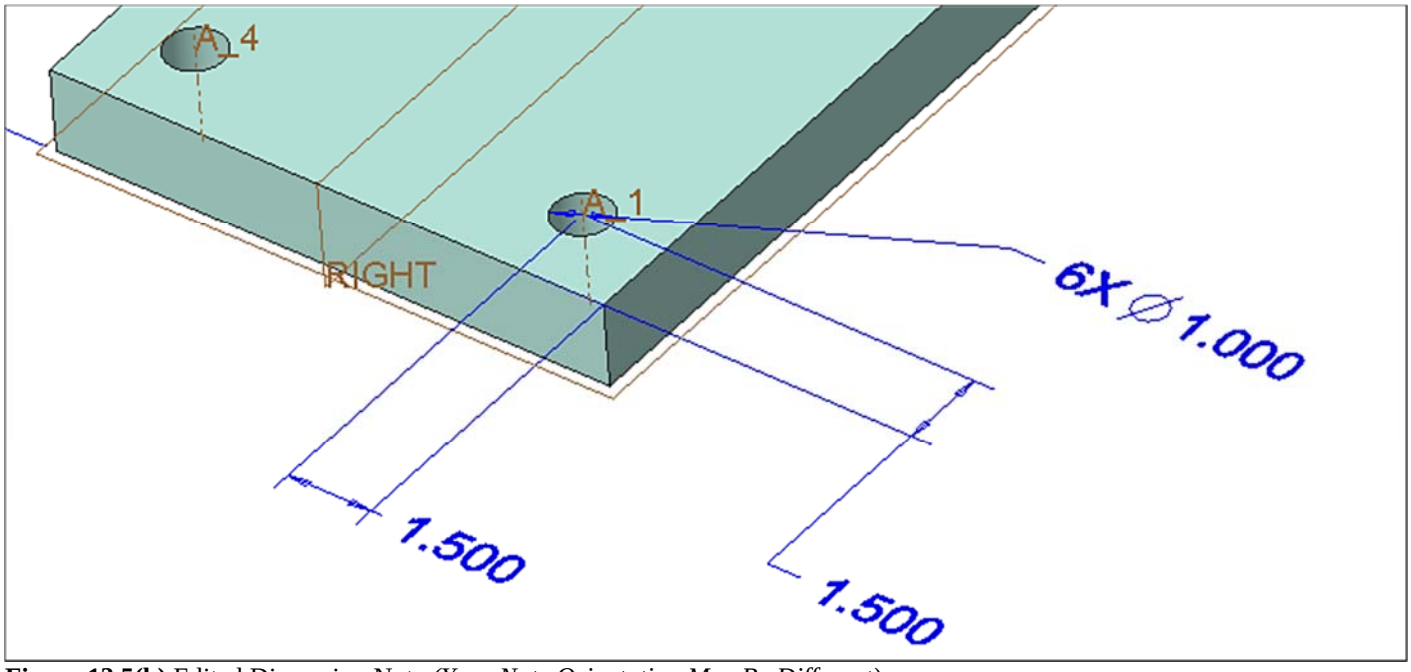


Figure 13.5(k) Edited Dimension Note *(Your Note Orientation May Be Different)*

Mounting System Assembly

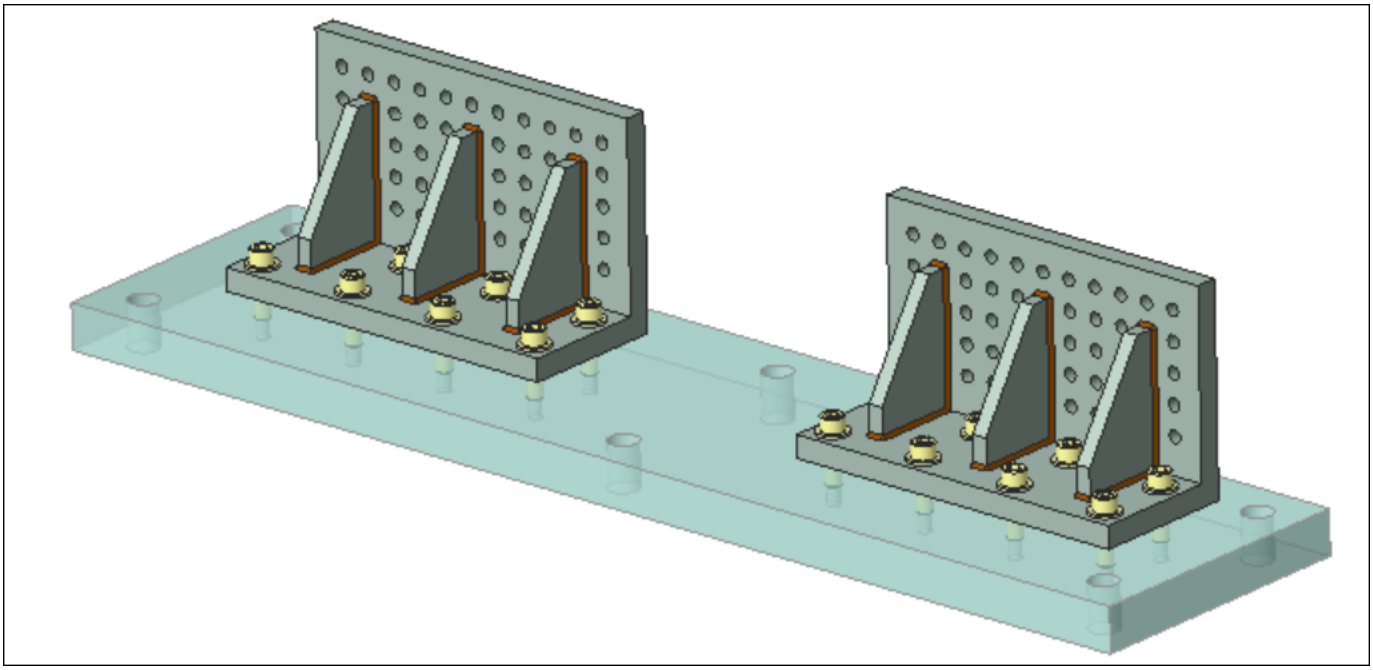


Figure 13.6(a) Mounting System Assembly

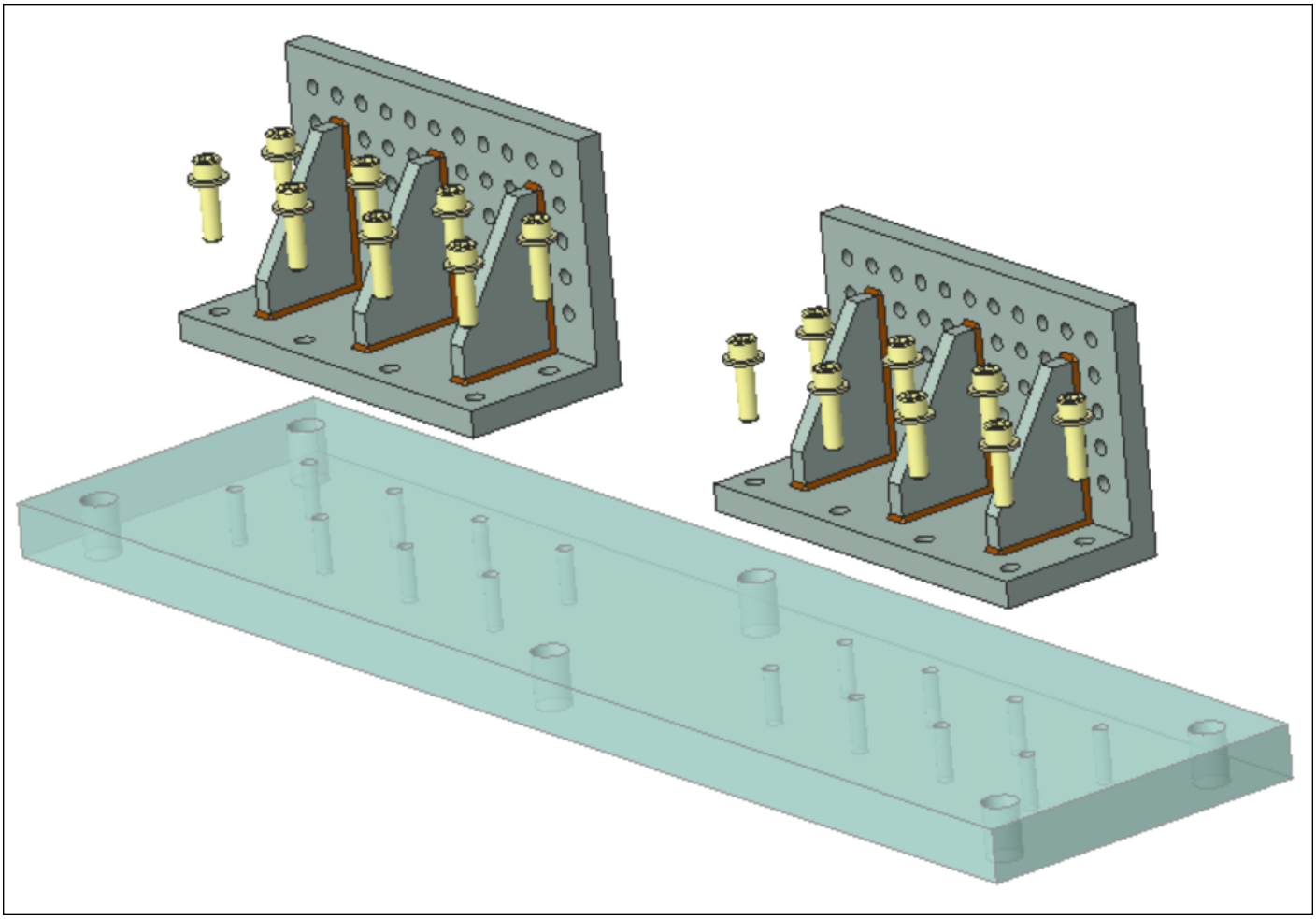


Figure 13.6(b) Mounting System Assembly Exploded

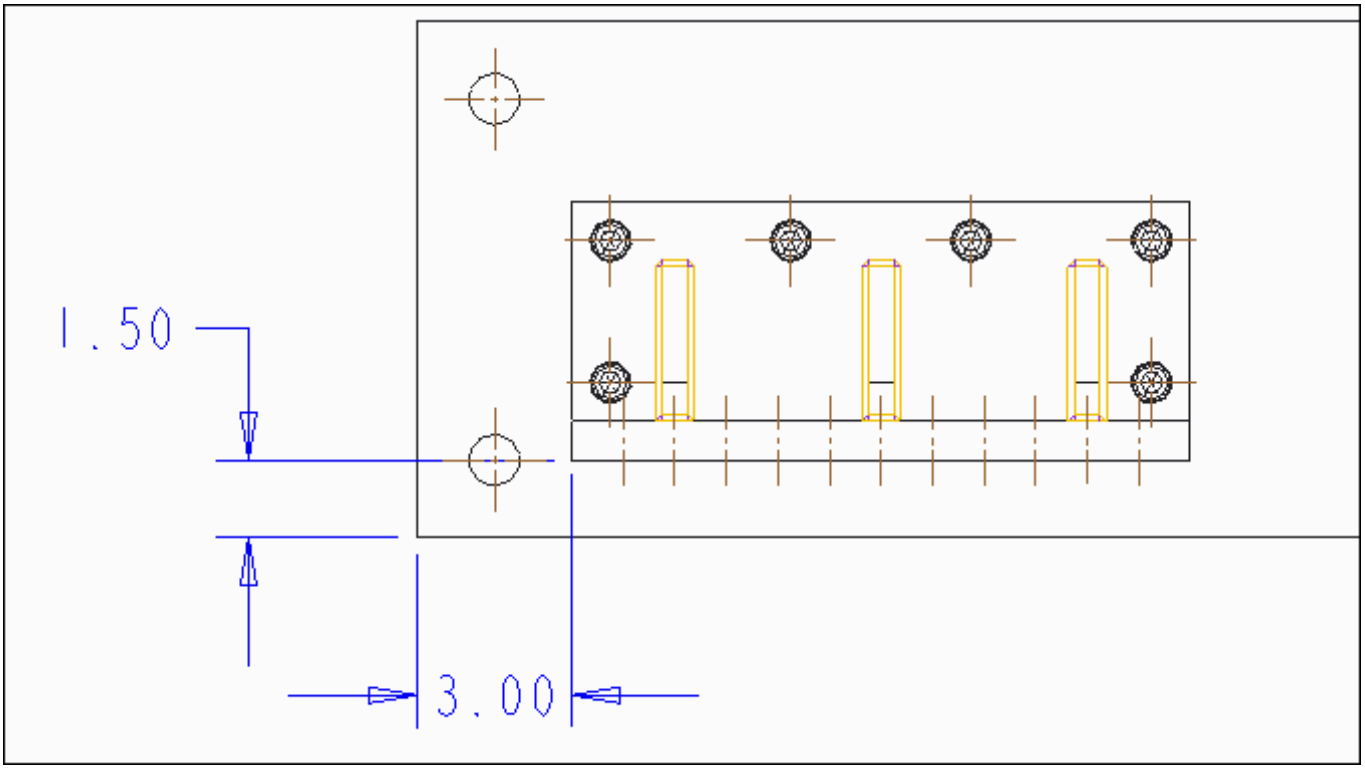


Figure 13.6(c) Mounting System Assembly Component Placement Location Dimensions

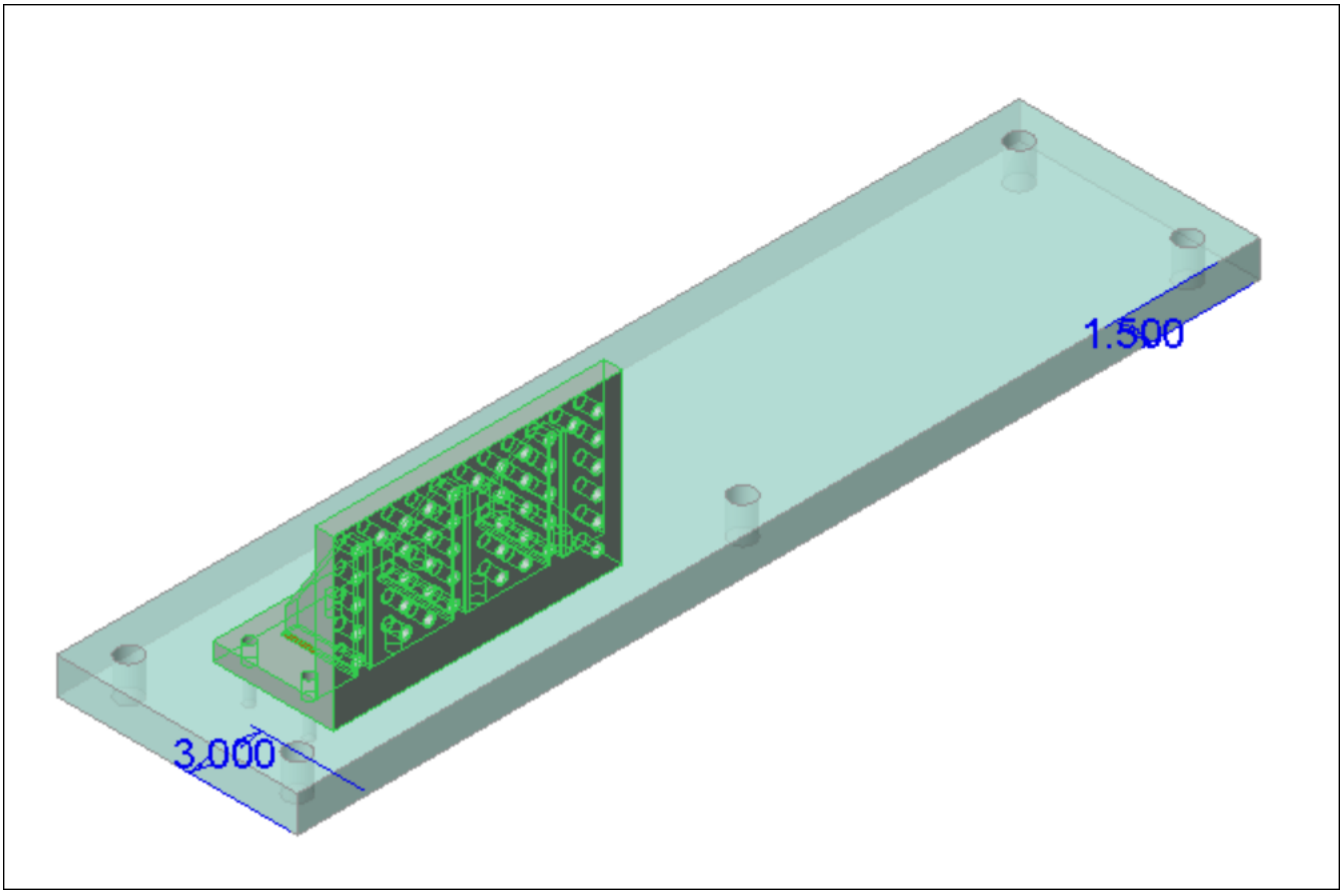
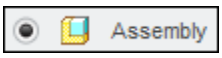
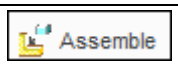
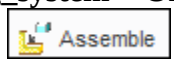


Figure 13.6(d) Mounting System Assembly Component Placement Location in the Assembly Model

Create the Mounting System Assembly shown in Figures 13.6(a-d).

Click:  > 

> **mounting_system** > **OK** >  off > 

> **base_plate** > **Open** > press **RMB** > **Default Constraint** >  > 

> **mounting_bracket** > **Preview** > **Open** > use the 3D Dragger to initially orient and position the component > **Placement** tab > first constraint [Fig. 13.7(a)]

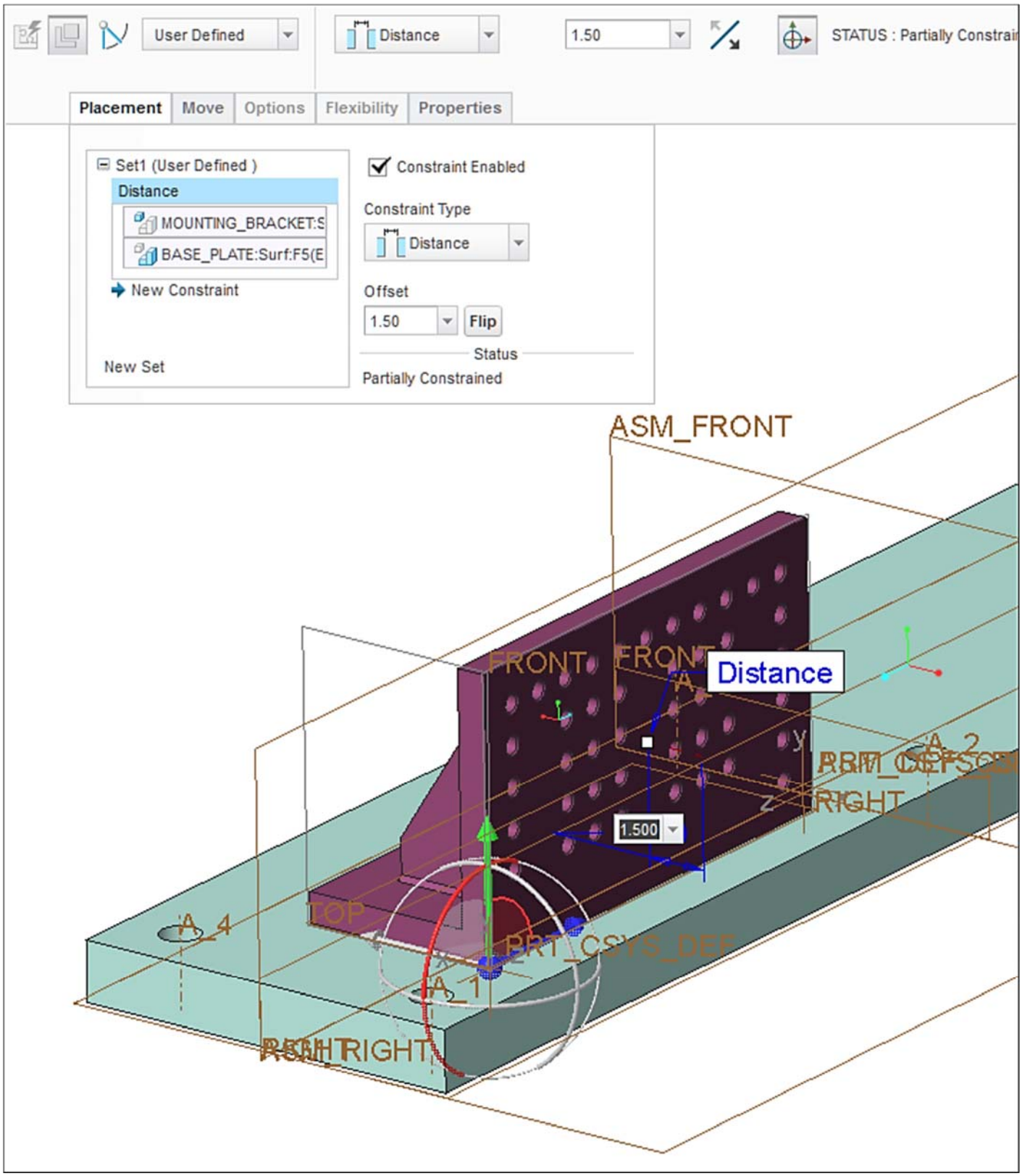


Figure 13.7(a) First Constraint Distance Offset **1.50** (Enter a Negative Value if Required)

In the Graphics Window, press: **RMB > New Constraint >** second constraint [Fig. 13.7(b)]

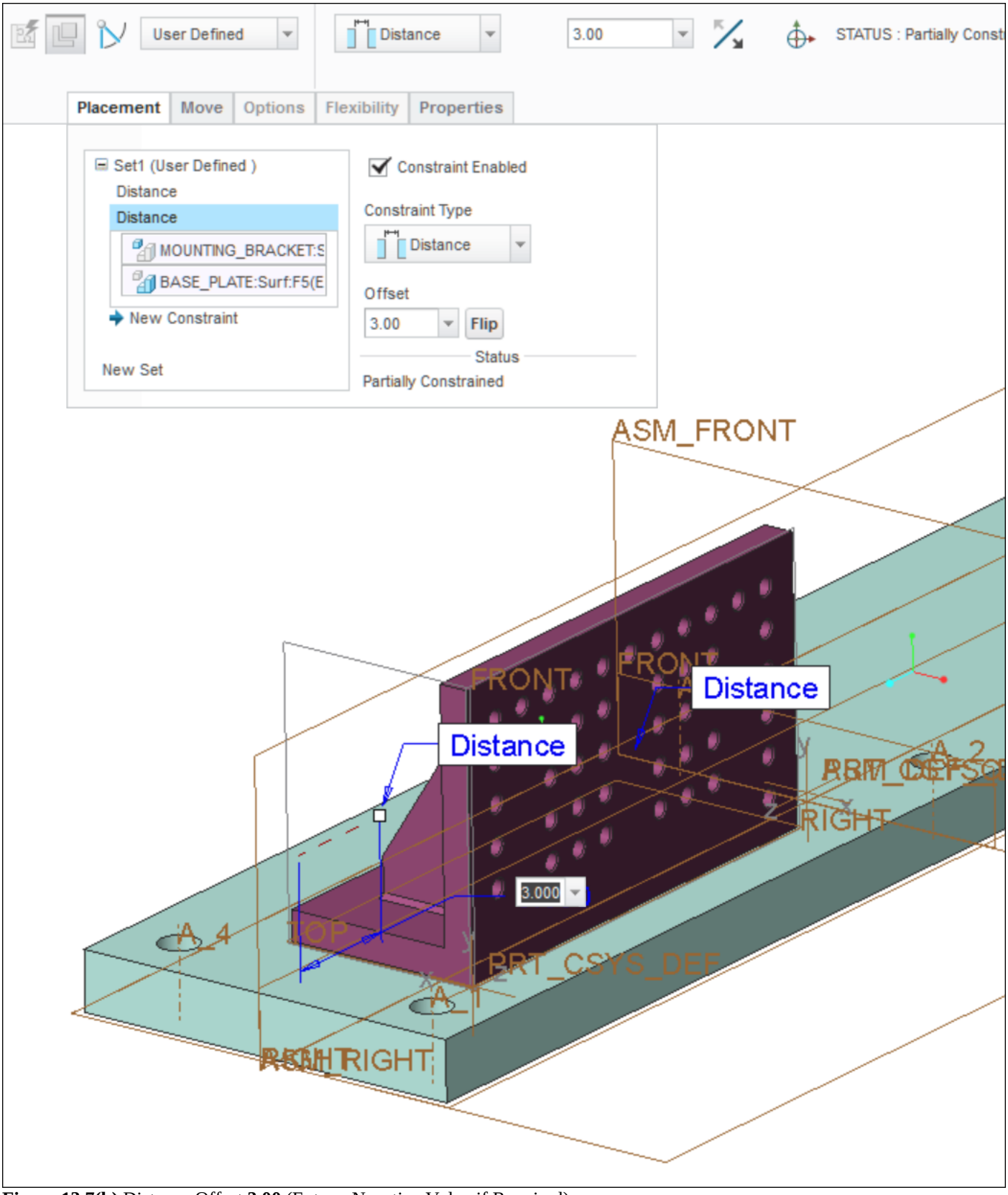


Figure 13.7(b) Distance Offset **3.00** (Enter a Negative Value if Required)

Select: **New Constraint** in the Placement window > [Fig. 13.7(c)] >  >  > **OK**

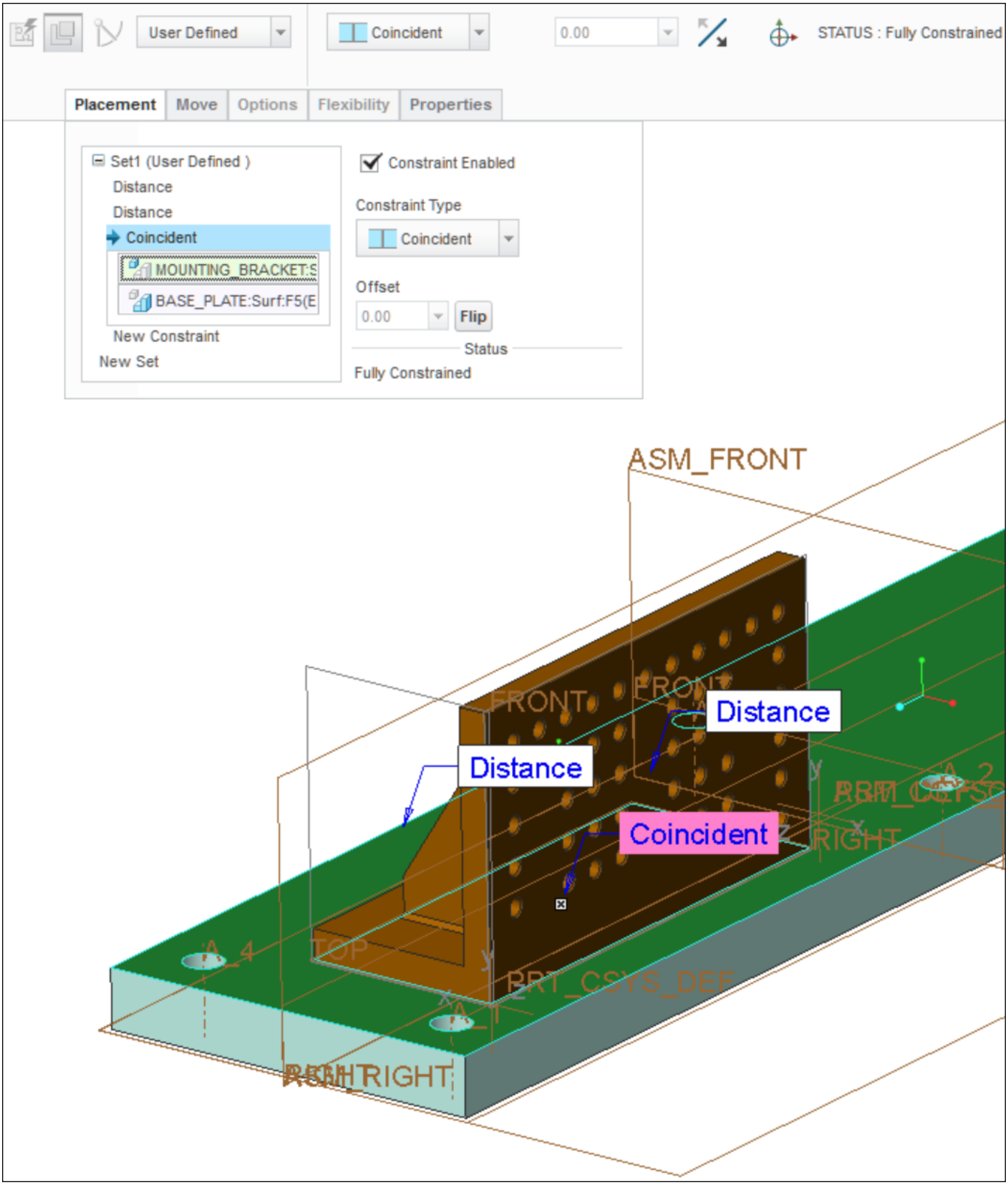


Figure 13.7(c) Coincident (Use the **RMB** and click through the features and select the bottom face of the Mounting Bracket)

Set: 

> 

> pick a position on front corner of the **Mounting_bracket** [Fig. 13.8(a)] > locate the hole at **.750** from each vertical face [Fig. 13.8(a)] > **OK** > **Ctrl+S**

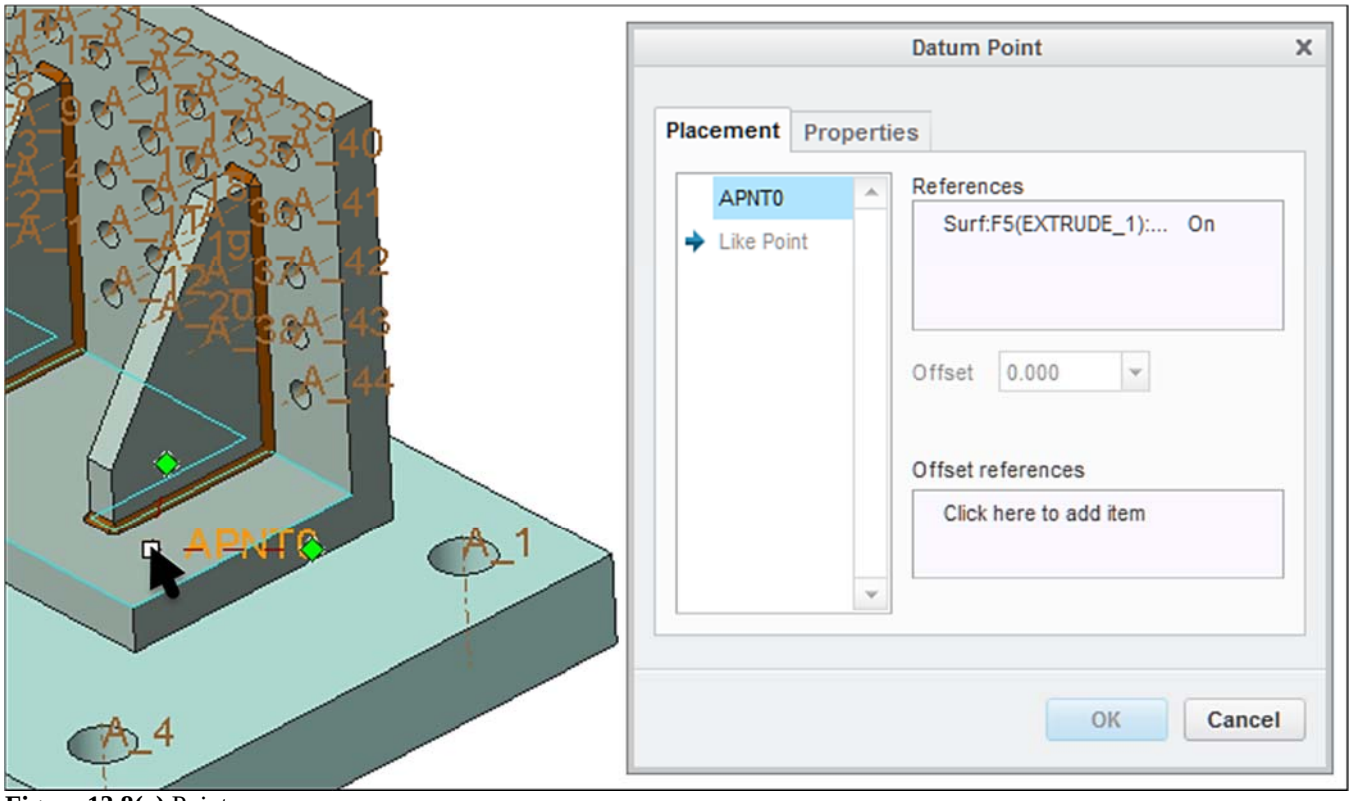


Figure 13.8(a) Point

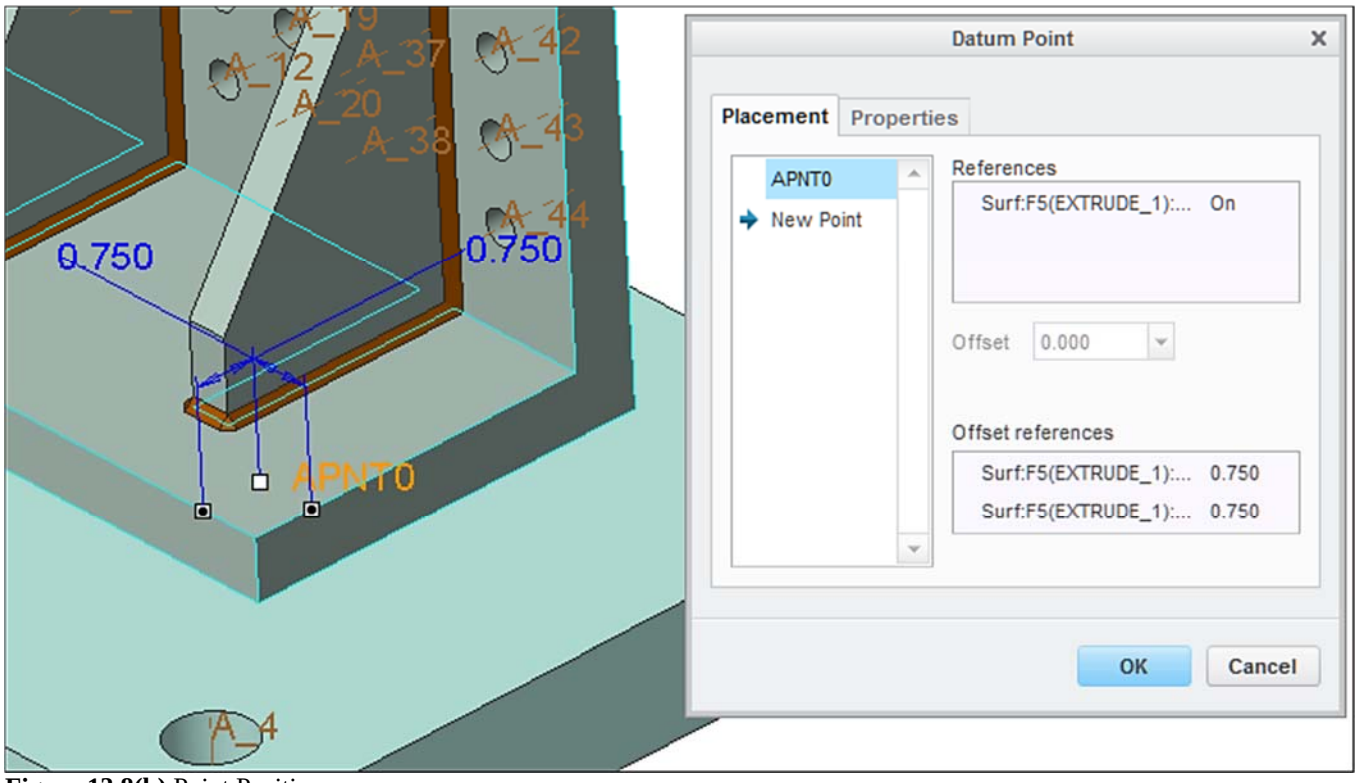


Figure 13.8(b) Point Position

With the point still selected: Axis [Fig. 13.8(c)] > press **Ctrl** key > select the surface [Fig. 13.8(d)] > **OK** > **LMB** > **Ctrl+S**

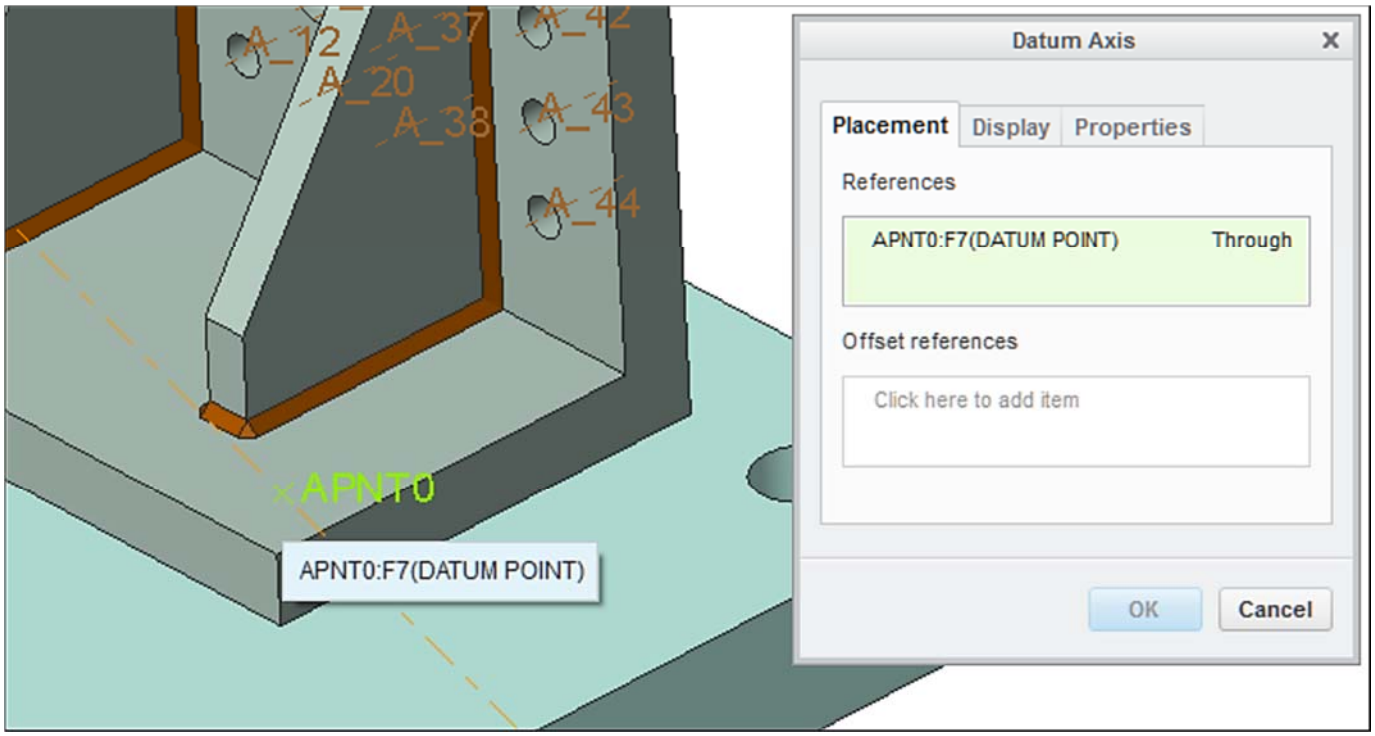


Figure 13.8(c) Select the Point

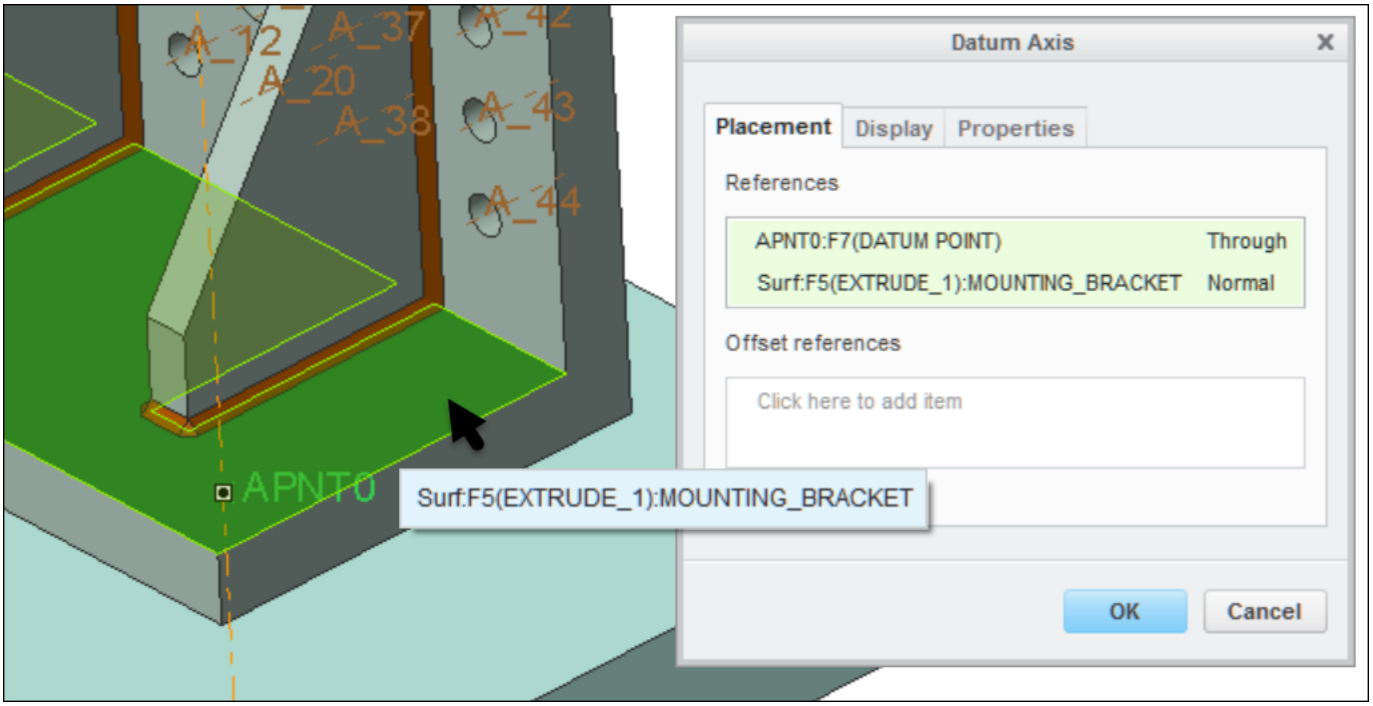


Figure 13.8(d) Select the Surface

Select **Tools tab** > Screw **Screw** > Assemble on point or axis > Select the position (point/axis) **APTN0** > [Fig. 13.9(a)] > Select the screw head placement surface [Fig. 13.9(b)]

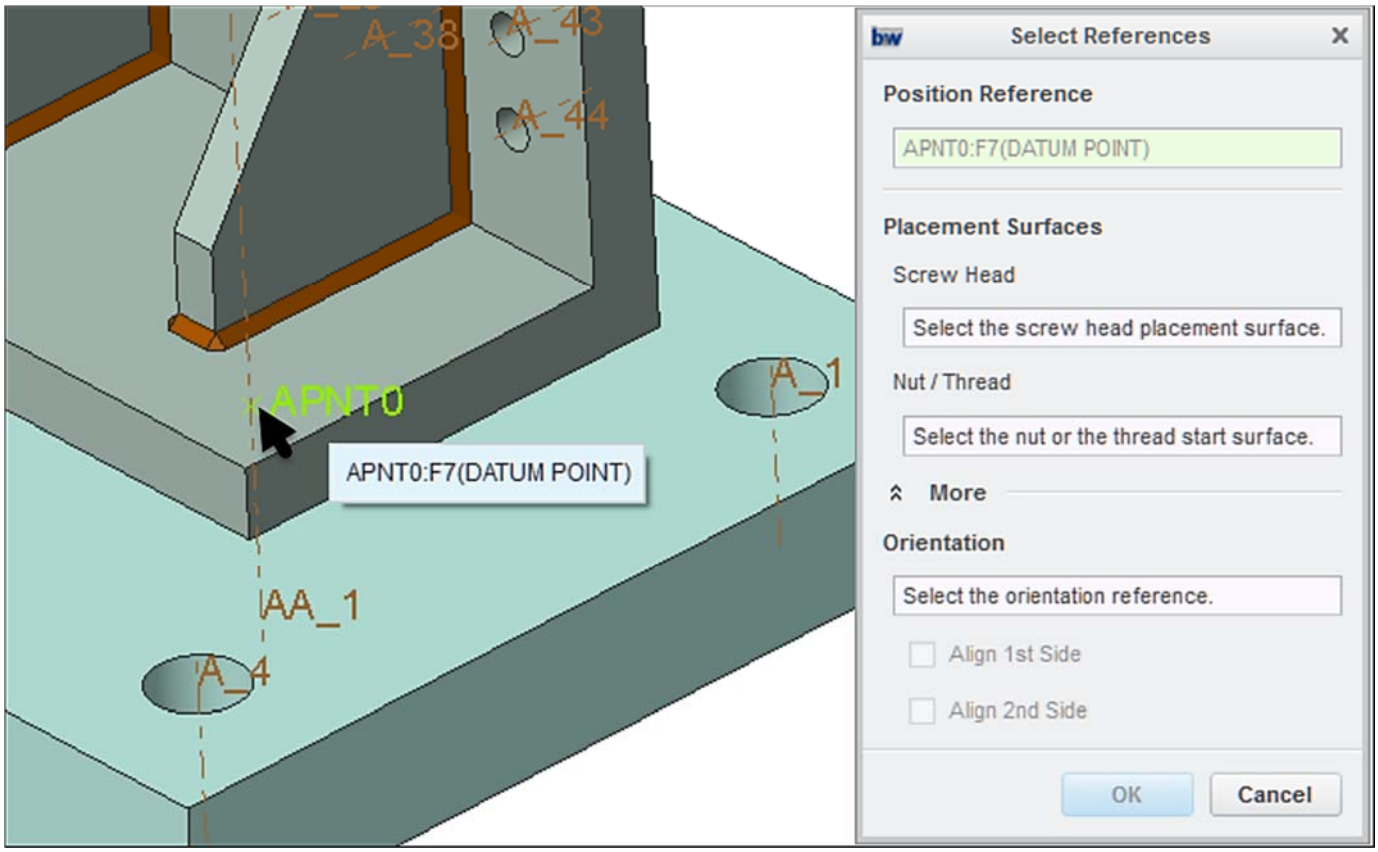


Figure 13.9(a) Select the Point

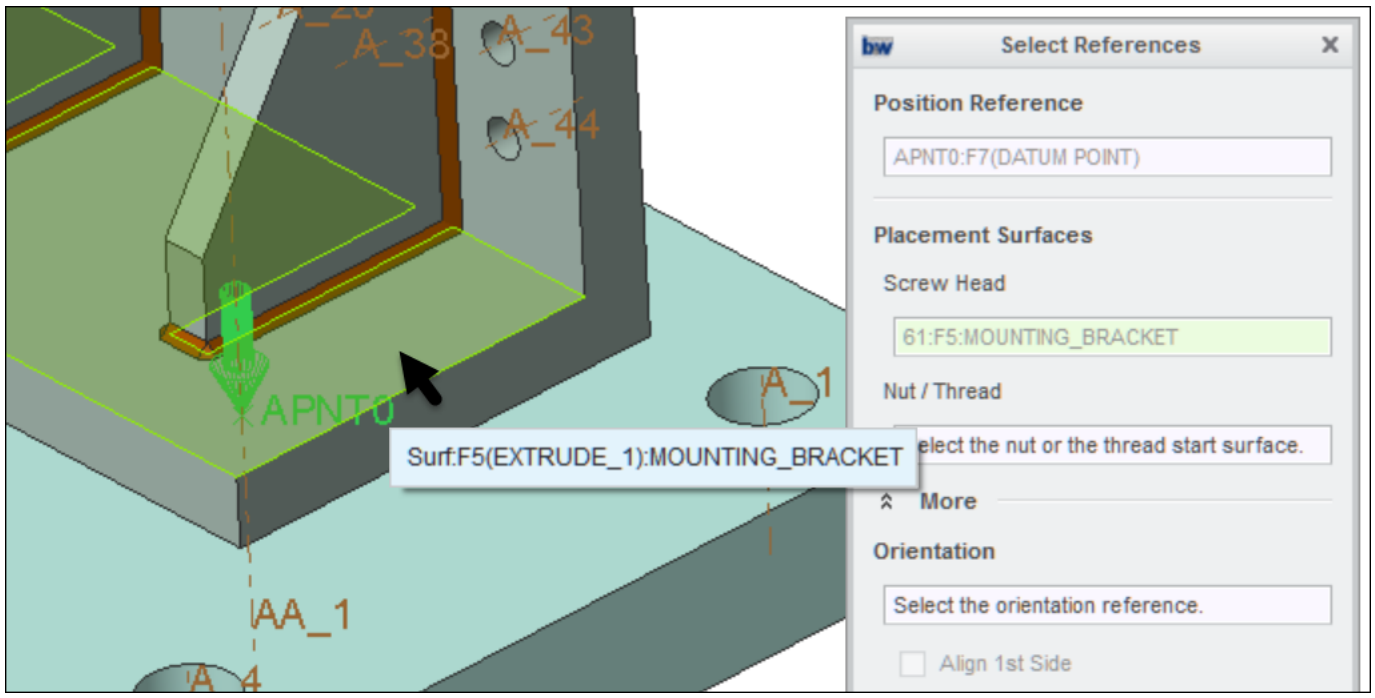


Figure 13.9(b) Select the Surface

Select the nut or the thread surface start surface [Fig. 13.9(c)] > Set Screw Fastener Definition [Fig. 13.9(d)

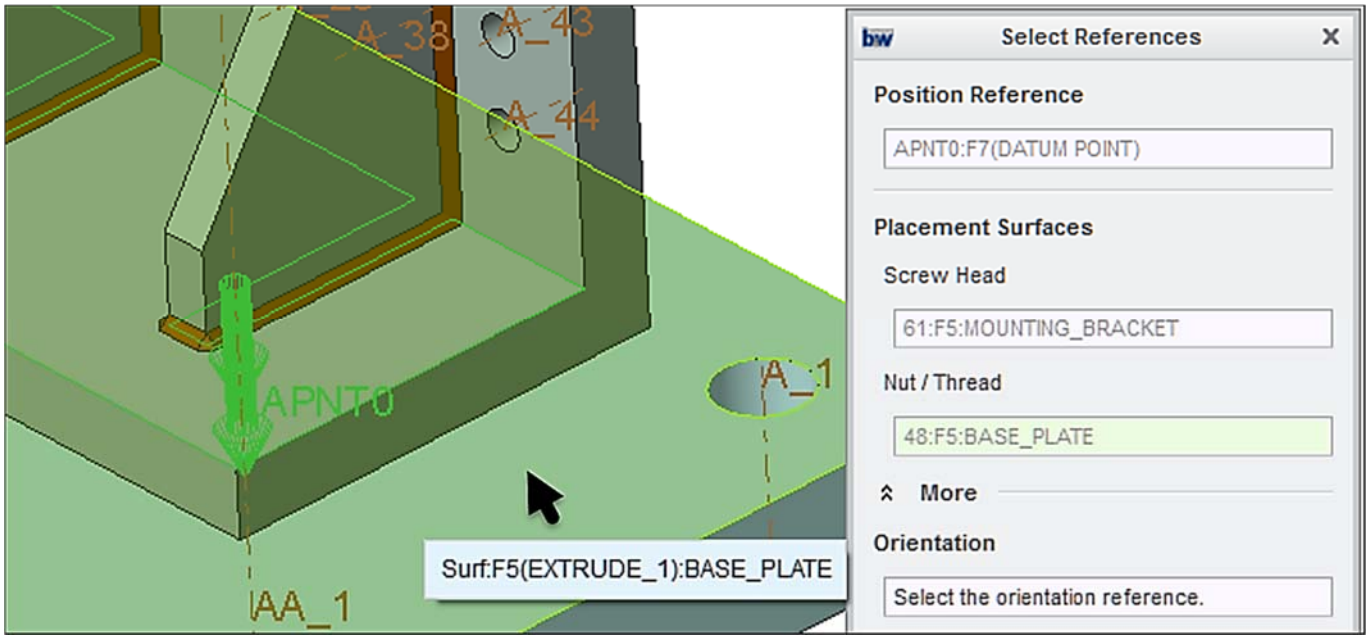


Figure 13.9(c) Select the Thread Start Surface

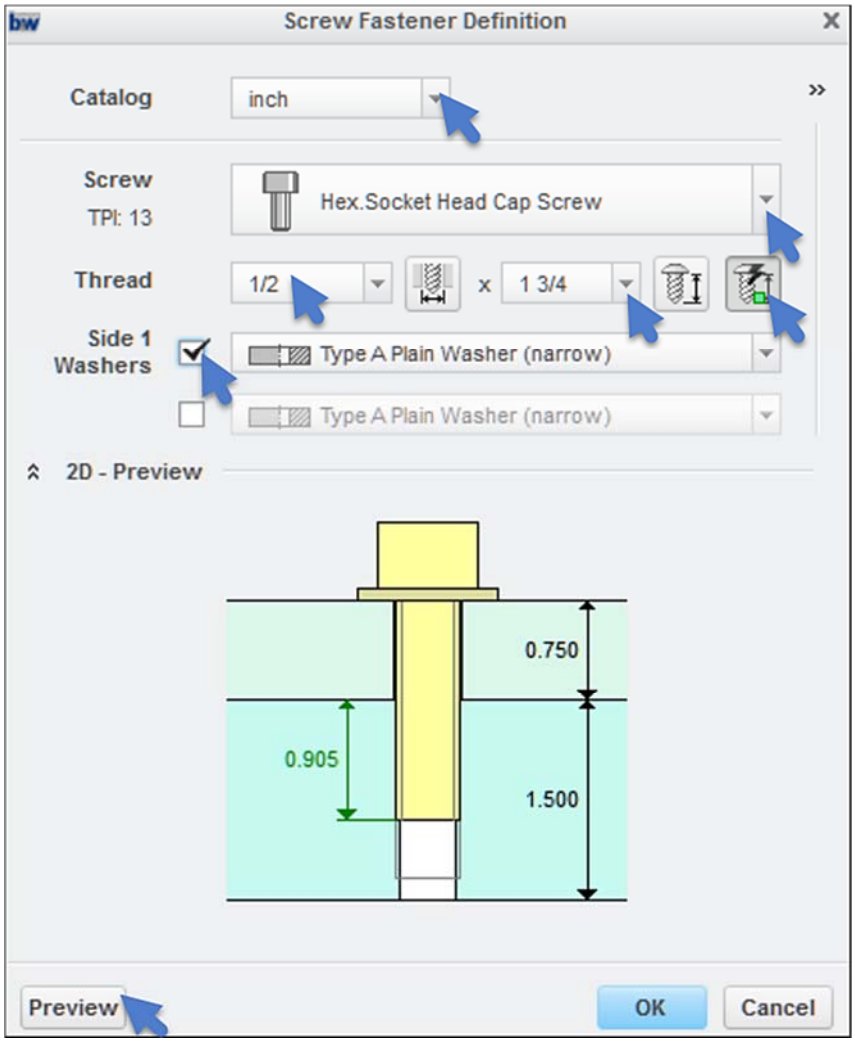


Figure 13.9(d) Screw Fastener Definition

Click: **OK** [Fig. 13.9(e)] > **LMB** > **Save**

In the Model Tree and graphics window note the features automatically generated on the parts and in the assembly.

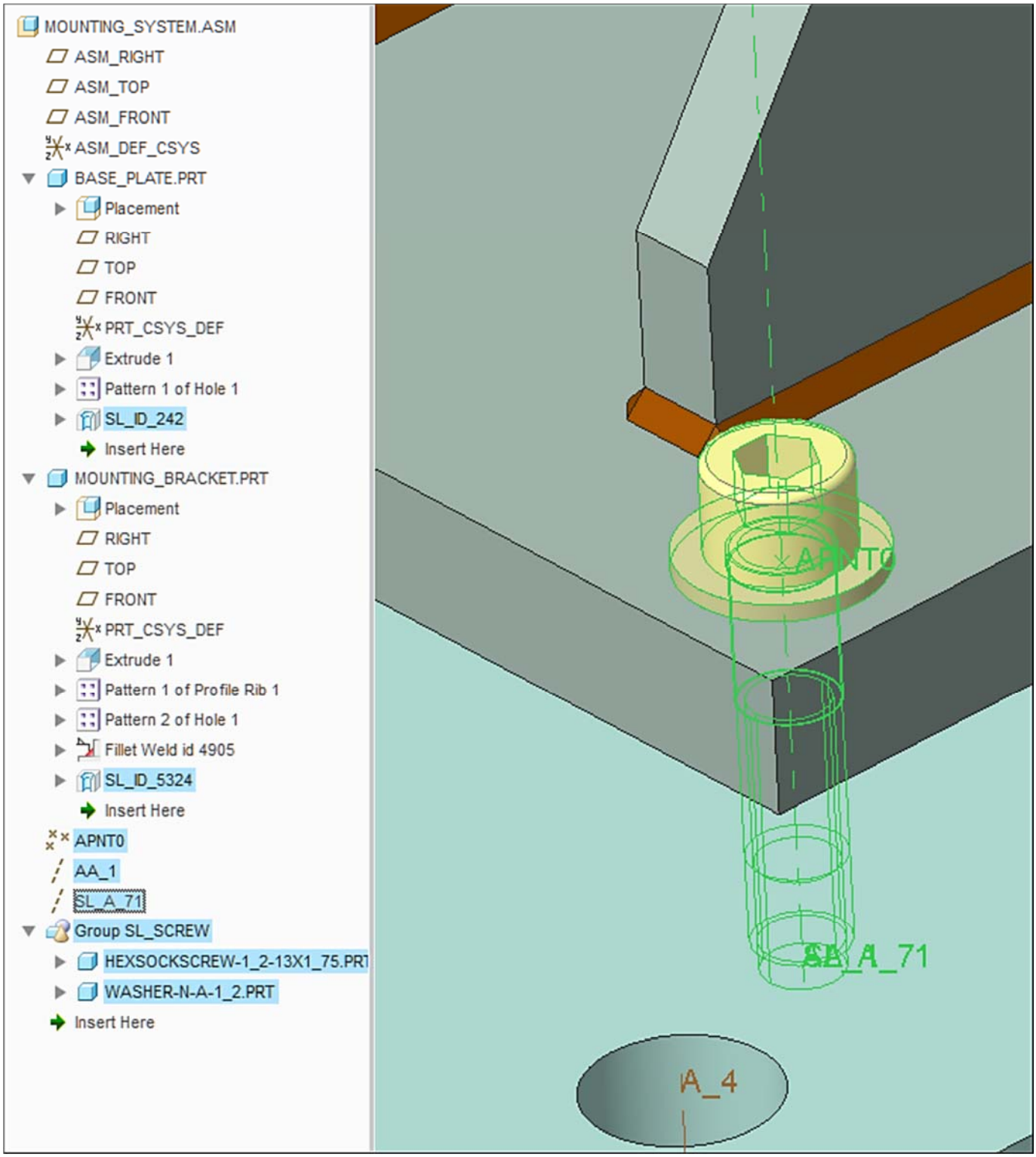


Figure 13.9(e) Holes, Threads, Screw and Washer

Select the point, axes, and **Group SL_Screw** from the Model Tree > **RMB** > **Group** > **Group** [Fig. 13.10(a)] > **RMB** > **Pattern** [Fig. 13.10(b)] >  > **LMB**

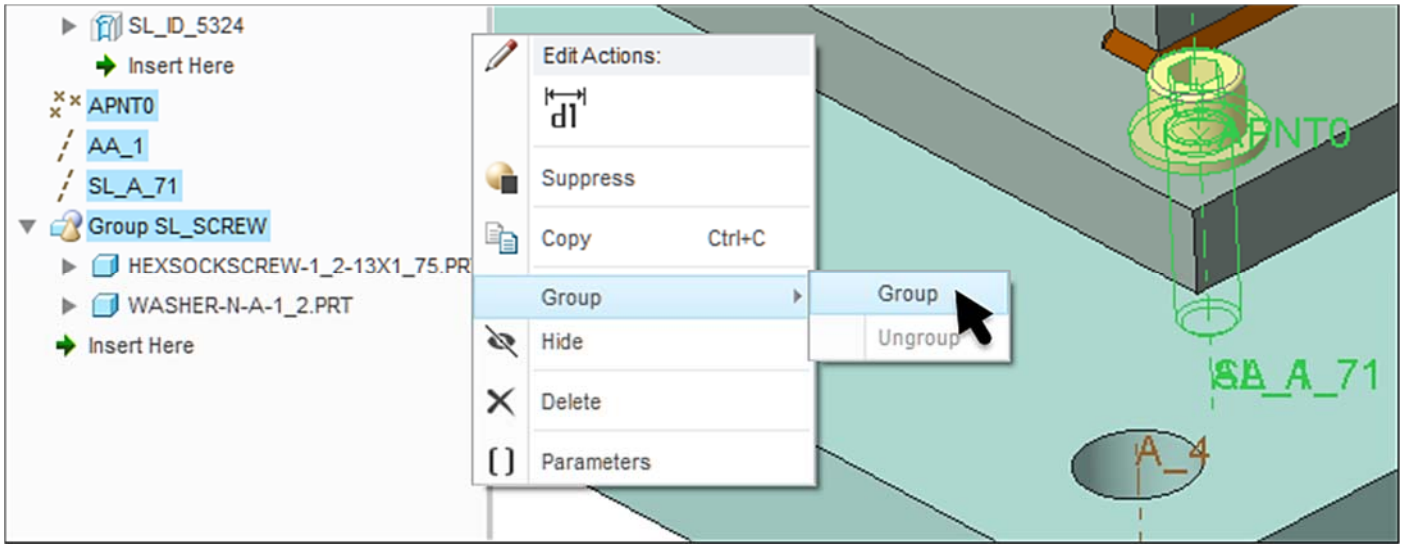


Figure 13.10(a) Group

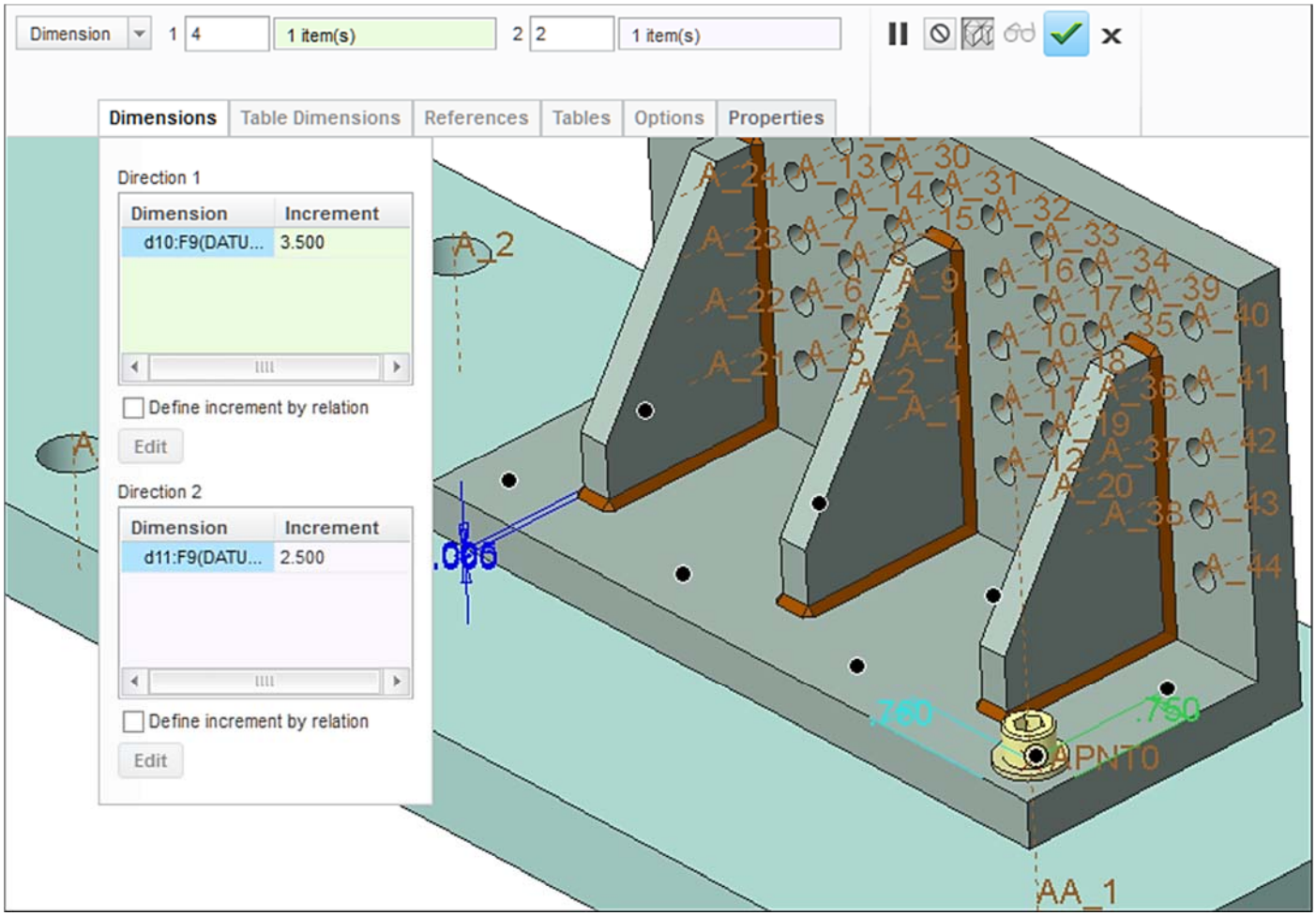


Figure 13.10(b) Pattern

Select: SL_ID_5324 of the Mounting Bracket in the Model Tree > **RMB** > **Pattern** > **Reference** > ✓ > select SL_ID_242 of the Base Plate in the Model Tree > **RMB** > **Pattern** [Fig. 13.10(c)] > ✓ > **LMB** > **Ctrl+S**

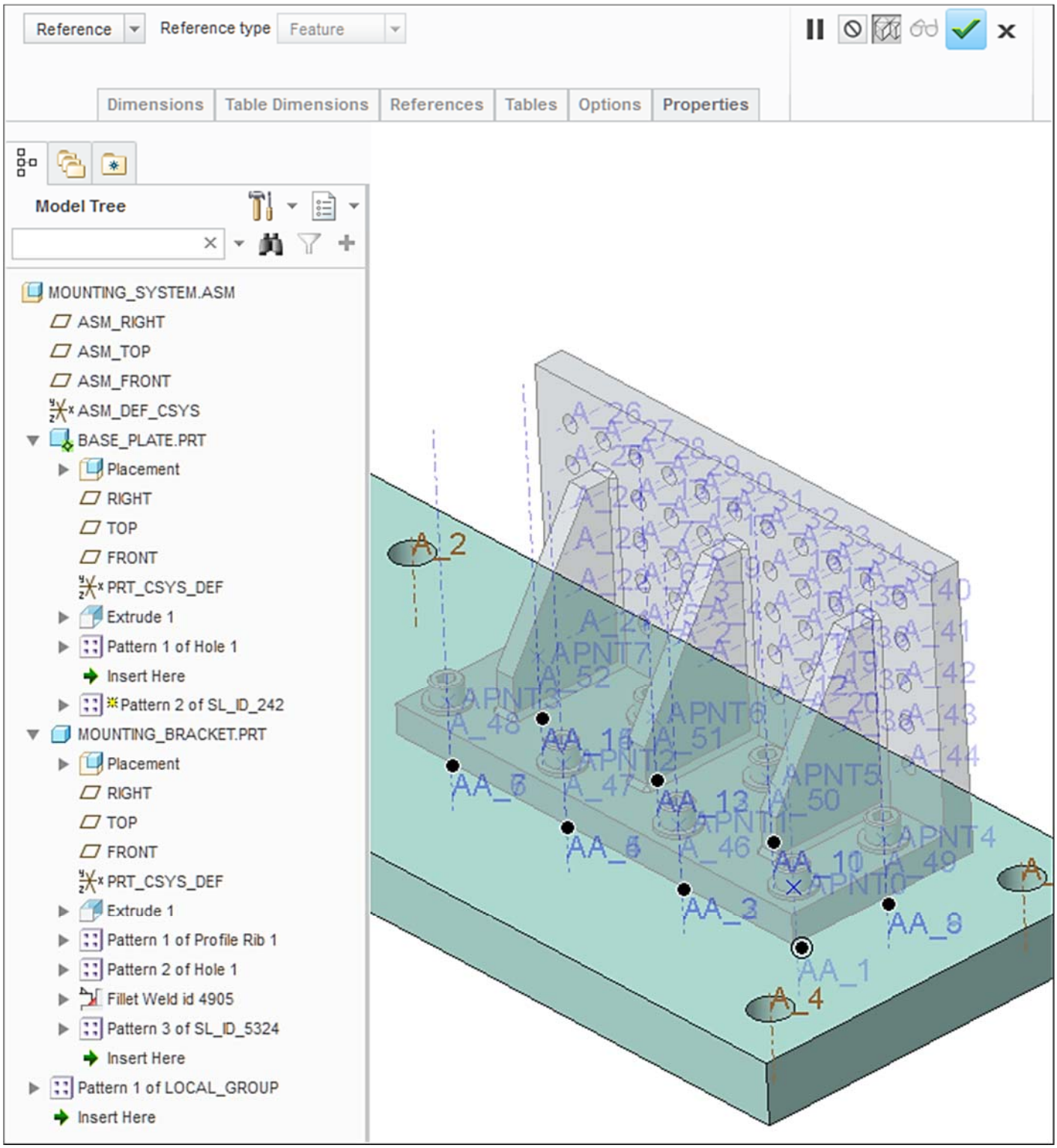


Figure 13.10(c) Pattern

Select: **Base_Plate** from the Model Tree **>** spin the model **> RMB > Activate > View** tab **> RMB** on the model color **> Edit > RMB >** make the Transparency about **27%** [Fig. 13.10(d)] **> Close > Ctrl+D >** select **Mounting_System.asm** from the Model Tree **> RMB > Atctivate > LMB > Ctrl+S**

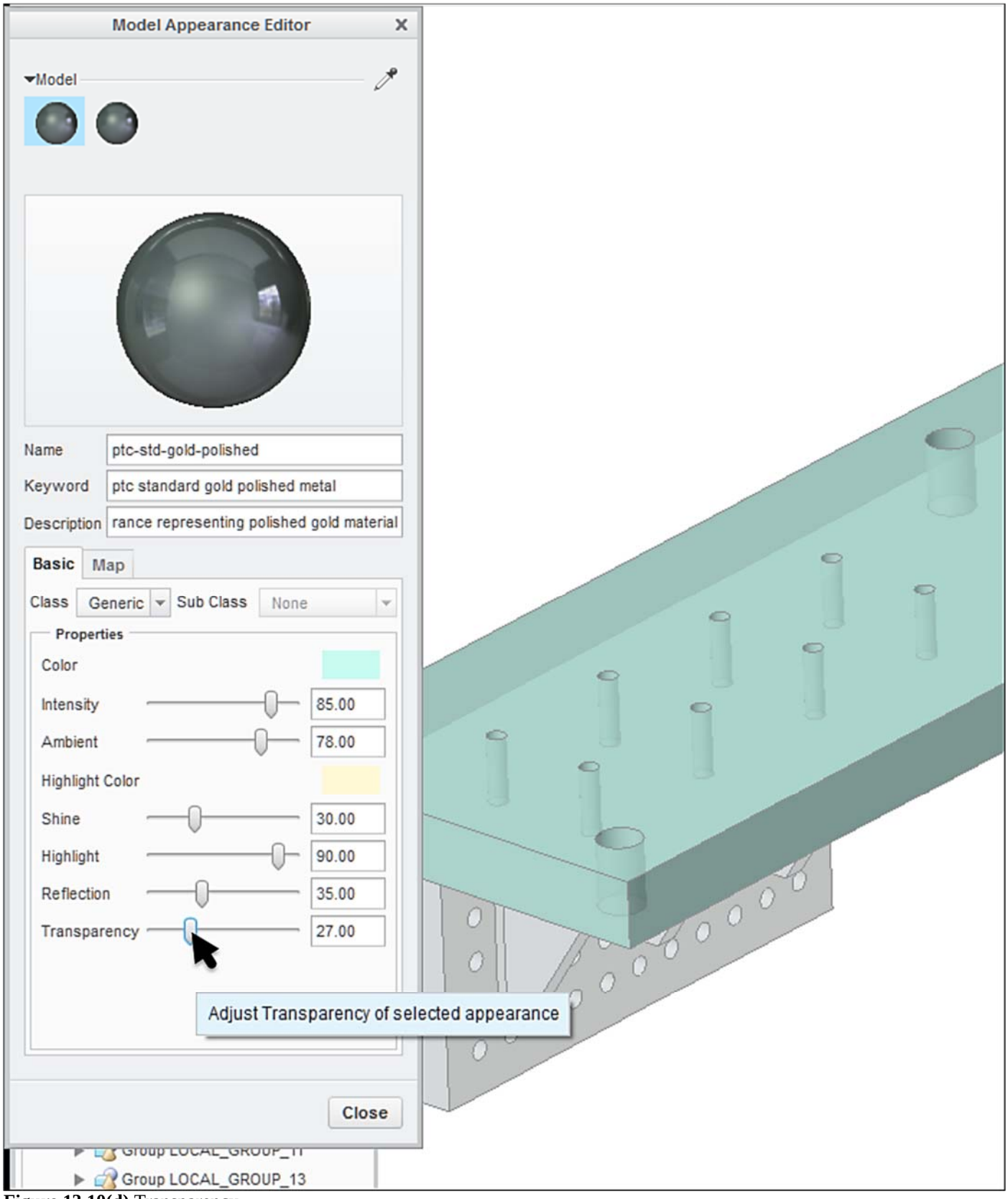


Figure 13.10(d) Transparency

Select: **MOUNTING_BRACKET** and the **Pattern 1 of LOCAL_GROUP** from the Model Tree **> RMB >** **Group** > **Group** [Fig. 13.11(a)] > Copy > Copy > Paste Special > Apply move/rotate transformations to copies **> OK >** Direction Reference **Surf.F5** [Fig. 13.11(b)]

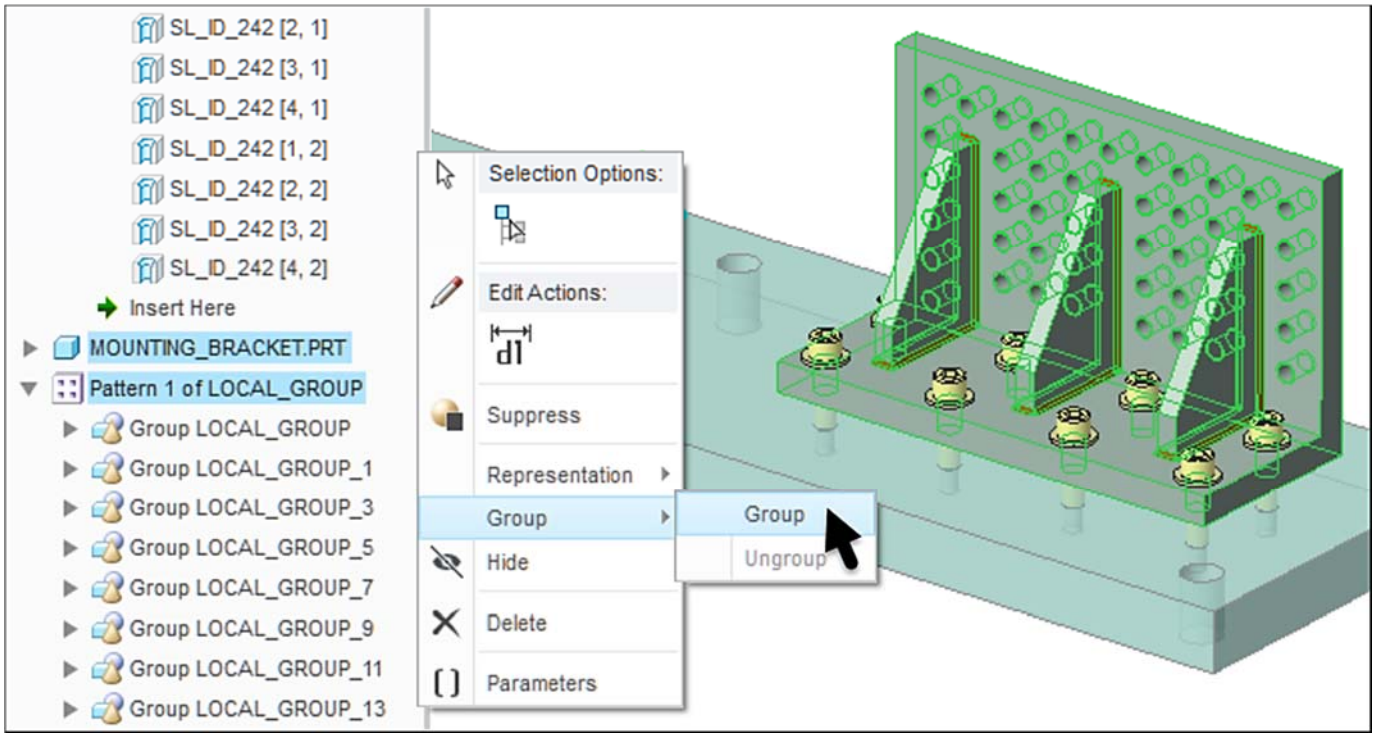


Figure 13.11(a) Group the Mounting_Bracket and Pattern 1 of Local_Group

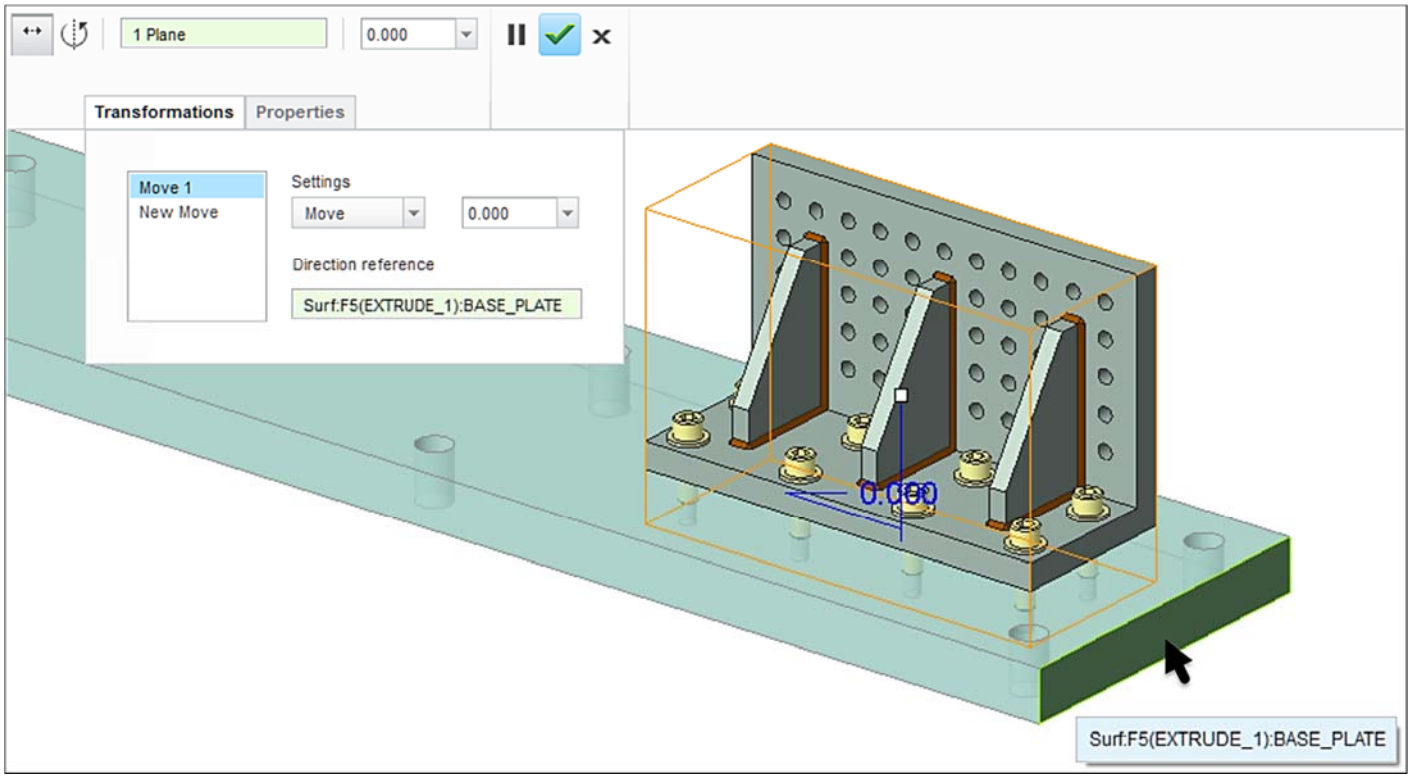


Figure 13.11(b) Copy > Paste Special > Select the Surface

Drag the Group **22** inches [Fig. 13.11(c)] >  > **LMB** [Fig. 13.11(d)] > **Ctrl+S**

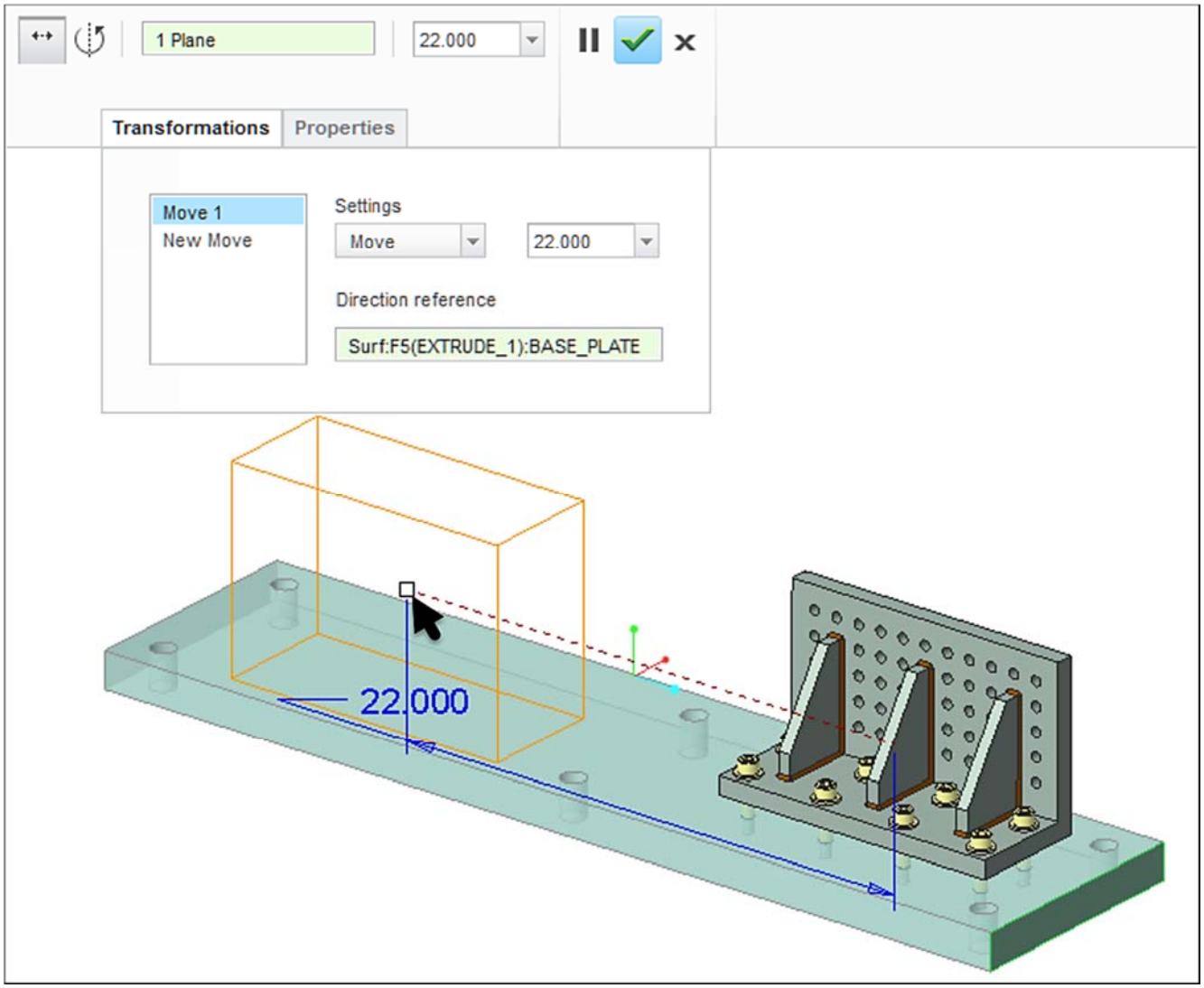


Figure 13.11(c) Drag the Group

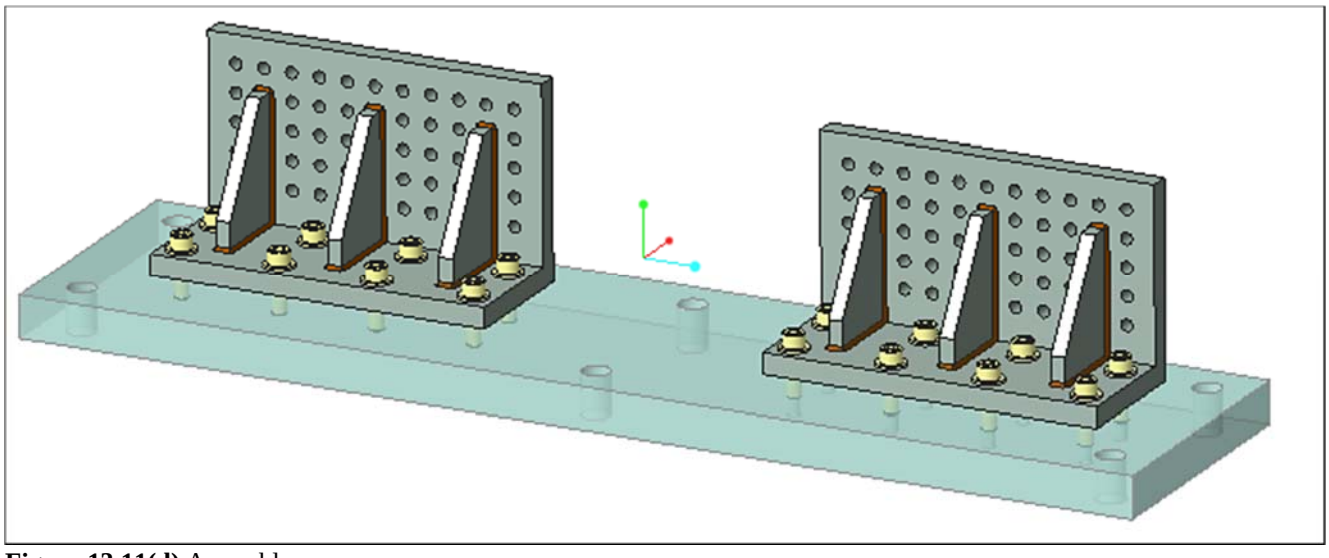


Figure 13.11(d) Assembly

Select: **Base_Plate** > **RMB** > **Activate** > 

>

> select the **DATUM AXIS** [Fig. 13.12(a)] > 

> **Ctrl** key > select the top surface of the **Base_Plate** [Fig. 13.12(b)] > 

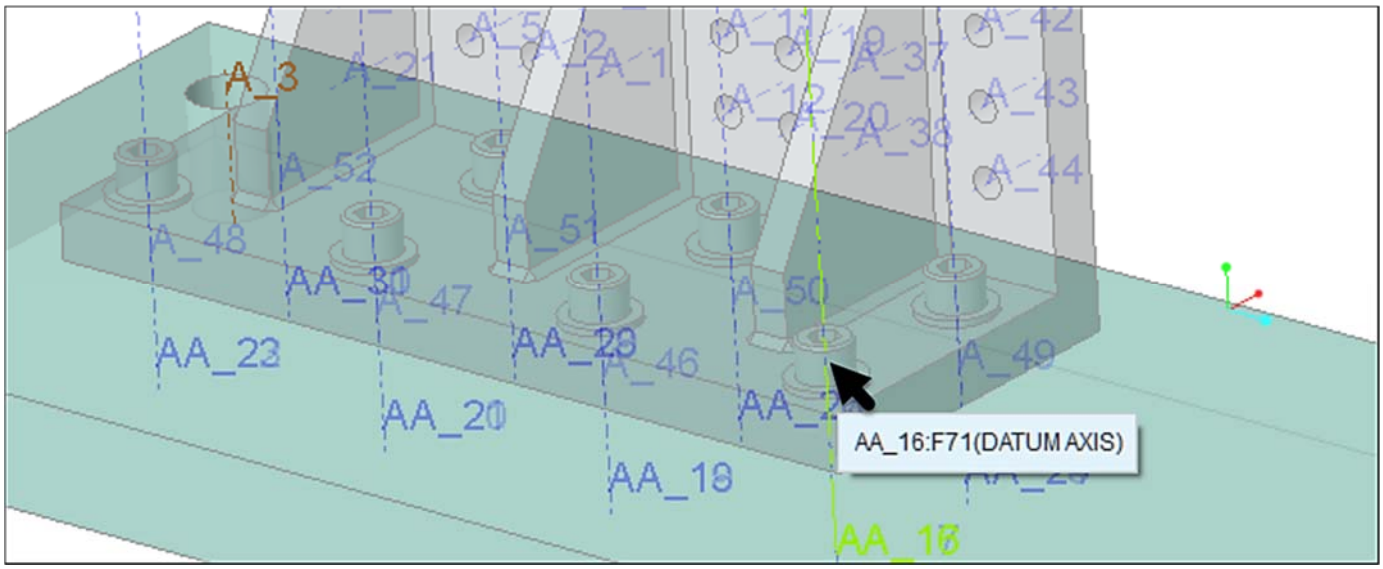


Figure 13.12(a) Select the Axis

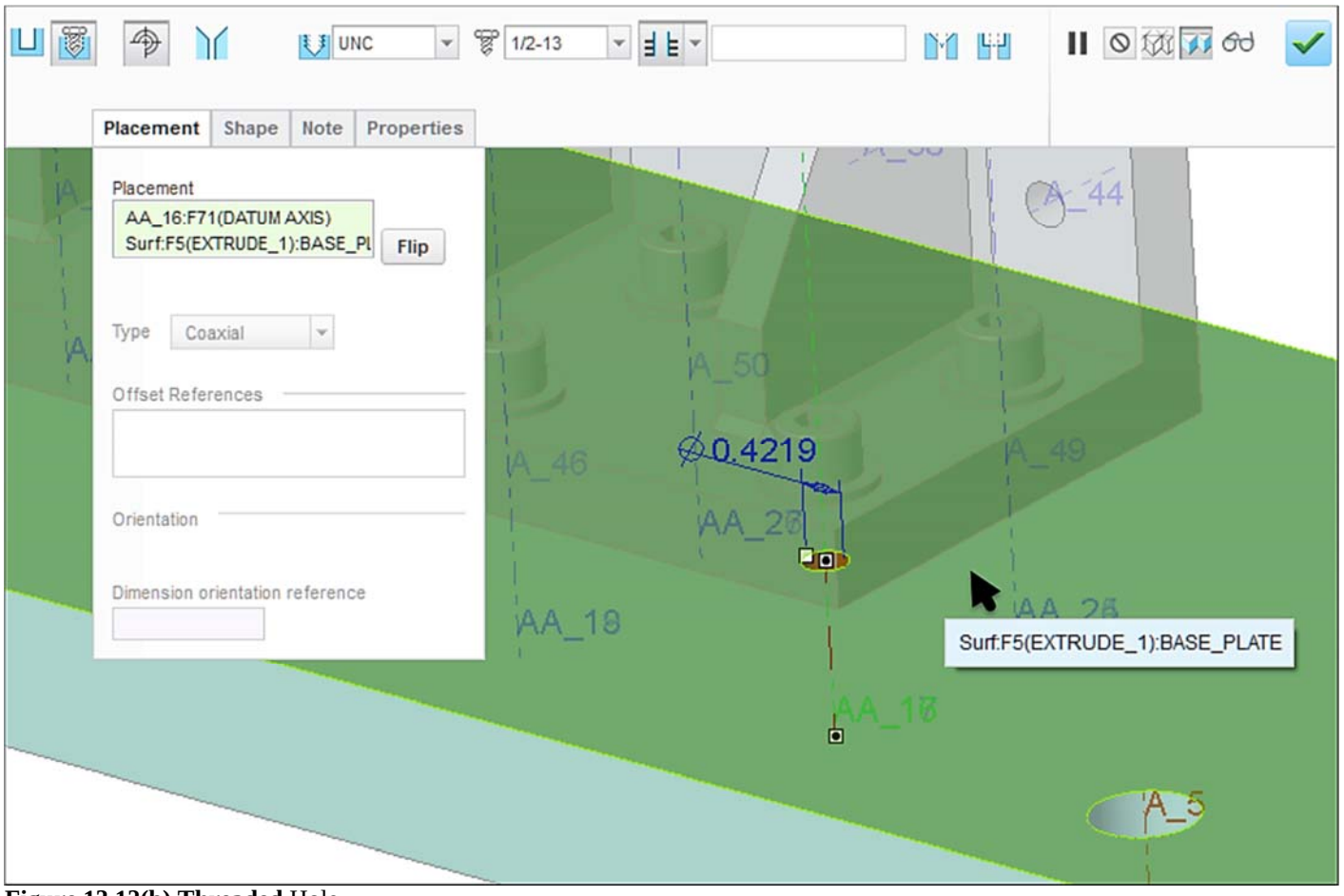


Figure 13.12(b) Threaded Hole

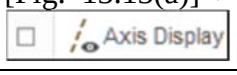
With the threaded hole still selected > **RMB** > **Pattern** > **Reference** [Fig. 13.13(a)] >  > select **Mounting_System.asm** from the Model Tree > **RMB** > **Atctivate** > **LMB** >  [Fig. 13.13(b)]

Figure 13.13(a) Pattern

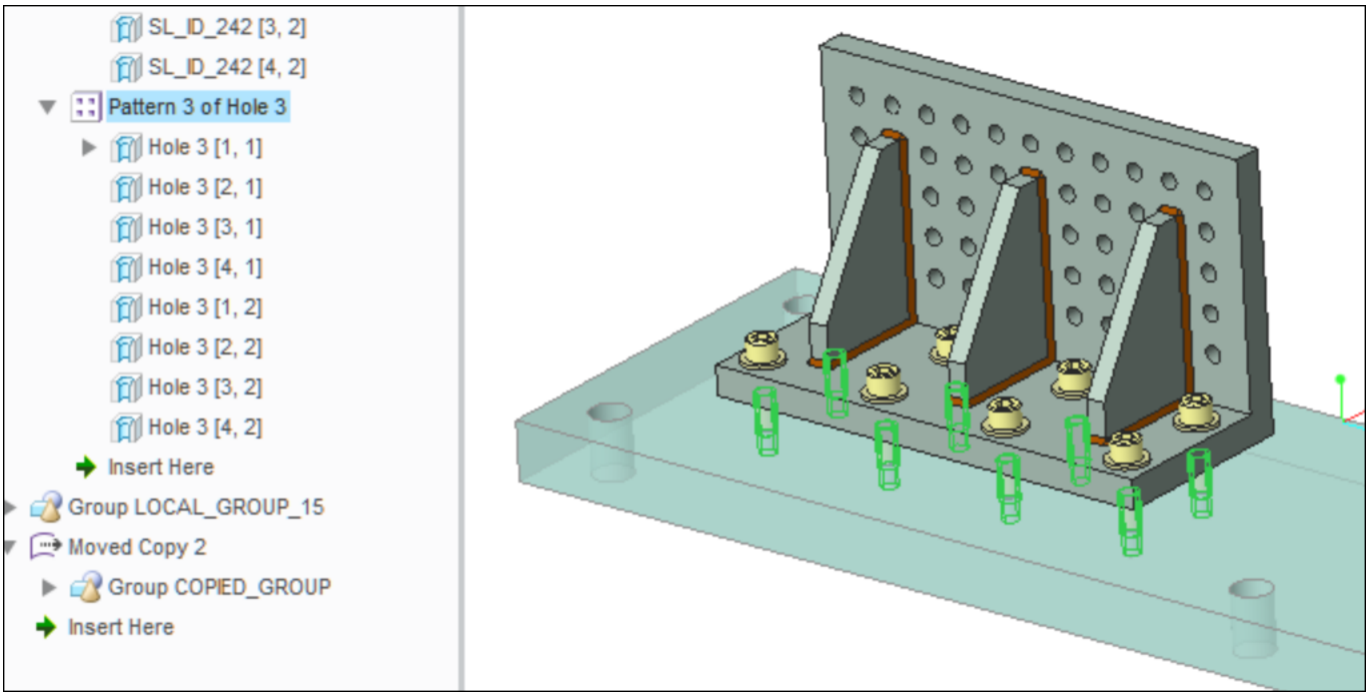


Figure 13.13(b) Patterned Threaded Hole

With the assembly active: **Saved Orientations** > **Front** > zoom in > **Tools** tab > Axis Display, Point Display > Csys Display, Plane Display > Point > pick a position on front corner of the **Base_Plate** > locate the hole from each vertical face/surface [Fig. 13.14(a)] > with the point still selected: Axis > press **Ctrl** key > select the surface [Fig. 13.14(b)] > **OK** > **LMB** > **Ctrl+S**

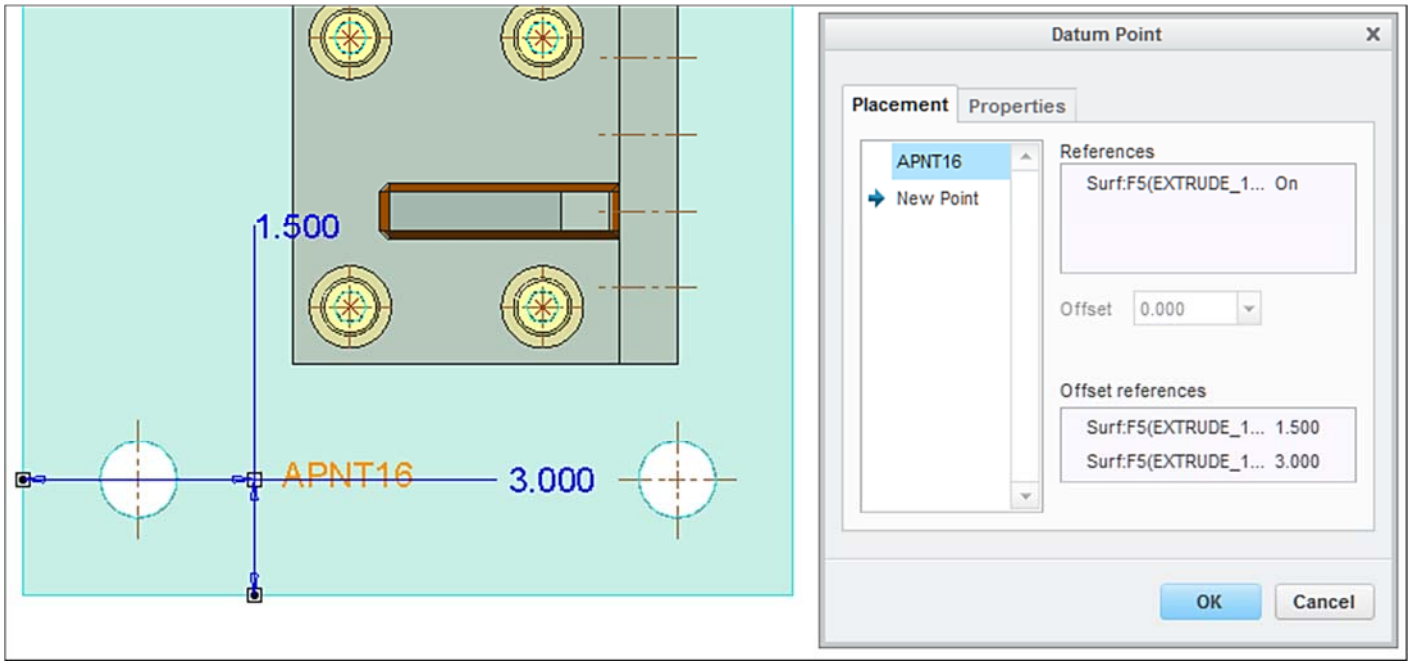


Figure 13.14(a) Datum Point

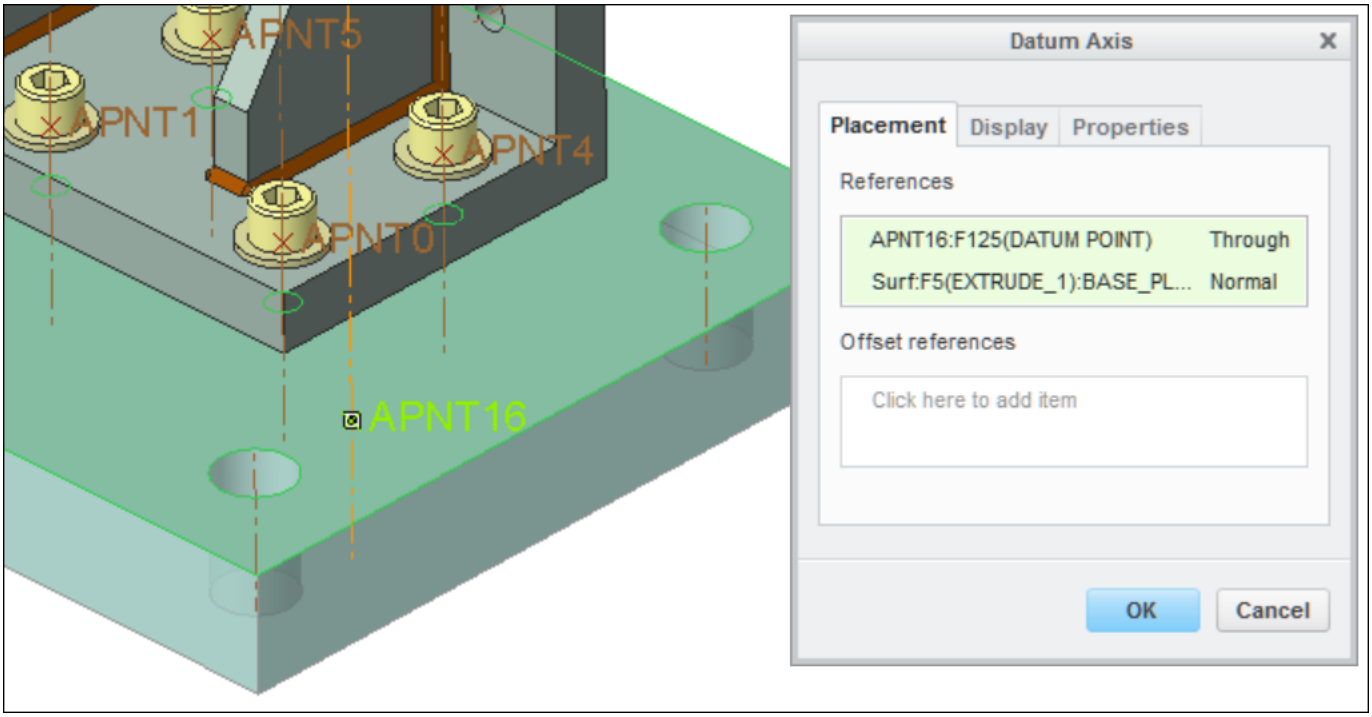


Figure 13.14(b) Datum Axis

Select **Tools** tab > Dowel Pin **Dowel** > Assemble on point or axis > Select the position (point/axis) **APTN16** > > Select the dowel pin placement surface [Fig. 13.15(a)] > **OK** > Set the Dowel Pin Fastener Definition [Fig.13.15(b)] > **OK** > **Ctrl+S**

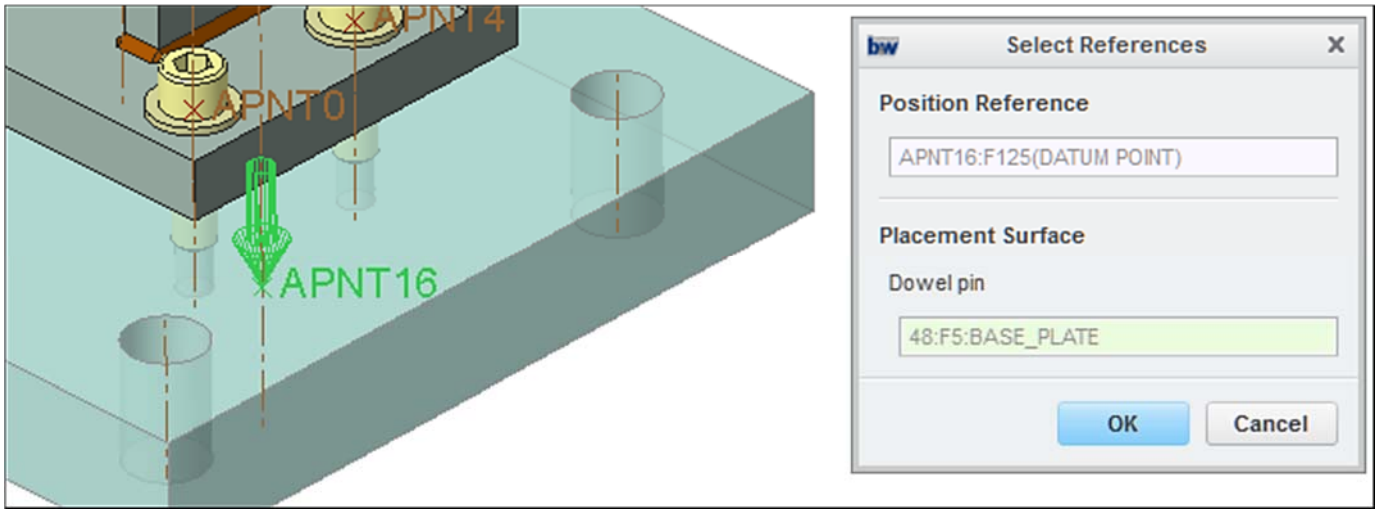


Figure 13.15(a) Point and Surface Selection for Dowel Placement

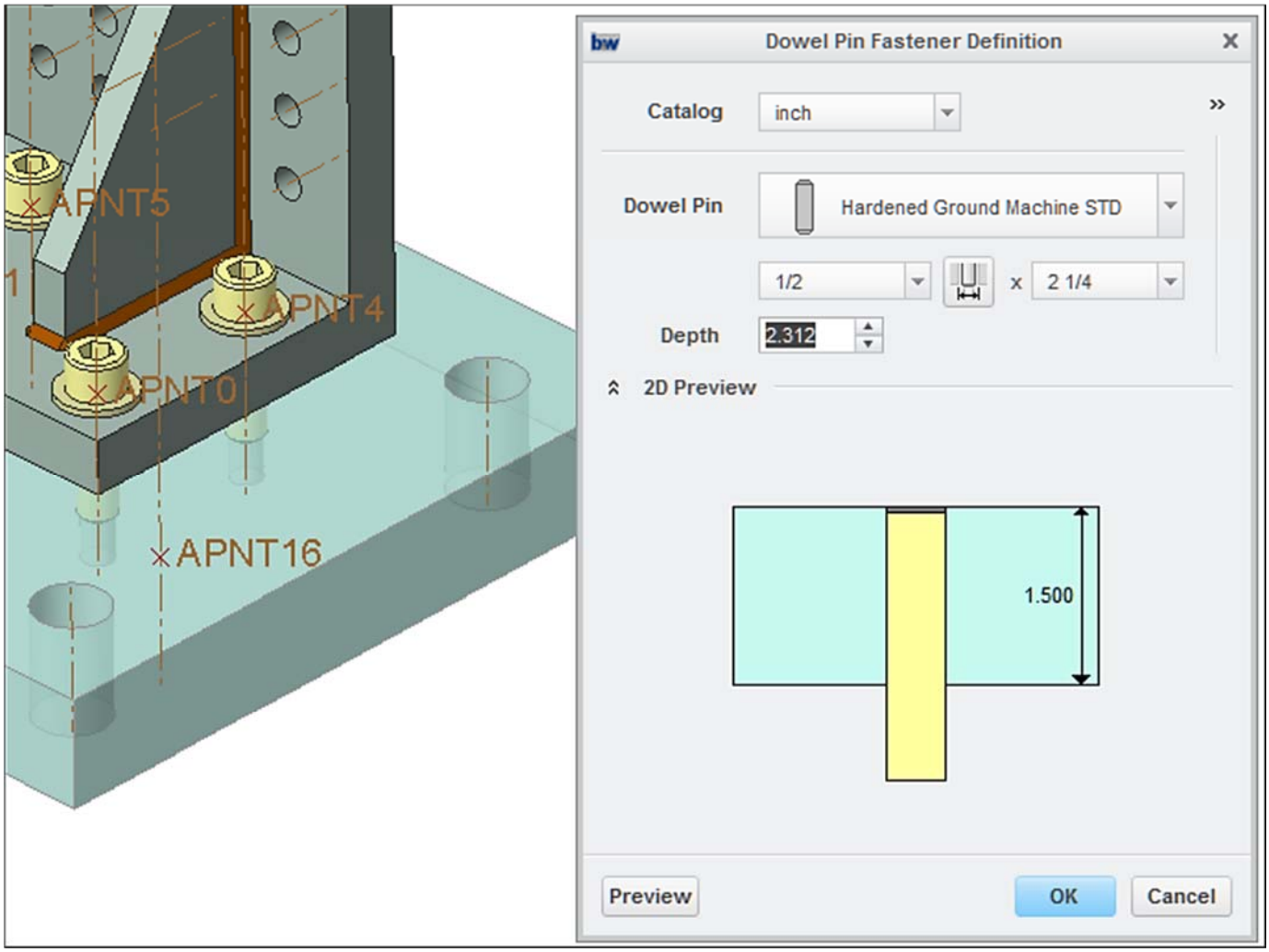


Figure 13.15(b) Dowel Pin Fastener Definition

Select the new features and create a group > **Model** tab > **Pattern** Fig.13.16(b)] >  > **Ctrl+S**

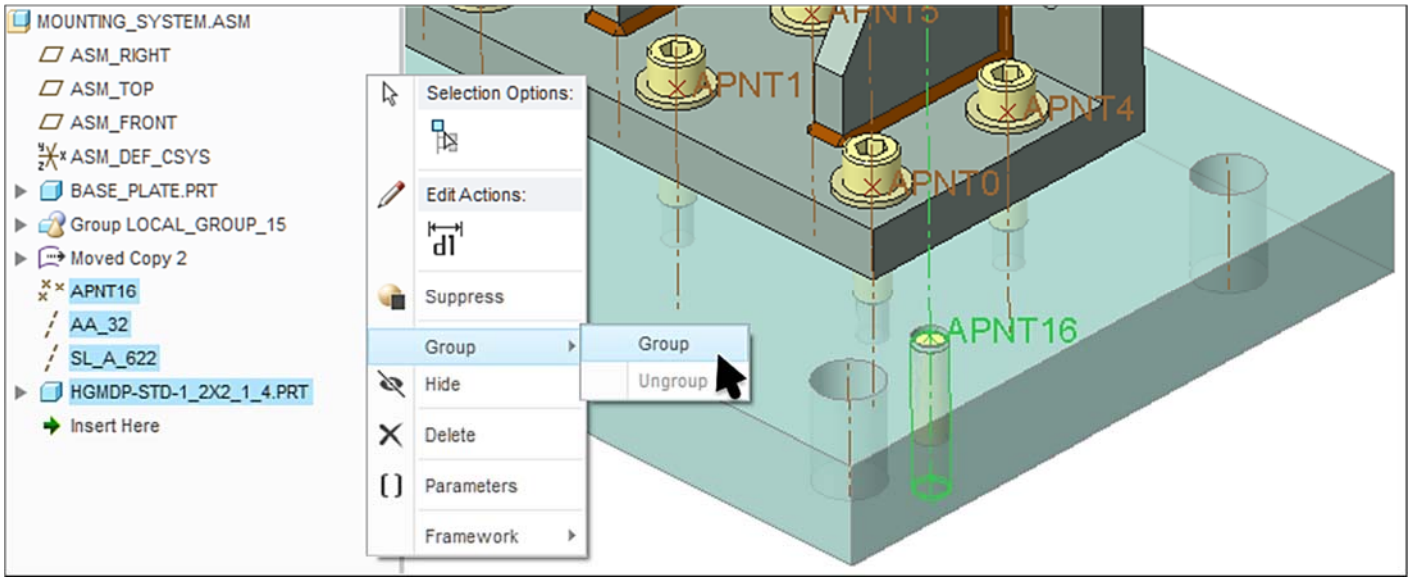


Figure 13.16(a) Group

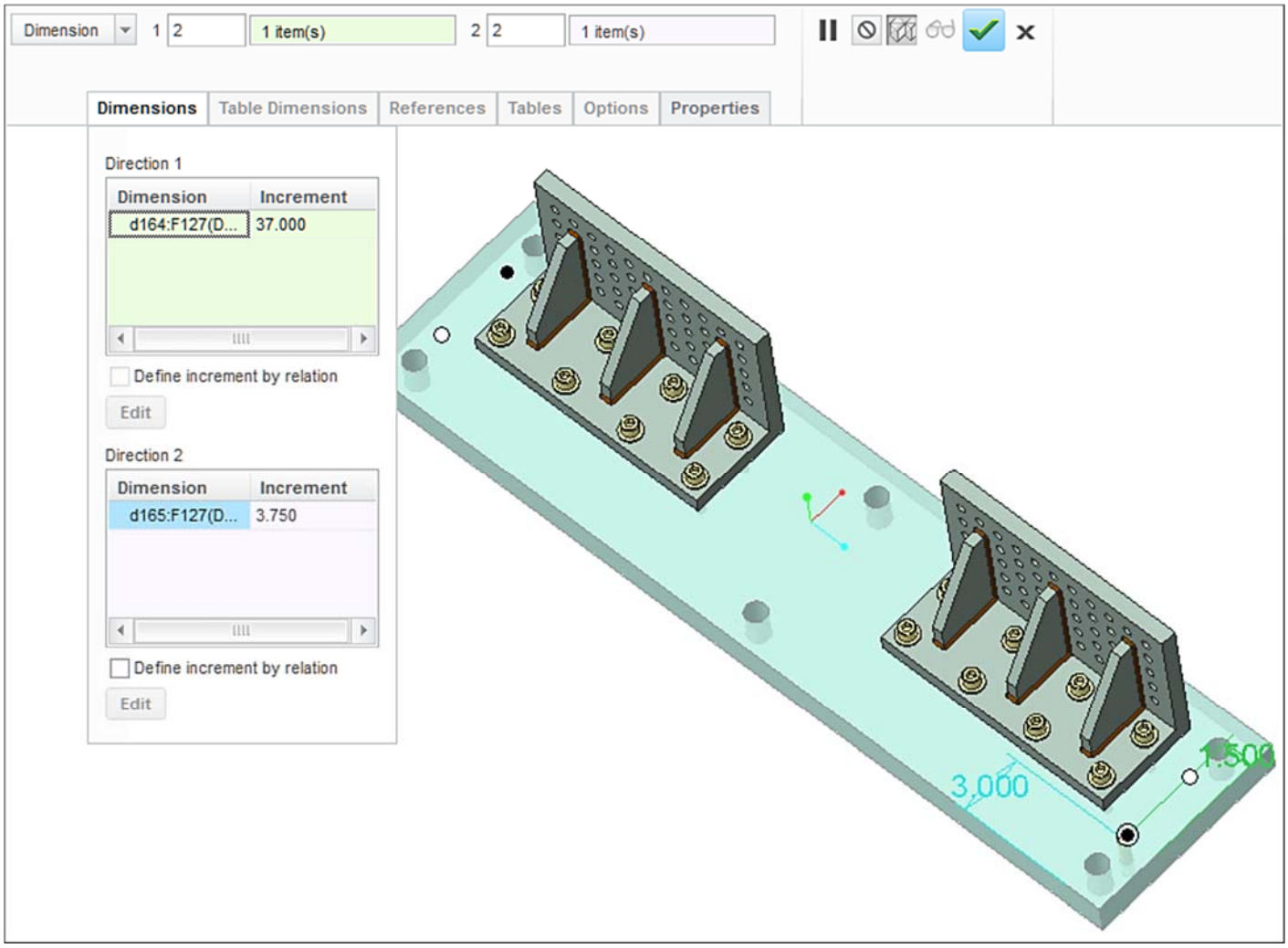


Figure 13.16(b) Group Pattern (2 of 4 positions)

Select: **SL_ID_1798** from the **Base_Plate** in the **Model Tree > RMB > Pattern > Reference** Fig.13.17(a)] >  > **Ctrl+S** Fig.13.17(b)]

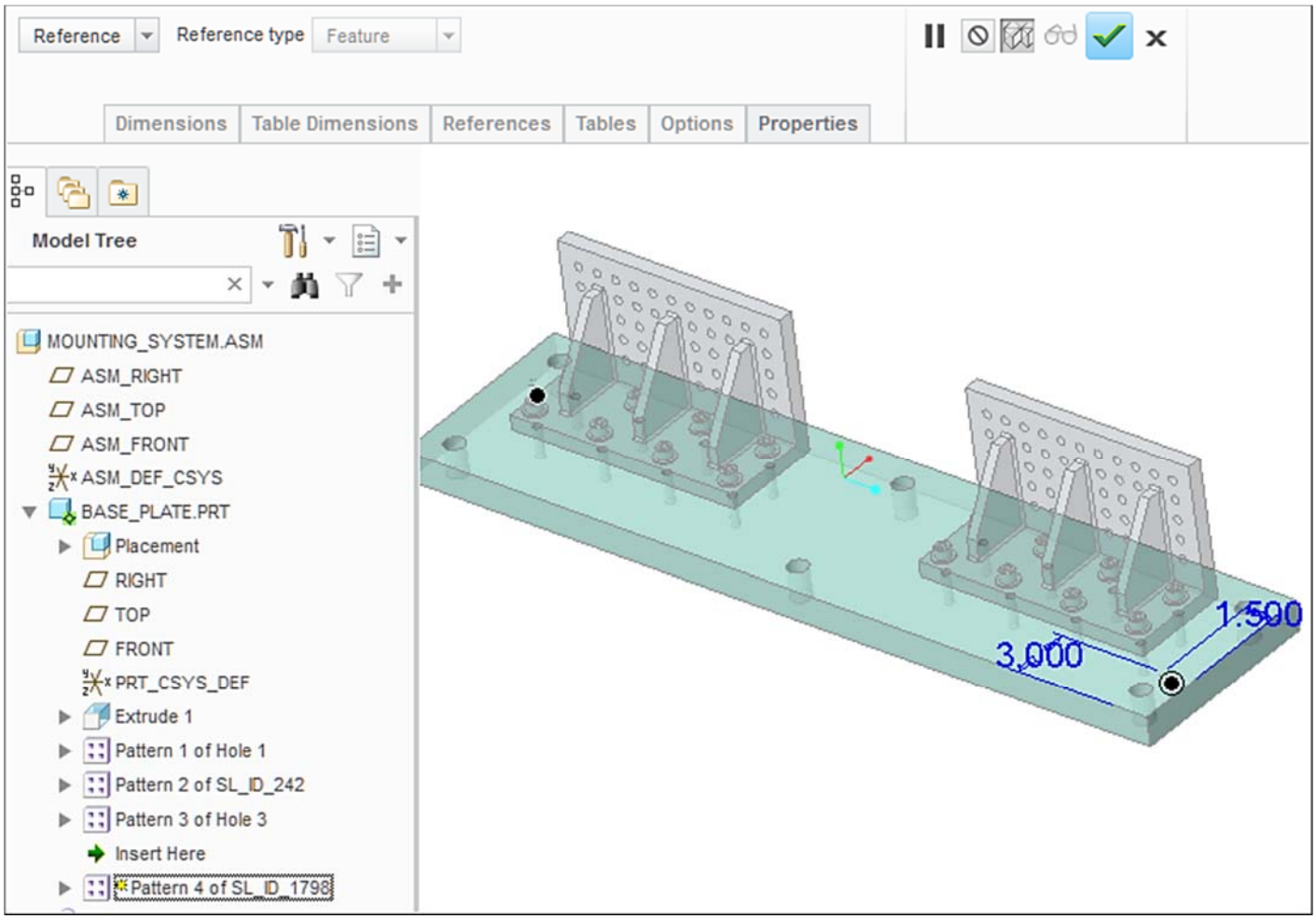


Figure 13.17(a) Pattern the Hole

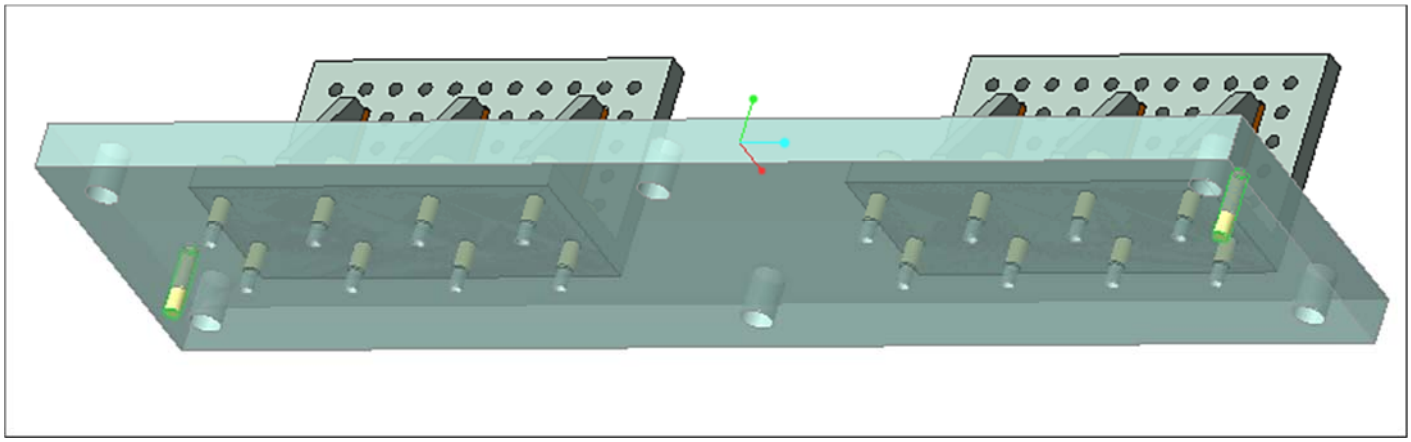


Figure 13.17(a) Dowels

Click: **Reference Viewer** > Dependencies > (Fig. 13.18) > **Close** >

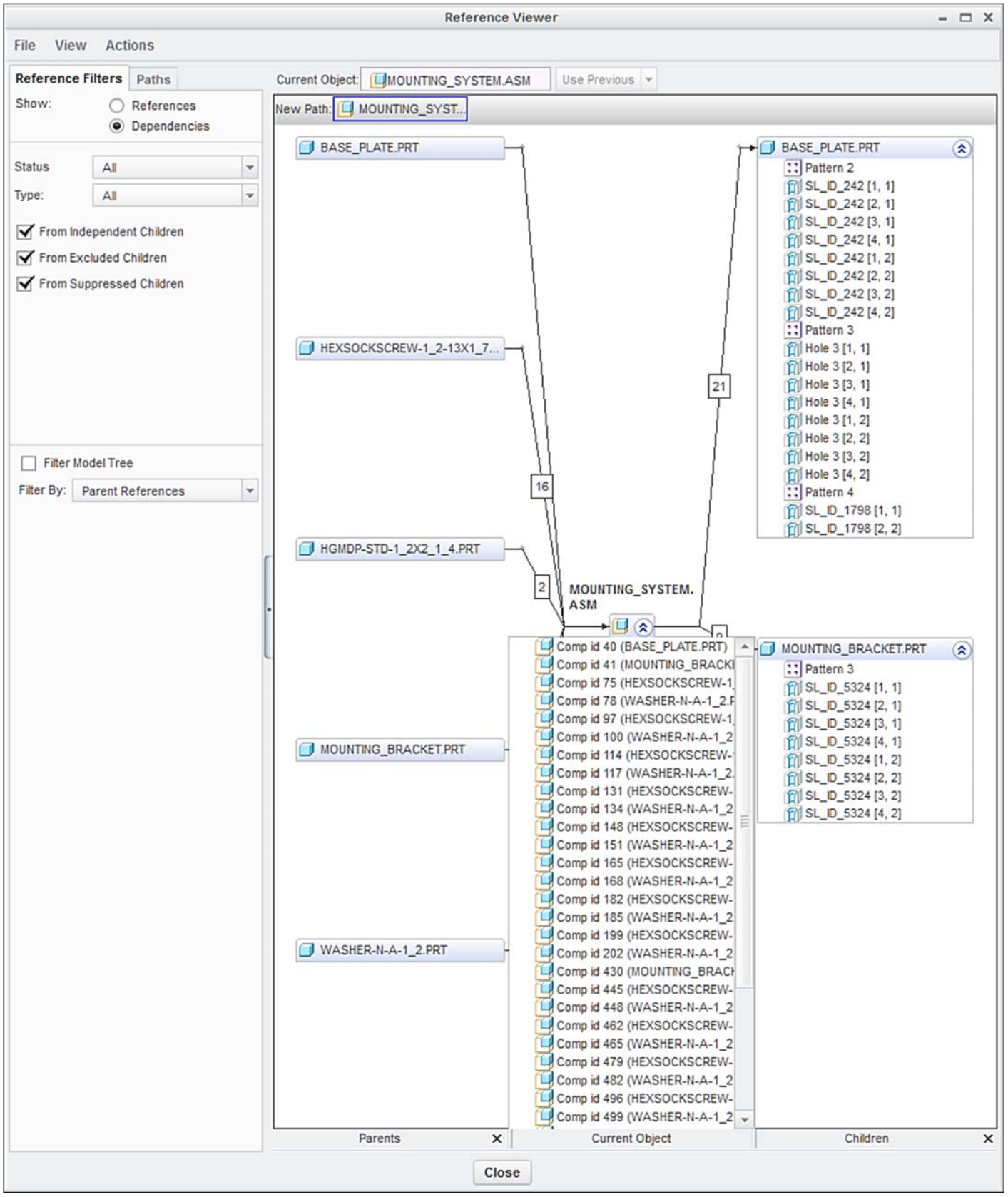


Figure 13.18 Reference Viewer

Click: **View** tab > **Model Display** Group > **Temporary Shade** (Fig. 13.19)

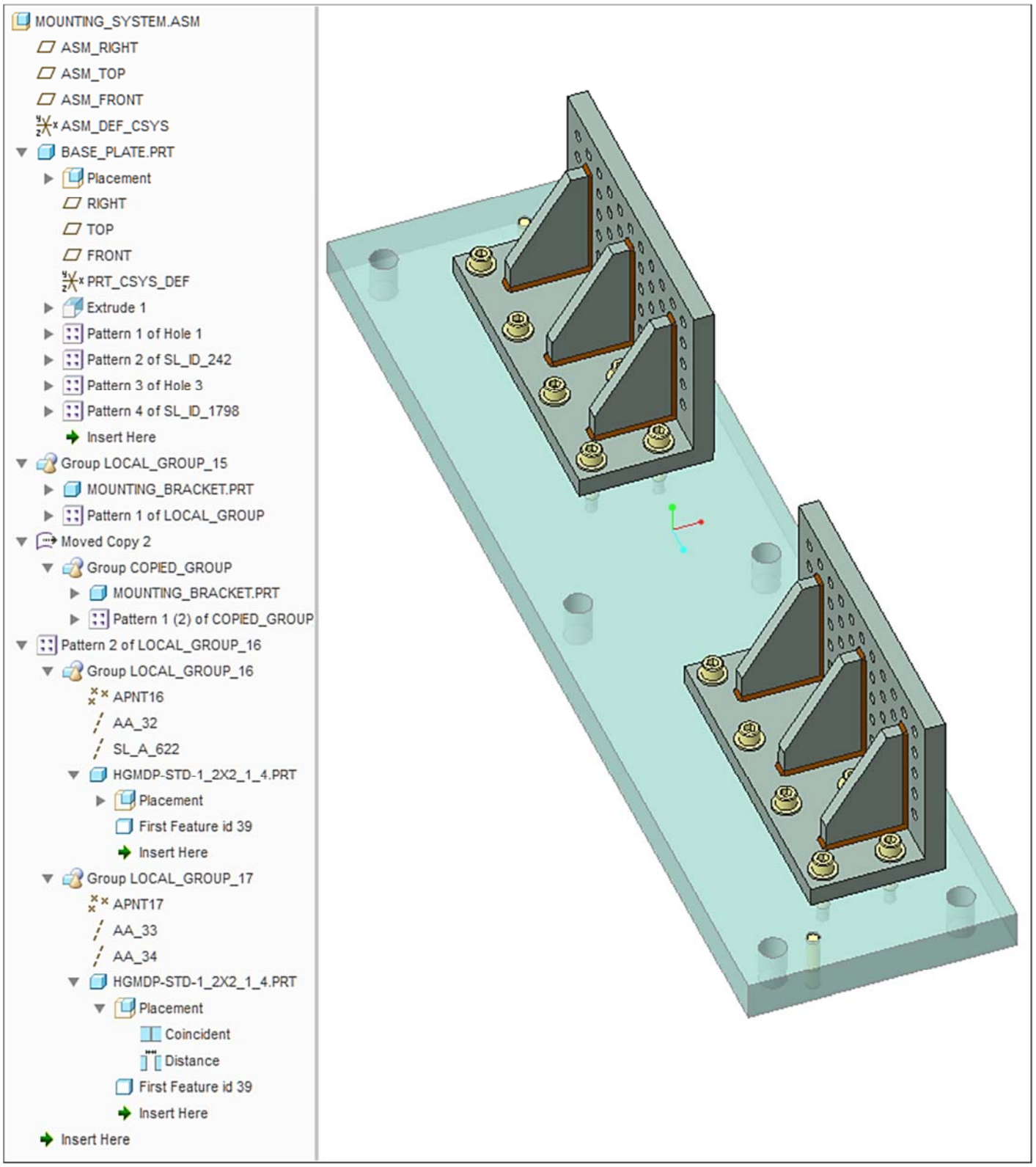


Figure 13.19 Temporary Shading

Ctrl+N > Drawing > mounting_system > Template **Browse >** from Lesson 12 select **ASM_FORMAT_E > OK >** delete the top view **> SCALE .5 >** add a **Projection View** from the **Front** view **> RMB > Sheet Setup > Browse > E Size > OK** [Fig. 13.20(a)] > add a **New Sheet** and **General View > SCALE .75** [Fig. 13.20(a)]

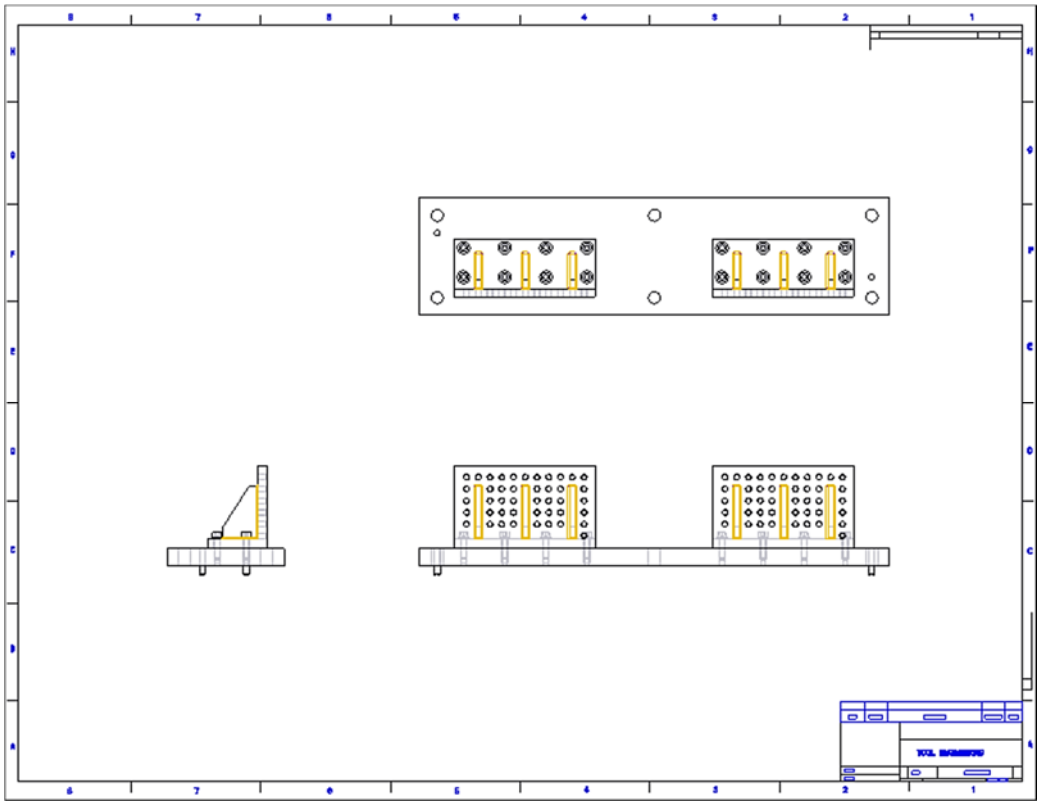


Figure 13.20(a) Sheet 1

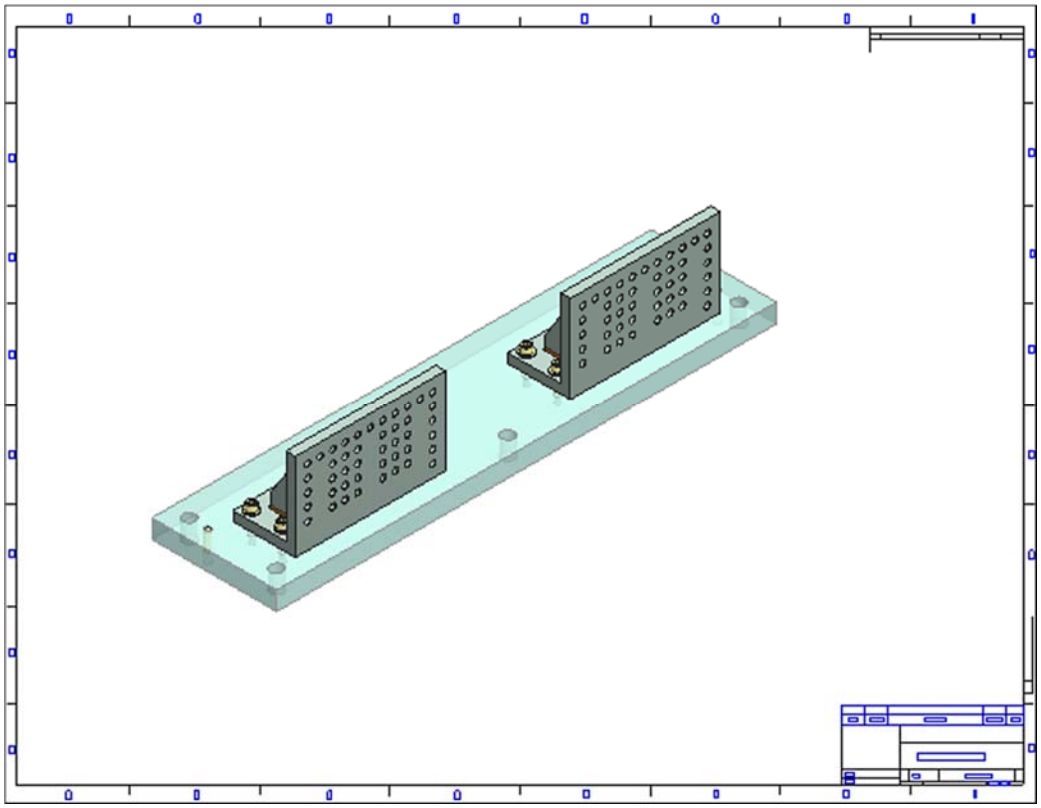


Figure 13.20(b) Sheet 1

Double click on the view: **Angles** > **Edge/Axis** > select a vertical reference > **180** [Fig. 13.21(a)]

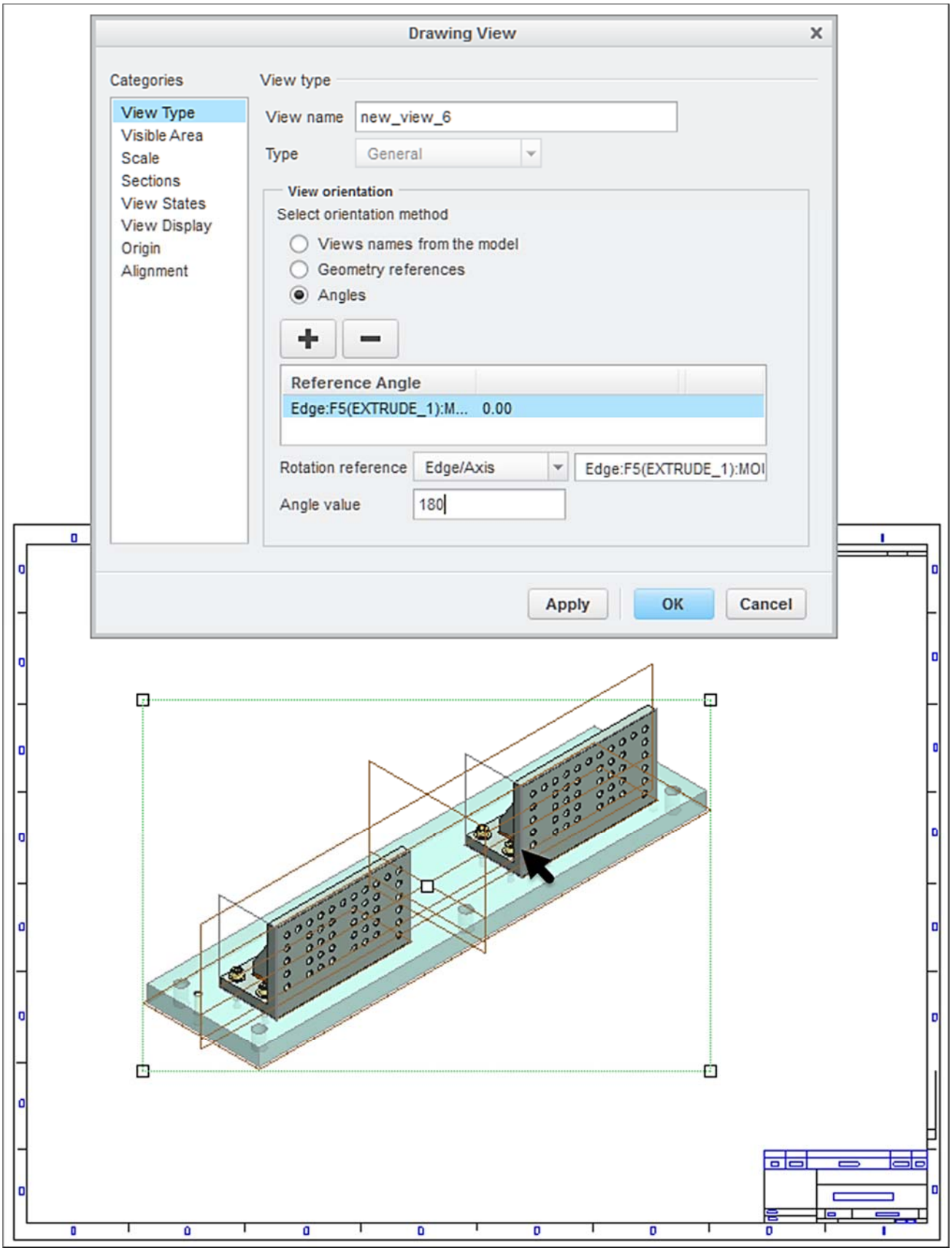


Figure 13.21(a) Reorient the Model

Click: **Apply** [Fig. 13.21(b)] > **OK** > **Ctrl+S**

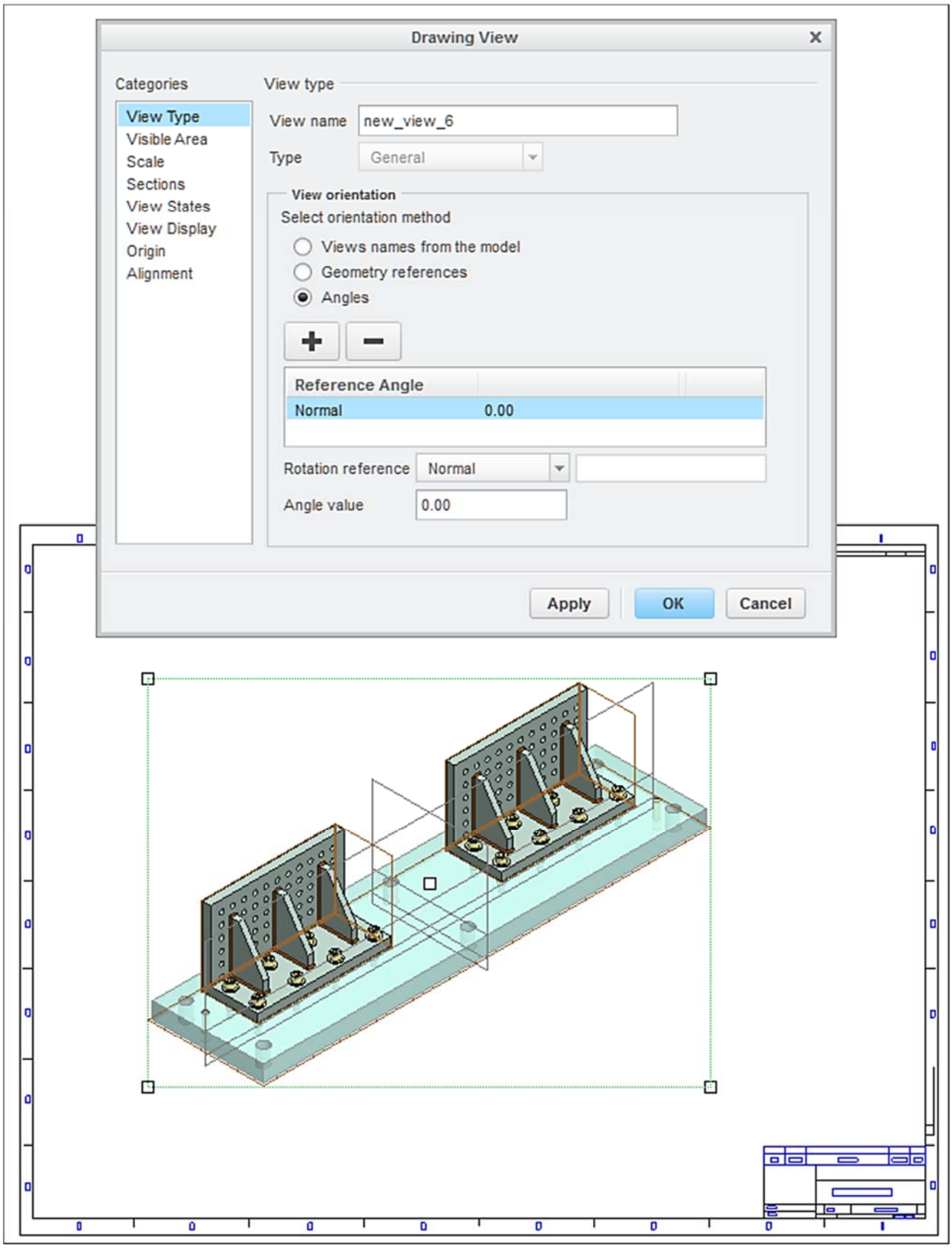


Figure 13.21(a) Reoriented View

Ctrl+S > File > Manage File > Delete Old Versions > Enter > File > Save As > Type ▼ **> Zip File (*.zip)** [Fig. 13.22(a)] *(The Zipped file includes all components, the assembly, and the drawing.)* **> OK > upload** the zip file to your course interface or attach to an email and send to your instructor and/or yourself [Fig. 13.22(b)] **> File > Close > File > Exit >Yes**

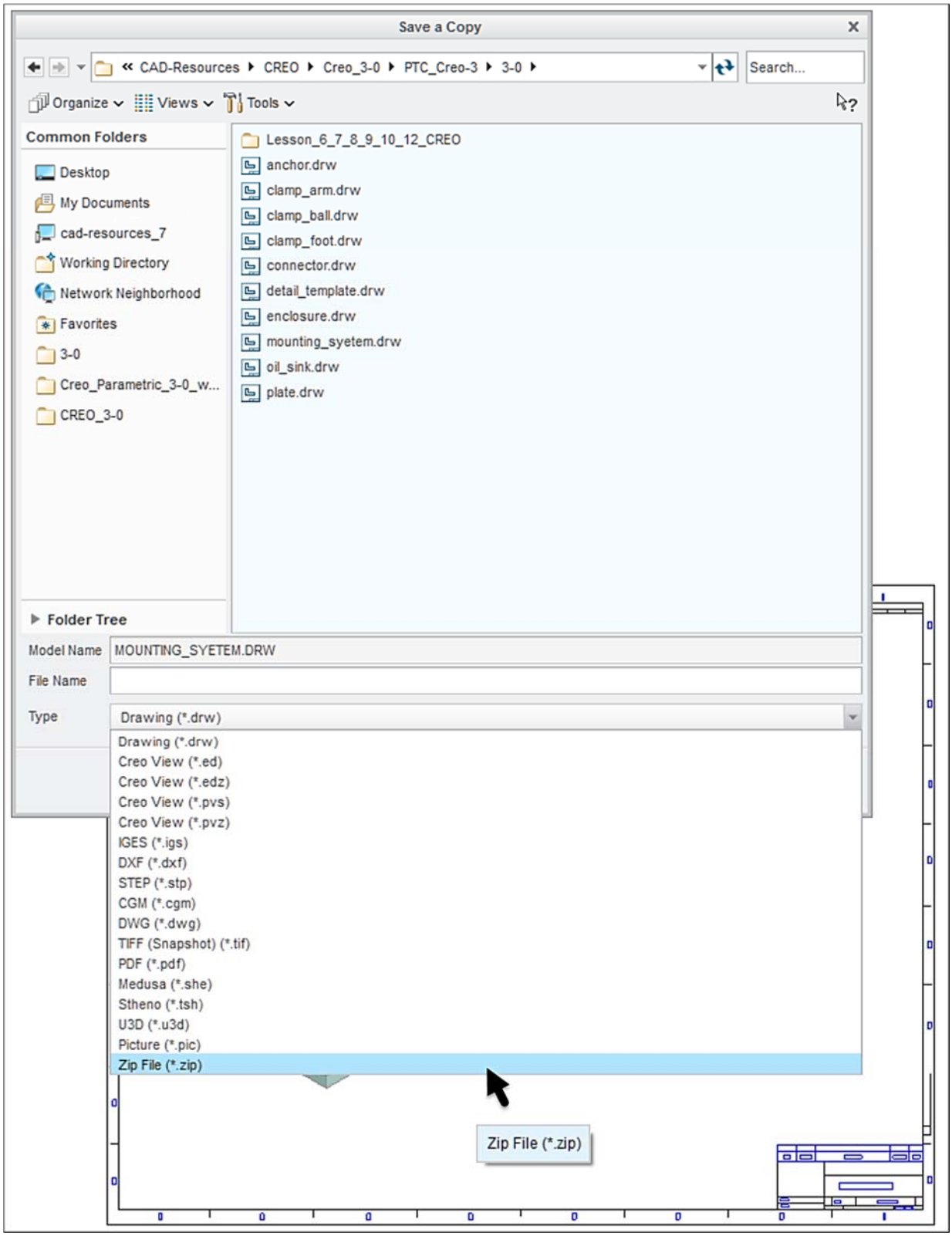


Figure 13.22(a) Zip File

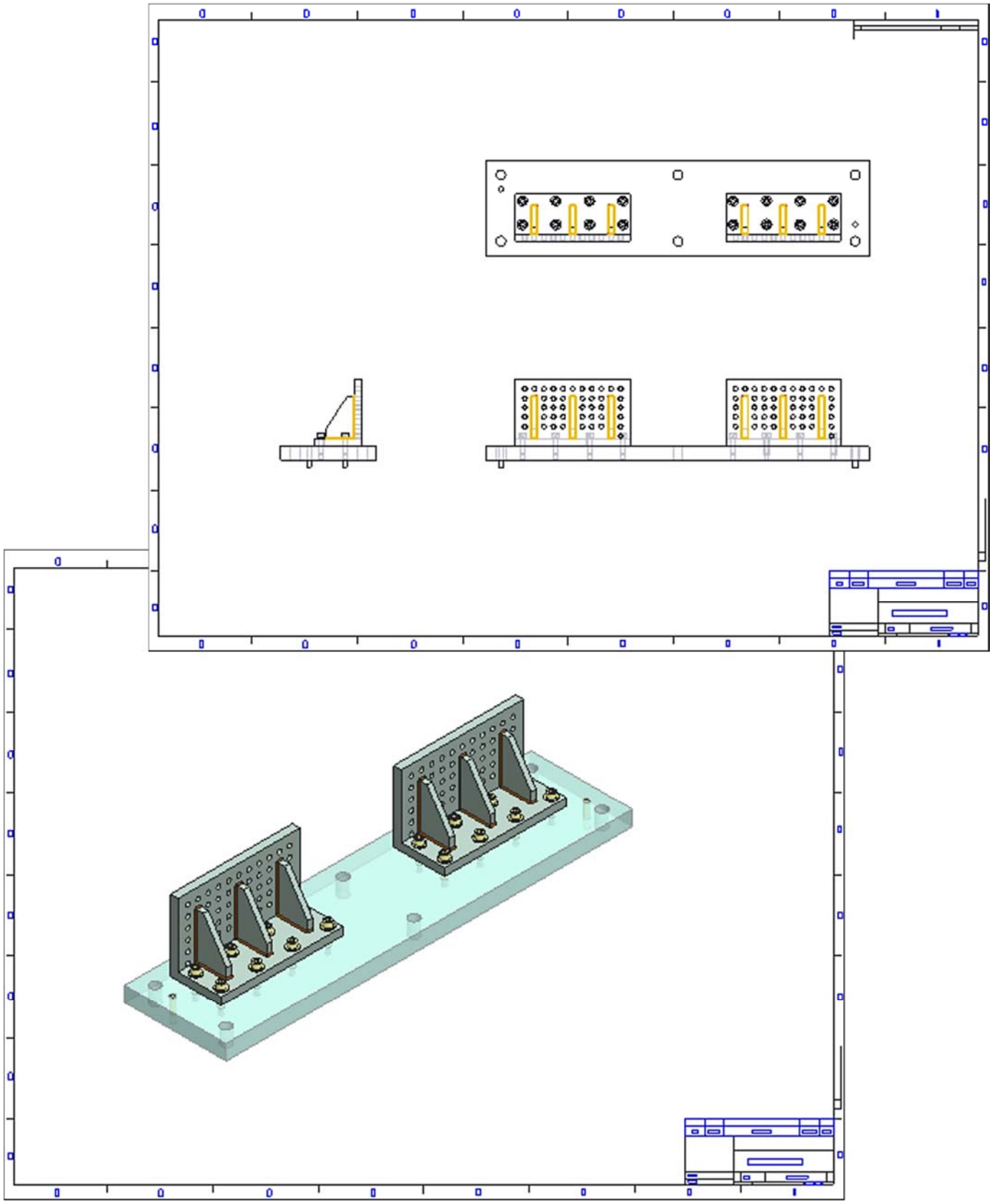


Figure 13.22(a) Zipped file includes all components, the assembly, and the drawing

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