

Topics:

- *PTC Product Focus: Mechanism Dynamics Option (MDO)*
 - *This Week's Technical Tip: Sheetmetal Walls and 2001 Menu Picks*
 - *Upcoming Events and Training Class Schedule*
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- *PTC Product Focus: Mechanism Dynamics Option (MDO)*
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Mechanism Dynamics Option (MDO)

The Challenge

The acceleration and weight of the parts in a mechanism generate various forces. Designers use devices like motors, springs, and dampers to control those forces and ensure that the mechanism works as intended. In some cases, they use controlled contact (or impact) between parts to make a mechanism work correctly. In these and many other situations, the ability to include dynamic effects in a virtual prototype to accurately simulate mechanism behavior can significantly increase innovation, product quality, and speed to market.

The Solution

Pro/ENGINEER Mechanism Dynamics adds dynamic functionality to Pro/ENGINEER Mechanism Design to provide a powerful virtual prototyping environment for the simulation and improvement of mechanism operation as part of the design process. Pro/ENGINEER Mechanism Dynamics allows designers to virtually engineer a mechanism without leaving the familiar user interface and workflow of Pro/ENGINEER.

Benefits

- Provides up-front virtual prototyping of real-world mechanisms
- Works with Behavioral Modeling to explore design alternatives
- Reduces hardware prototype iteration and test failures
- Helps design faster, lighter, more efficient mechanisms
- Reduces time to market

Capabilities

- Gravity, force motors, point forces, and body torques
- Springs, dampers, cam and slot impacts, and friction
- Dynamic, static, and force balance simulations
- Comprehensive results graphing and animated display of forces

Animation Examples

Select the following link for Pro/E Mechanism Dynamics Animations

<http://www.ptc.com/products/proe/mdo/animations.htm>

Questions & Answers

Q: What is MDO?

A: MDO is an add-on option to Pro/ENGINEER's MDX (Mechanism Design Extension) which allows designers to simulate real-world dynamic behavior with gravity, force motors, springs, dampers, impact, and more.

Q: Why would I need MDO? Isn't MDX enough?

A: MDX let's designers see how a mechanism moves, whether there is interference and what the space claim envelope looks like, but it doesn't reveal how fast the mechanism will operate or what forces are generated. In many situations, desired operation of a mechanism depends largely on the speed and the forces generated between its components – designers need MDO to simulate this.

Q: Will MDO let me calculate reaction forces and accelerations within my mechanism?

A: Yes. MDO provides full dynamic simulation including consideration of gravity, inertia and applied forces. MDO reports resulting forces generated by the operation of the mechanism through graphs, tabulated data, and/or animated vectors.

Q: What's the difference between MDO and Pro/MECHANICA Motion?

A: Pro/MECHANICA Motion will eventually be replaced by MDO (in conjunction with MDX). MDO is generally faster, easier to use, and fully integrated with Pro/ENGINEER workflow and data. MDO does not use the Pro/MECHANICA Motion solver and does not require a C compiler.

Q: Does MDO have the same functionality as Pro/MECHANICA Motion?

A: MDO has more functionality than Motion in some aspects of mechanism dynamics simulation, but in other aspects, MDO will not initially contain all functionality currently offered in Motion (such as custom loads). The plan is to rapidly develop MDO to include all popular Motion functionality.

Q: Can customers upgrade from Pro/MECHANICA Motion to MDO?

A: Yes. There are two upgrade paths and each one allows customers to keep their current Pro/MECHANICA Motion license at zero cost maintenance.

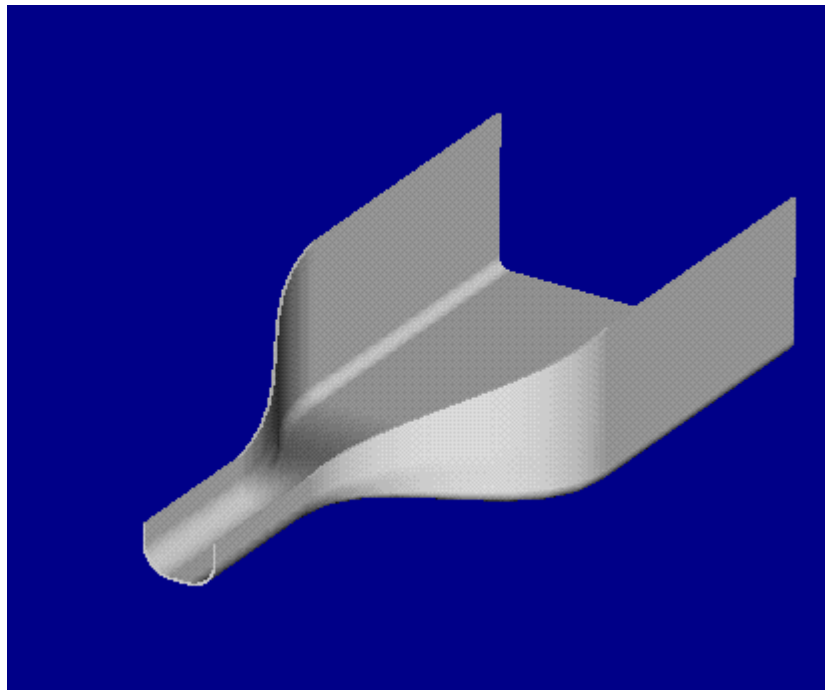
Q: How can I justify an upgrade to MDO if I'm a Pro/MECHANICA customer?

A: By choosing one of the upgrade paths, you'll get an exciting new simulation product with better Pro/E integration and useability, while retaining the right to continue using Motion. The upgrade options are structured such that you may pay lower maintenance than you currently pay for just Motion alone.

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- *This Week's Technical Tip:* **Sheetmetal Walls and 2001 Menu Picks**
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Creating Unattached Walls, Offset Walls and Merging Walls

This example demonstrates the steps needed to create a merged wall from several unattached walls. This example will outline the creation of two unattached walls, an offset wall and merged walls. The final product is to create the geometry shown below.



Procedure

1. Create the wall shown in Figure 1 by selecting **Feature, Create, Sheetmetal, Wall, Extruded,** and **Done.** Select **One Side** and **Done.** Select DTM3 as the sketching plane, **Okay,** and DTM2 as the **Top** plane.

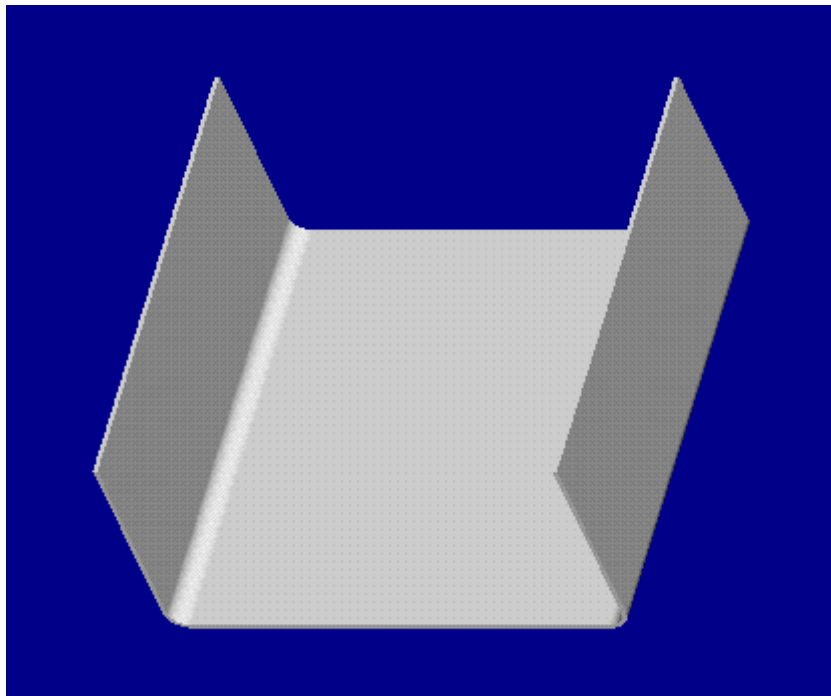


Figure 1

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2. **Sketch** the section shown in Figure 2. **Regenerate** the sketch and select **Done**. Orient the arrow using **Flip** and select **Okay** when the arrow is pointing inside the sketch. Input a thickness for the sheetmetal part and select **Blind** and **Done** for the depth. Input a value for the depth and select **Okay** from the dialogue box.

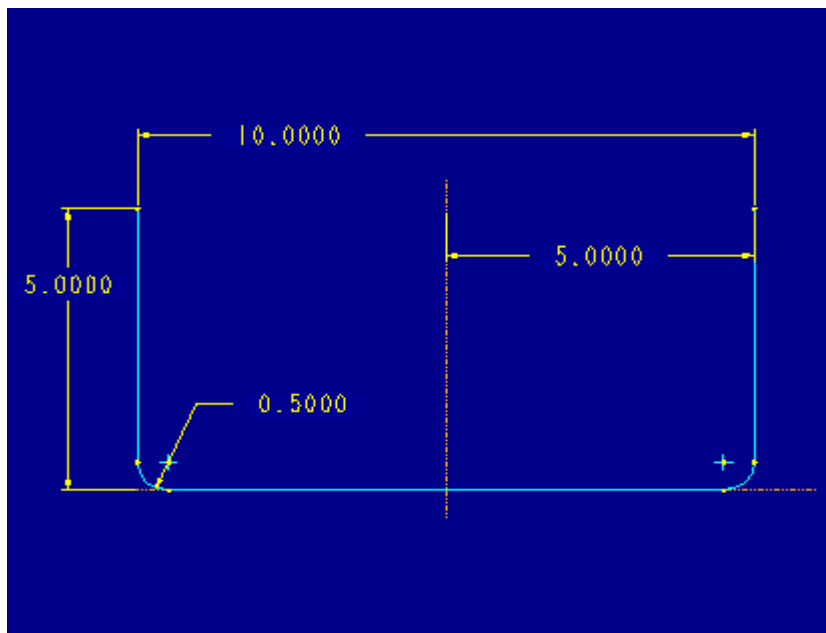


Figure 2

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3. To create the unattached wall, select **Feature, Create, Sheetmetal, and Wall**. Select **Extrude**, checkmark **Unattached**, and select **Done**. Create the feature on **One Side** and select **Done**. For the sketching plane, select **Make Datum, Offset** and select DTM3. Select **Enter Value** and input a value for the offset. The datum plane is now fully constrained. Select **Done** and **Okay** for the direction of feature creation. Select DTM2 as the **Top** plane and sketch the section shown in Figure 3.

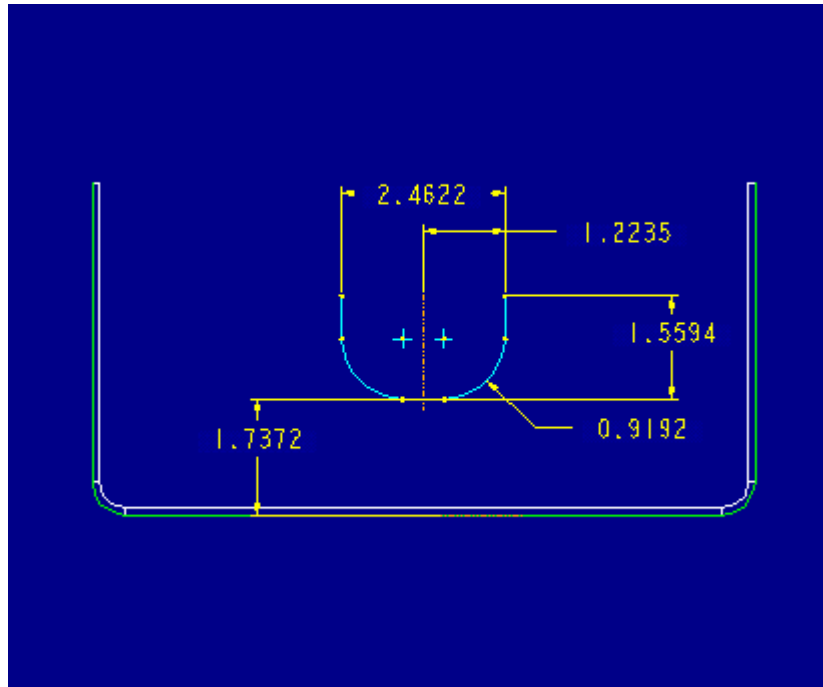


Figure 3

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4. **Regenerate** the sketch and select **Done**. Orient the arrow for thickening toward the inside of the sketch using **Flip**. Once the arrow is correctly oriented, select **Okay**. For the depth, select **Blind** and **Done**. Specify a depth for the wall and select **Okay** from the dialogue box. Figure 4 shows the part after the first unattached wall has been created.

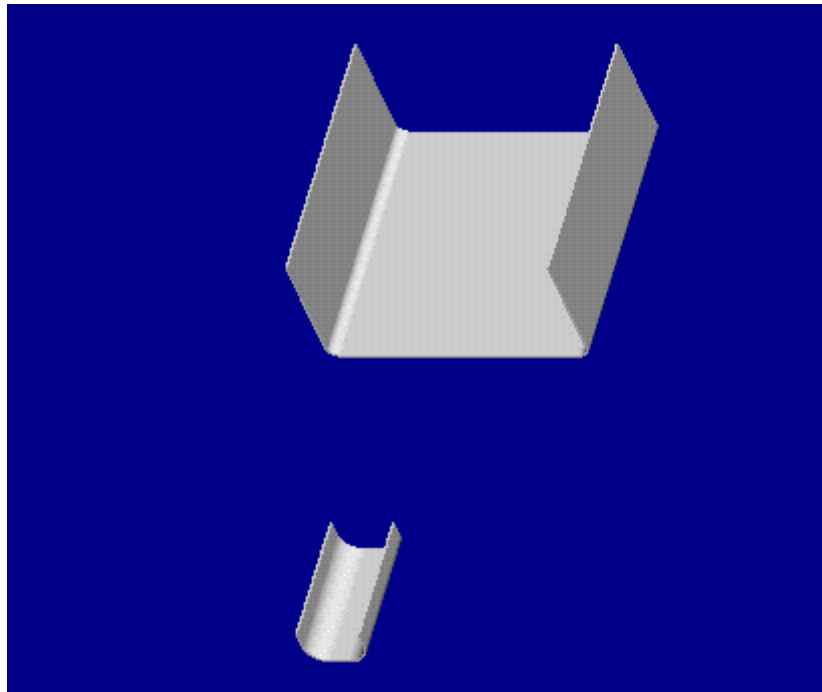


Figure 4

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5. The next step is to build the intermediate wall. Select **Feature, Create, Surface, Advanced,** and **Done.** Select **Boundaries, Done, Blended Surf,** and **Done.** The first curve is the lower, front set of edges on the large wall, as shown in Figure 5. Select **Chain** from the SELECT ITEM menu and **Tangent Chain.** Pick anywhere on the curve shown in Figure 5 and select **Done.**

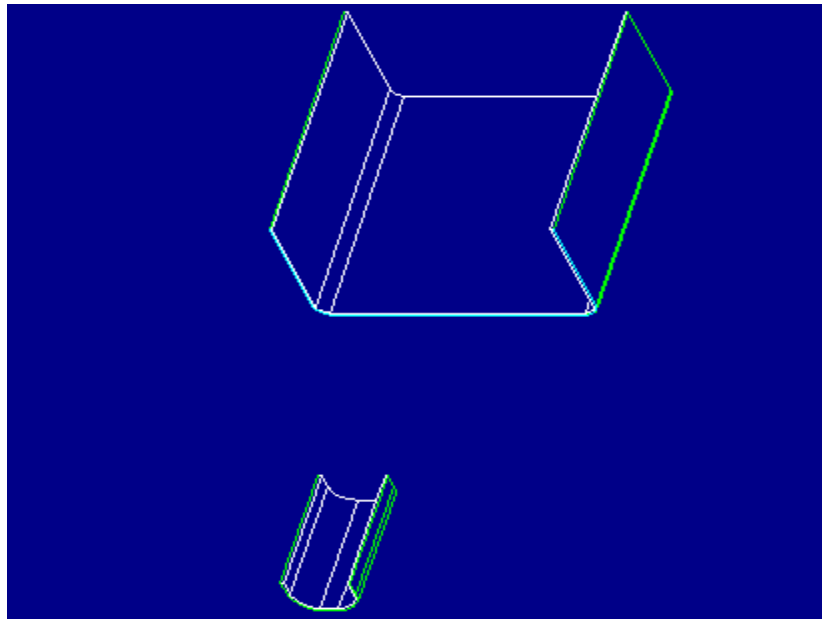


Figure 5

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6. For the second curve, select **Tangent Chain** and select one of the back, lower set of edges on the small wall, as shown in Figure 6. Select **Done** and **Done Curves** from the CRV_OPTS menu.

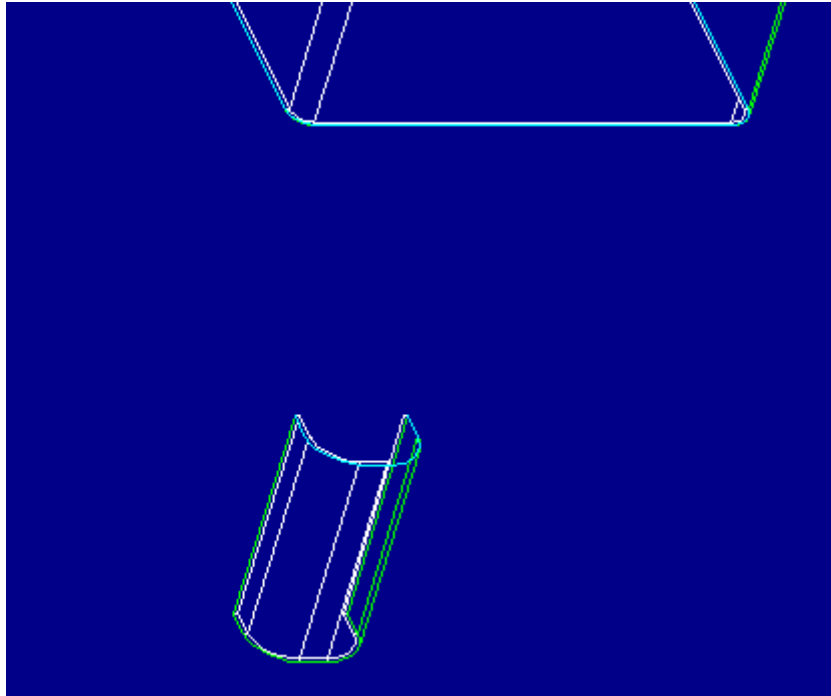


Figure 6

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7. When defining the intermediate surface, the surface needs to tangent at both ends to the existing sheetmetal surfaces. From the dialogue box select **Boundary Cond** and **Define**. Select **Boundary #1, Tangent**, and **Done**. A menu will appear that will list each entity within the first boundary curve. For each entity, a tangent surface needs to be specified. Select the surfaces on the existing geometry that the surface being defined will be tangent to. Figure 7 shows the surface that would be selected for the first entity. Once all the surfaces have been selected, select **Okay** from the dialogue box labeled "Boundary #1".

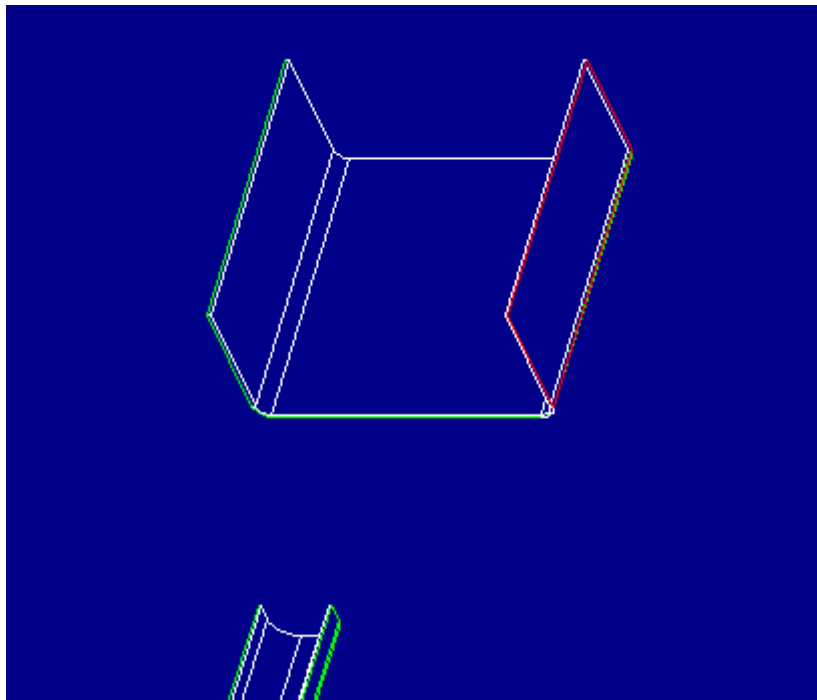


Figure 7

8. Repeat step 7 for the second boundary.

9. Select **Done** from the BOUNDARY menu and **Okay** from the Main dialogue box. Figure 8 shows the part after the surface feature has been created.

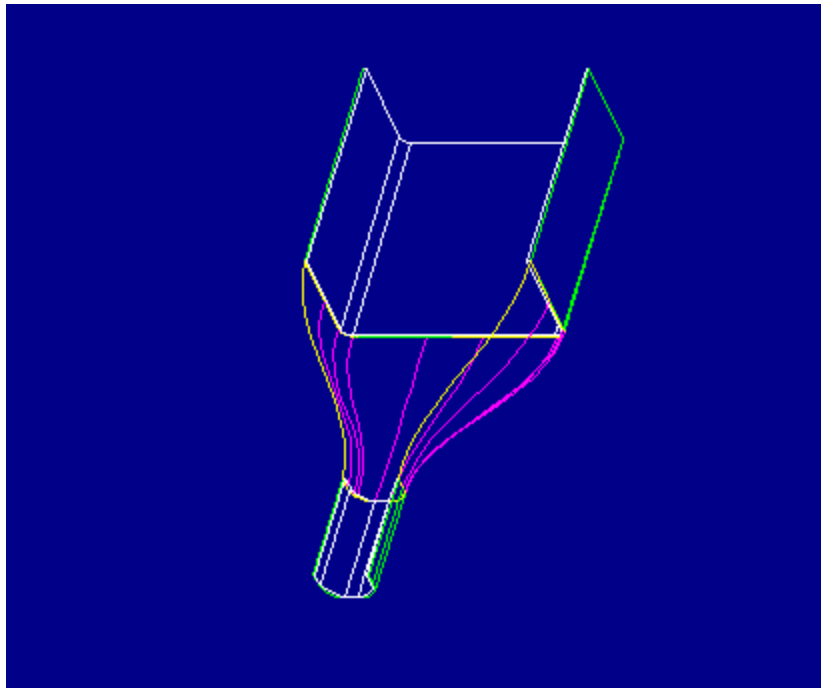


Figure 8

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10. Create a sheetmetal wall from this surface. Select **Feature, Create, Sheetmetal, Wall, Offset**, checkmark **Unattached**, and **Done**. Select the quilt created in step 9. Enter 0 for the offset distance and **Flip** the arrow to point to the inside of the surfaces. Select **Okay** once the arrow has been oriented correctly and select **OK** from the dialogue box.
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11. Create a layer and place the quilt on the layer. Blank the layer and the part will resemble Figure 9.

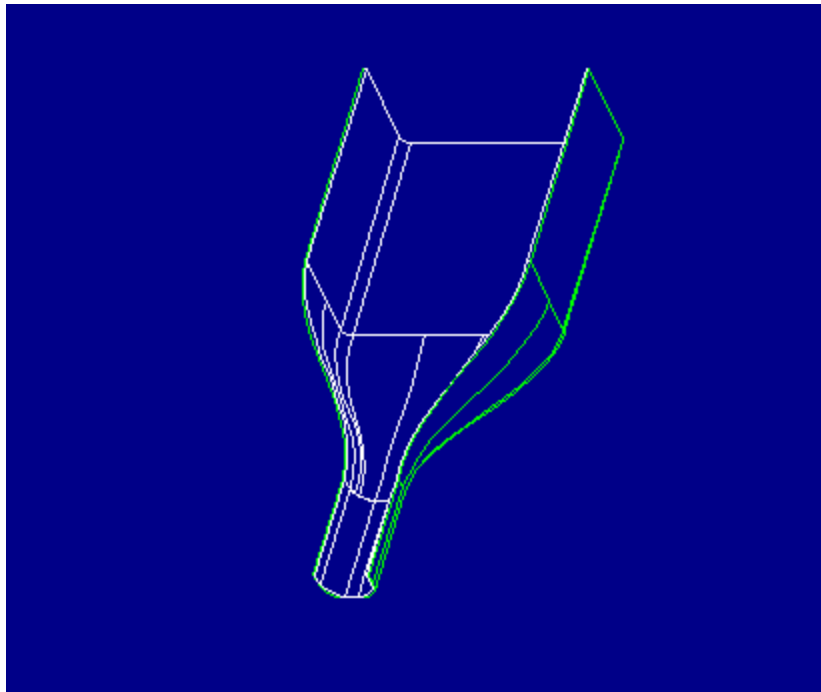


Figure 9

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12. Merge the walls together by select **Feature, Create, Sheetmetal, Merge, and Done**. The first set of surfaces belongs to the base wall. The unattached walls will be merged to the base wall. Select the surfaces shown in Figure 10, select **Done Sel**, and **Done Refs**.

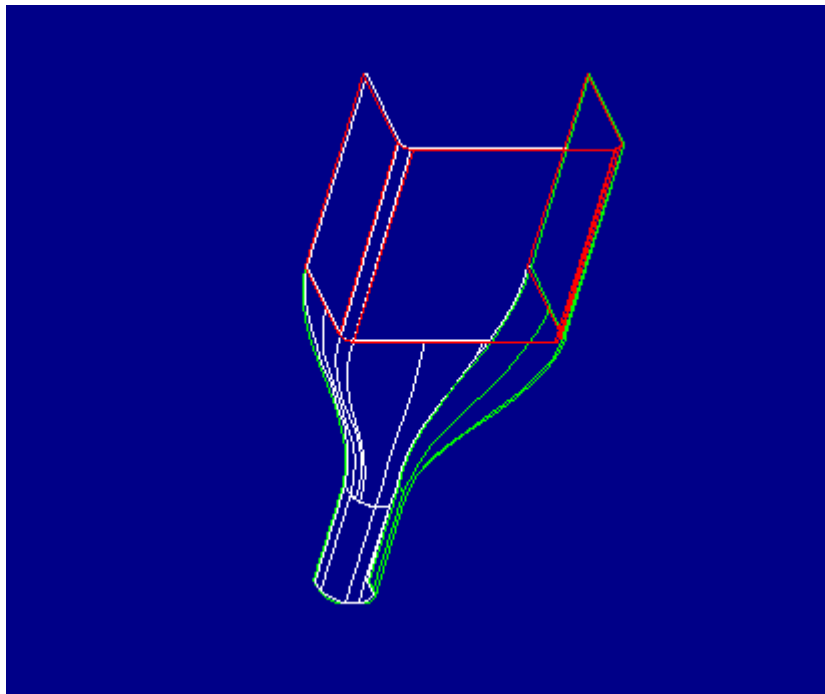


Figure 10

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13. Select the surfaces from the intermediate wall as shown in Figure 11, **Done Sel**, and **Done Refs**. Select **OK** from the dialogue box to complete the merge.

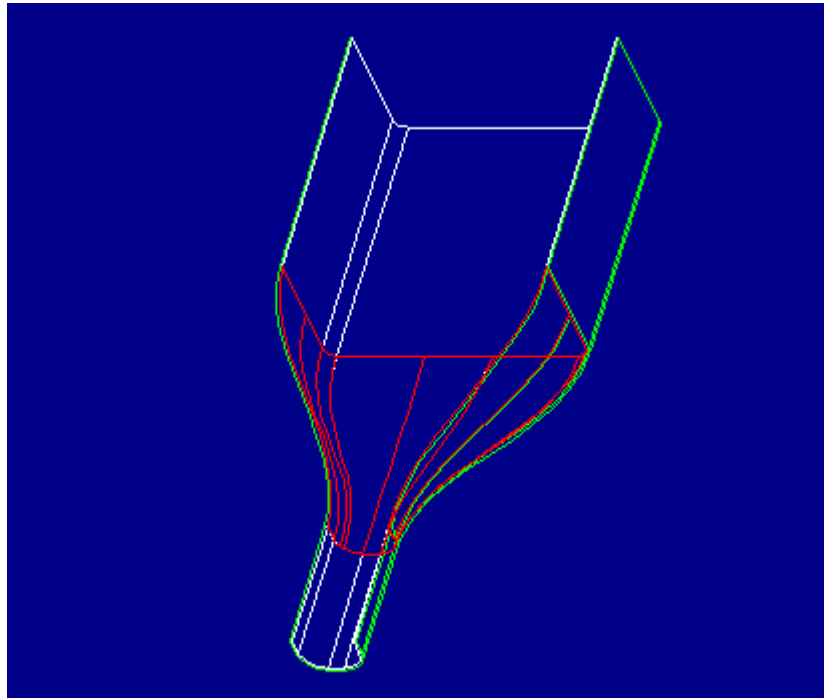


Figure 11

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14. Create another merge feature on the end wall using the steps outlined previously. For the first wall select the surfaces shown in Figure 11 (above), **Done Sel**, and **Done Refs**. For the second set of surfaces, select the surfaces shown in Figure 12, **Done Sel**, and **Done Refs**. Select **OK** from the dialogue box to complete the merge.

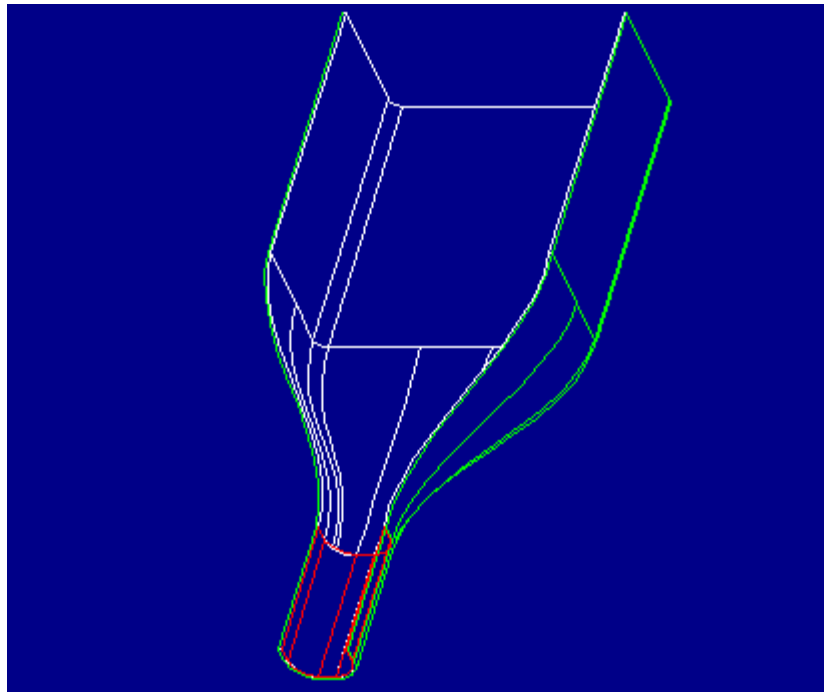


Figure 12

Pro/E Sheetmetal 2001 - Where did they move that pick!

Previous Location

#Feature, #Create #Sheetmetal, #Notch

#Feature, #Create #Sheetmetal, #Punch

#Feature, #Create #Sheetmetal, #Wall,
#Flat, #No Radius

#Feature, #Create #Sheetmetal, #Wall,
#Flat, #Use Radius

#Feature, #Create #Sheetmetal, #Wall,
#Extruded, #No Radius

#Feature, #Create #Sheetmetal, #Wall,
#Extruded, #Use Radius

#Feature, #Create #Sheetmetal, #Revolve

New Location

#Insert, #Shape, #Notch

#Insert, #Shape, #Punch

#Insert, #Sheetmetal Wall, #Flat

#Insert, #Sheetmetal Wall, #Flat with Radius

#Insert, #Sheetmetal Wall, #Extrude

#Insert, #Sheetmetal Wall, #Extrude with Radius

#Insert, #Sheetmetal Wall, #Unattached, #Revolve

Pro/E Sheetmetal 2001 - Where did they move that pick!

Previous Location

#Feature, #Create #Sheetmetal, #Blend

#Feature, #Create #Sheetmetal, #Offset

#Feature, #Create #Sheetmetal, #Advanced

#Feature, #Create #Sheetmetal, #Twist

#Feature, #Create #Sheetmetal, #Swept,
#No Radius

#Feature, #Create #Sheetmetal, #Swept,
#Use Radius

#Feature, #Create #Sheetmetal, #Extend

#Feature, #Create #Sheetmetal, #Merge

#Feature, #Create #Sheetmetal, #Bend

#Feature, #Create #Sheetmetal, #Unbend

#Feature, #Create #Sheetmetal, #Bend Back

#Feature, #Create #Sheetmetal, #Flat Pattern

#Feature, #Create #Sheetmetal, #Form

#Feature, #Create #Sheetmetal, #Flatten Form

#Feature, #Create #Sheetmetal, #Cut,

#Feature, #Create #Sheetmetal, #Rip

#Feature, #Create #Sheetmetal, #Deform Area

#Feature, #Create #Sheetmetal, #Conversion

#Feature, #Create #Sheetmetal, #Edge Bend

#Feature, #Create #Sheetmetal, #Corner Relief

New Location

#Insert, #Sheetmetal Wall, #Unattached, #Blend

#Insert, #Sheetmetal Wall, #Unattached, #Offset

#Insert, #Sheetmetal Wall, #Unattached, #Advanced

#Insert, #Sheetmetal Wall, #Twist

#Insert, #Sheetmetal Wall, #Sweep

#Insert, #Sheetmetal Wall, #Sweep with Radius

#Insert, #Sheetmetal Wall, #Extend

#Insert, #Merge Walls

#Insert, #Bend Operation, #Bend

#Insert, #Bend Operation, #Unbend

#Insert, #Bend Operation, #Bend Back

#Insert, #Bend Operation, #Flat Pattern

#Insert, #Shape, #Form

#Insert, #Shape, #Flatten Form

#Insert, #Sheetmetal Cut

#Insert, #Shape, #Rip

#Insert, #Bend Operation, #Deform Area

#Insert, #Conversion

#Insert, #Edge Bend

#Insert, #Corner Relief

Upcoming Events and Training Class Schedules

Date	Class Name	Location
November 19	Core Pro/E 2001 Update Training	El Segundo, CA
November 20	Mechanism Analysis in Pro/E	El Segundo, CA
November 26	Fundamentals of Design	El Segundo, CA
December 17	Introduction to Pro/E	El Segundo, CA
November 12	Introduction to Pro/E	Newport Beach, CA
November 12	Fundamentals of Drawing	Newport Beach, CA
November 19	Fundamentals of Sheetmetal Design	Newport Beach, CA
November 19	Core Pro/E 2001 Update Training	Newport Beach, CA
November 20	Intralink User Training	Newport Beach, CA
November 26	Introduction to Pro/E	Newport Beach, CA
November 26	Fundamentals of Mechanica Structure / Thermal	Newport Beach, CA
December 3	Fundamentals of Design	Newport Beach, CA
December 10	Introduction to Pro/E	Newport Beach, CA
December 10	Fundamentals of Drawing	Newport Beach, CA
December 17	Fundamentals of Sheetmetal Design	Newport Beach, CA
December 17	Core Pro/E 2001 Update Training	Newport Beach, CA
December 18	Intralink User Training	Newport Beach, CA

Register for a PTC training course.

By phone: 1-888-782-3773 or 1-781-370-5103

On-line: www.ptc.com/services/edserv/index.htm

For Information on what is happening in Southern California

look to the Pro/E Southern California User Group at <http://www.socalproe.com/>



November 5, 2001

Note: This weekly PTC email will continue to be used for the following:

- 1) Inform you on events related to PTC products. (user groups, conferences, training schedules, etc.)
- 2) Educate you on products that are available at PTC
- 3) Tips and Techniques using PTC products

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