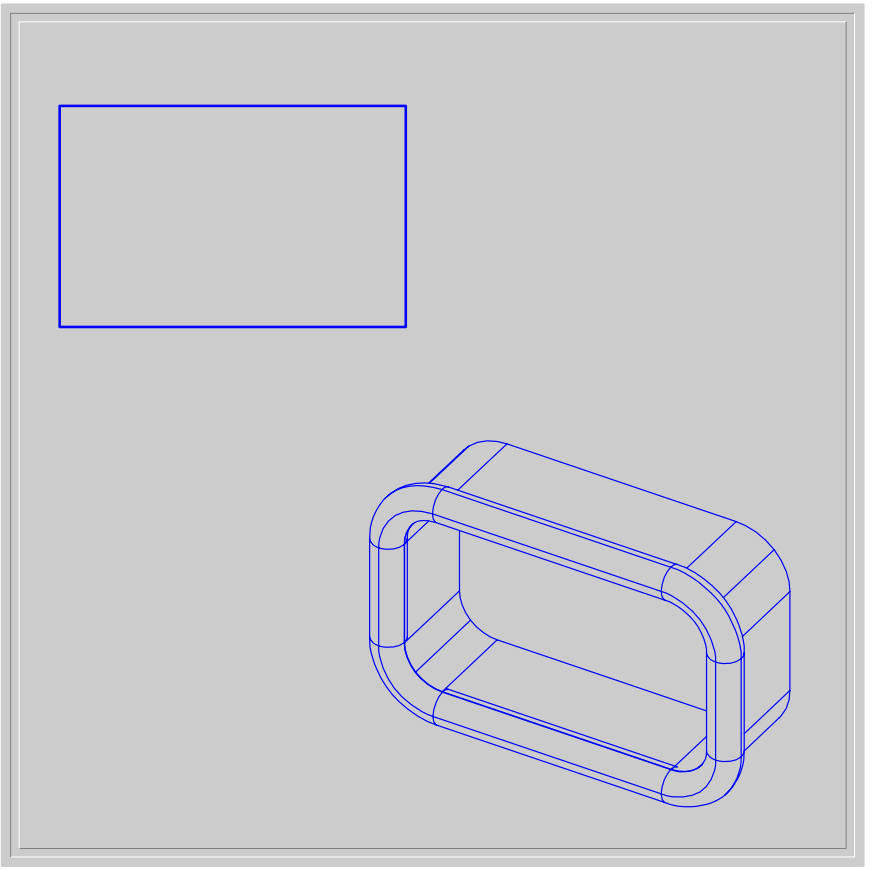


Creating Swept Features

I-DEAS™ Tutorials: Fundamental Skills

Learn how to:

- create a swept part or feature
- use variational sweep with wireframe
- use variational sweep with part edges

Before you begin...

Prerequisite tutorials:

1. Getting Started (I-DEAS™ Multimedia Training)

   –or–

   Quick Tips to Using I-DEAS
   –and–
   Creating Parts
2. Sketching and Constraining
3. Using Sections and Sketch Planes
4. Extruding and Revolving Features
5. Adding Fillet, Shell, and Draft Features

If you didn't start I-DEAS with a new (empty) model file, open a new one now and give it a unique name.

File
Open

Open Model File form

Model File name: any unique name
OK

Make sure you're in the following application and task:

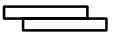
Design, *Manufacturing*, or *Simulation*
Master Modeler

Set your units to mm.

Options
Units

mm (*milli newton*)

Save your model file.



File
Save

Warning!

If you are prompted by I-DEAS to save your model file, respond:

No

Save only when the tutorial instructions tell you to—not when I-DEAS prompts for a save.

If you make a mistake at any time between saves and can't recover, you can reopen your model file to the last save and start over from that point.

Hint

To reopen your model file to the previous save, press Control-z.

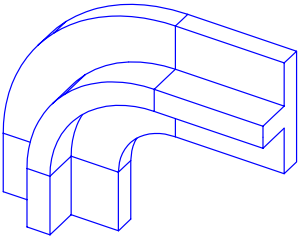
Create a swept part or feature 1 of 8

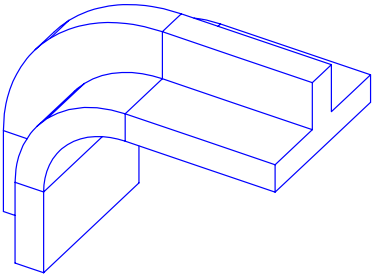
A swept feature requires one or more cross sections and a path curve.

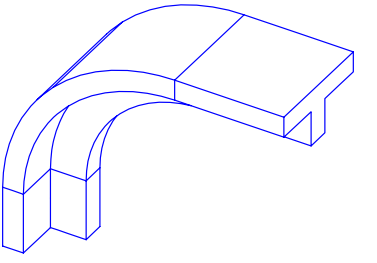
The path can be part edges, wireframe curves, or reference curves. It must be a continuous, tangent curve (no discontinuities in the slope of the curve).

The cross sections can also be part faces or wireframe sections. Options you need to consider are how the sections are located on the path, and how they are rotated to align with the path. The pop-up menu *Sweep Options*... controls whether the sections are used in place or moved to the path.

Options on the Surface Options form control how the sections follow the path, and allow you to move and rotate a coordinate system defining the section orientation.



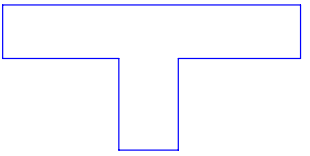


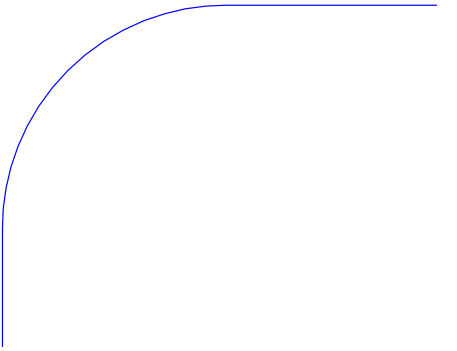


Create a swept part or feature 2 of 8

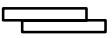
Sketch a section and a path as shown. (Avoid any constraints and dimensions between the two.)

Make the radius of the path larger than the “T” section so it won’t fold over on itself as it sweeps around the radius.



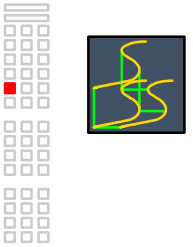


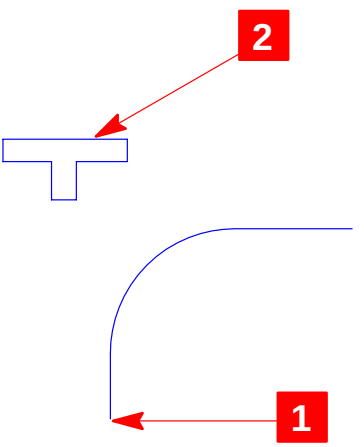
Recovery Point



File
Save

Sweep the “T” section along the path.



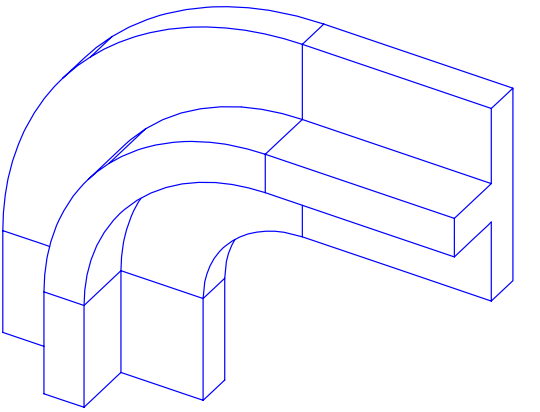


Create Surface form

Use the preview icon before you pick *OK* to get an idea of what the part will look like.

OK

Result

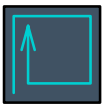


Things to notice

This may not be what you expected. The orientation of the section is defined by a coordinate system triad, which you can modify.

Z is the direction along the path, and X and Y are the orientation on the plane perpendicular to the path.

Let’s modify the swept part you just created.



 pick anywhere on part

 *Feature Parameters*

Surface Options form

 pick *Move* icon from form

---

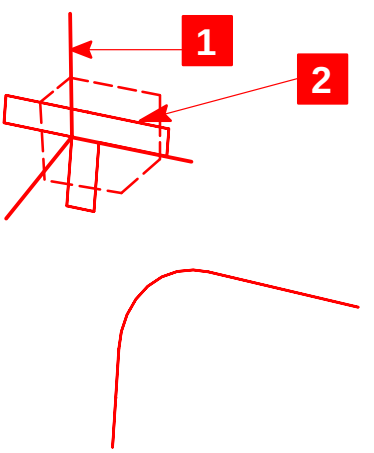
1 pick anywhere on triad

 *Y axis*

2

 *Yes*

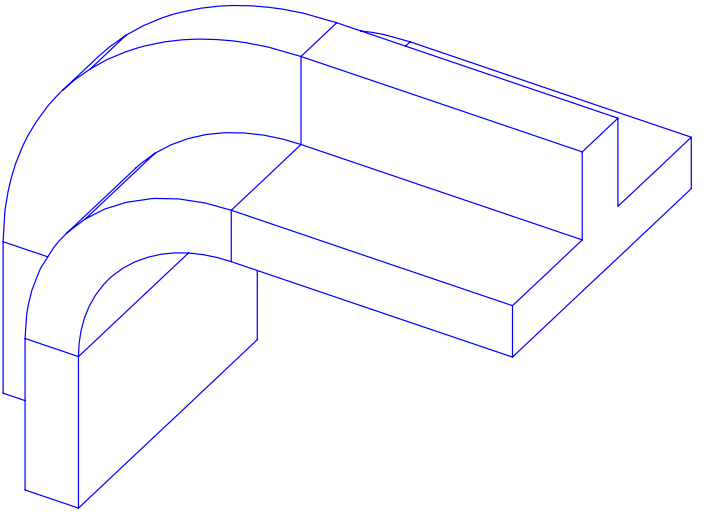
 *Done*



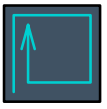
Surface Options form

 *OK*

Result



Maybe you want the rib on the bottom. In the next step, you'll modify the triad again, this time in the direction of the X axis.



 pick anywhere on part

 *Feature Parameters*

Surface Options form

1 pick anywhere on triad

 *X axis*

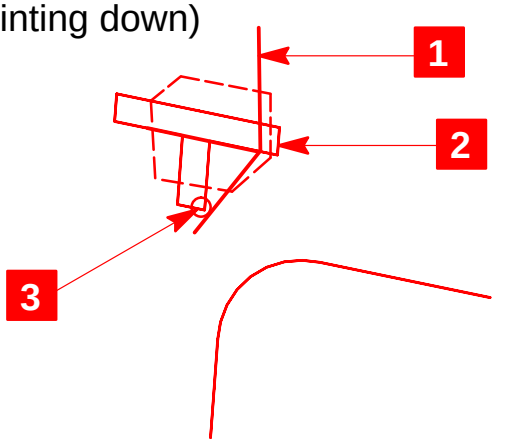
2

 *Yes* (if arrow pointing down)

 *Origin*

3

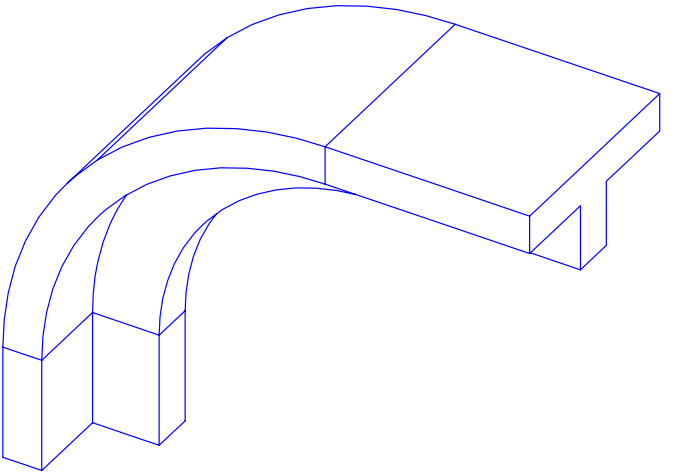
 *Done*



Surface Options form

 *OK*

Result



To start the next section with nothing on your workbench, name and put the part away if you want to keep it, or just delete it and continue to the next page.

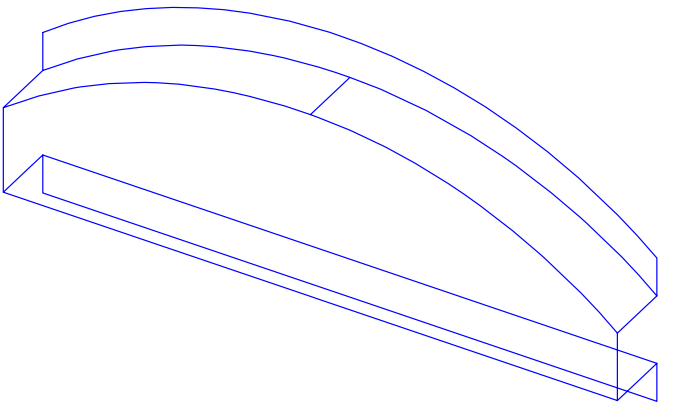
After you delete or put away your part, save your file.

Recovery Point

File
Save

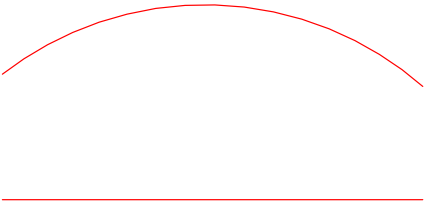
Use variational sweep with wireframe1 of 7

Variational sweep allows the section to vary along the path, following the path and other rails. One curve is used as the path, and others can be used as rails to drive the section. These can be part edges or reference curves.

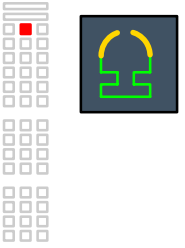


Use variational sweep with wireframe2 of 7

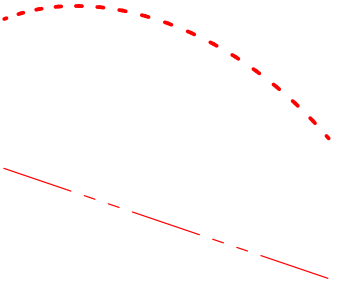
Sketch a line and an arc similar to those shown. Don’t worry about dimensions.



Create reference curves of all wireframe curves. Switch to isometric view.



All



Recovery Point

File
Save

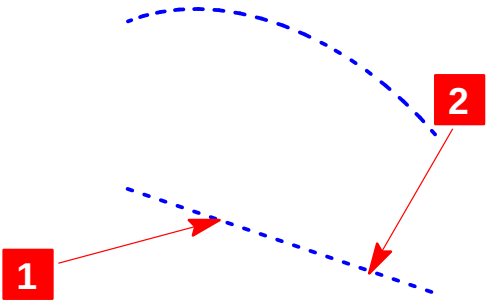
Use variational sweep with wireframe3 of 7

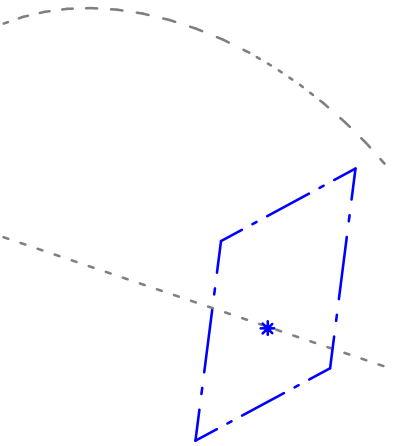
Sketch on path.

Sketch On Path

1 pick path

2 pick point





Use variational sweep with wireframe4 of 7

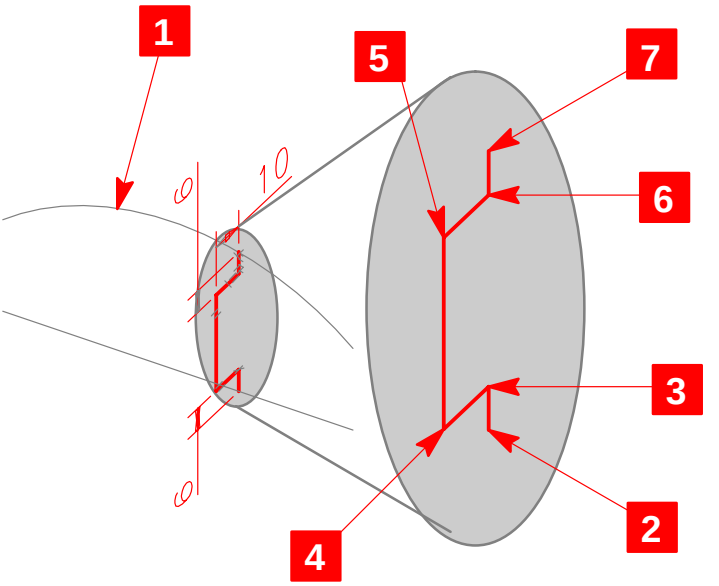
Sketch a shape as shown. It's okay if your dimensions are different.

Use the *Intersect* option to create points where the current rail intersects the sketch plane.

Intersect

1

Pick points 2 through 7 starting and ending the sketch at the intersect points.



Dimension the shape so the two flanges will remain a constant width, but leave the center width undefined, to be driven by the distance between the rail and the path.

Use variational sweep with wireframe5 of 7

Do a variational sweep along the path.

Section Options...

Planar sections only

Autochain

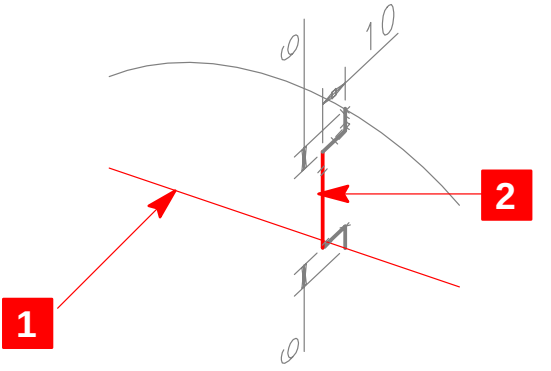
OK

1 pick line

(Done)

2 pick cross-section

(Done)

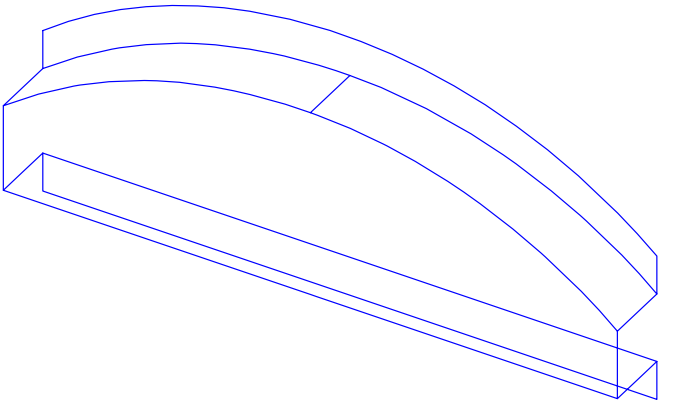


Create Surface form

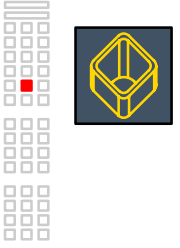
OK

Use variational sweep with wireframe6 of 7

Result



Optional
Now, shell the part.



 pick anywhere on part

 (Done)

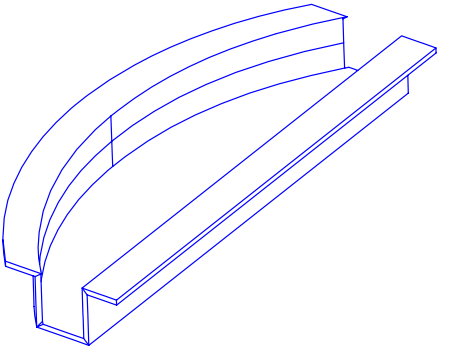
Shell form

 *Thickness*: 1

 *OK*

Use variational sweep with wireframe7 of 7

Result



Use dynamic viewing to rotate the part to see the results of the *Shell* command.

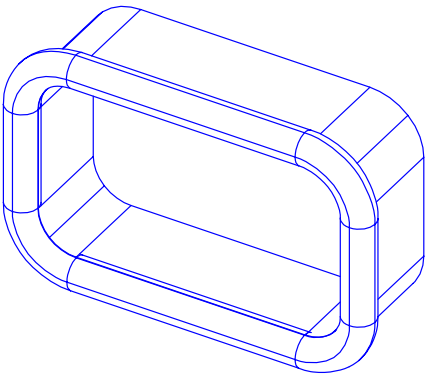
To start the next section with nothing on your workbench, name and put the part away if you want to keep it, or just delete it and continue to the next page.

Use variational sweep with part edges1 of 7

Either *Sweep* or *Variational Sweep* can use part edges as the sweep path.

Variational Sweep is more general since the swept section can be sketched and constrained to multiple paths. It is also often easier to define the orientation of the sweep section by defining constraints to existing part geometry rather than by using the orientation options as you did in the first sweep example.

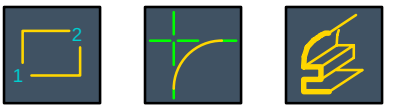
In this next example, you will sweep a simple “lip” on an open shelled box.

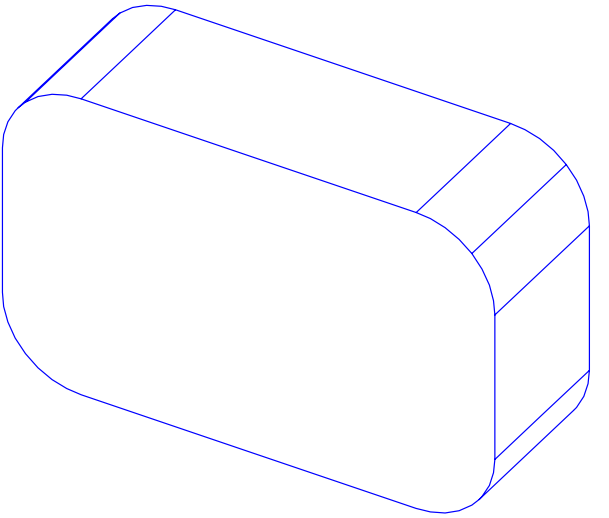


Use variational sweep with part edges2 of 7

Sketch a rectangle, fillet the corners, then extrude, accepting all defaults. Don’t worry about dimensions.

Round corners are used so the sweep can follow the entire perimeter.





Recovery Point

File
Save

Use variational sweep with part edges3 of 7

Shell the part. Make sure the thickness is less than the corner radius.

 pick anywhere on part

 (Done)

Shell form

 *Thickness*: 2

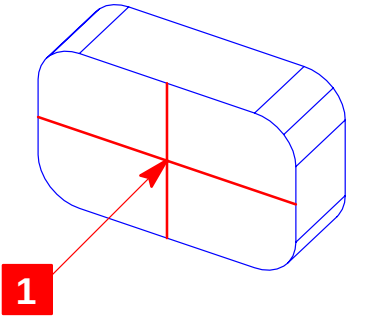
 pick *Delete Surface* icon on form

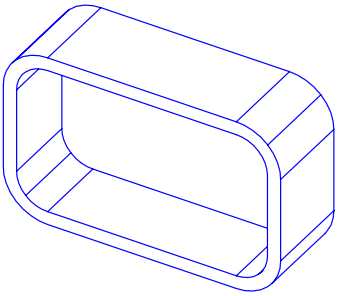
---

1 pick front face

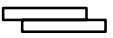
 (Done)

 *OK*





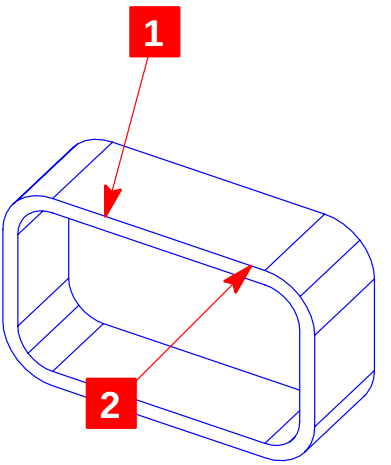
Recovery Point

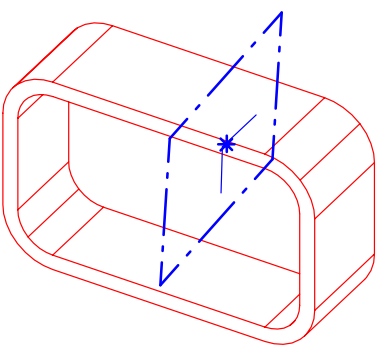
 *File*
Save

Use variational sweep with part edges4 of 7

Sketch on path.

Sketch On Path





Use variational sweep with part edges5 of 7

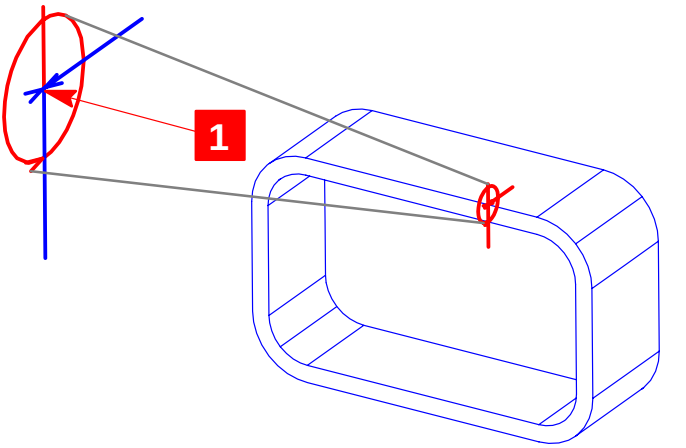
Sketch a circle, centered on the intersection of the path and the sketch plane.

 *Options*...

 *Radius*: 3

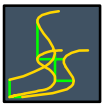
1 locate center (pick on intersect point)

 (to deactivate icon)



Use variational sweep with part edges6 of 7

Sweep the circle around the perimeter to form the “lip.”



Edge Chaining ON

Select only if the menu says Edge Chaining ON. If the menu has Edge Chaining OFF, move the mouse pointer off the menu without selecting anything.

Why: Edge chaining causes the program to automatically chain around tangent edges of parts. Note: This is similar to, but not the same as, autochaining which applies only to wireframe selection.

1 pick path

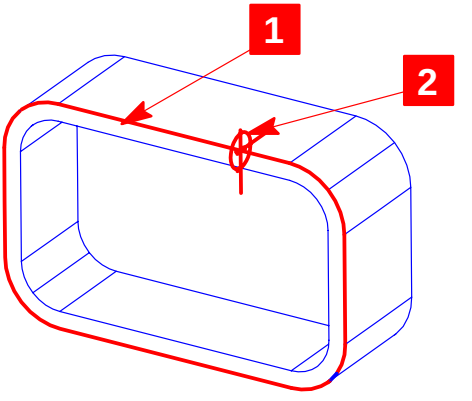
(Done)

Section Options...

☐ Stop at intersections

2 pick circle

(Done)



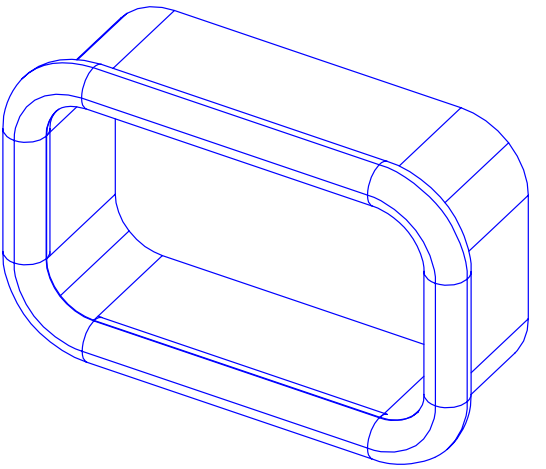
Use variational sweep with part edges7 of 7

Create Surface form

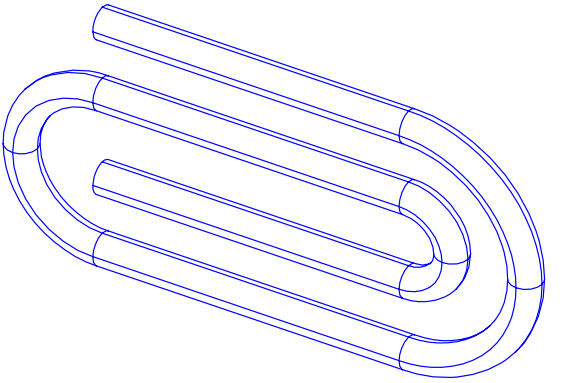

Protrude


OK

Result



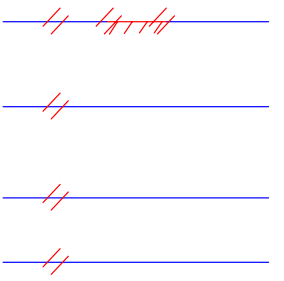
Create a paper clip like the one shown.



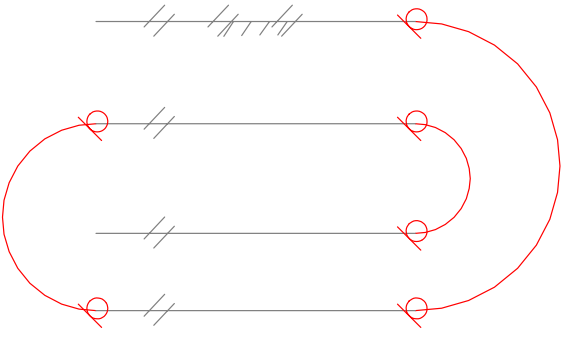
Try this on your own. You should be able to do this with the skills learned in this and previous tutorials.

If you need help, refer to the next few pages, which give you hints on how to create the part shown. If you would rather wait and try this later, skip to the last page for wrap-up instructions.

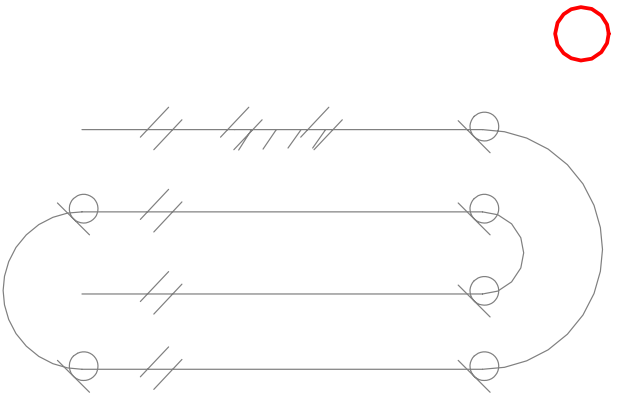
Step 1. Sketch 4 lines.



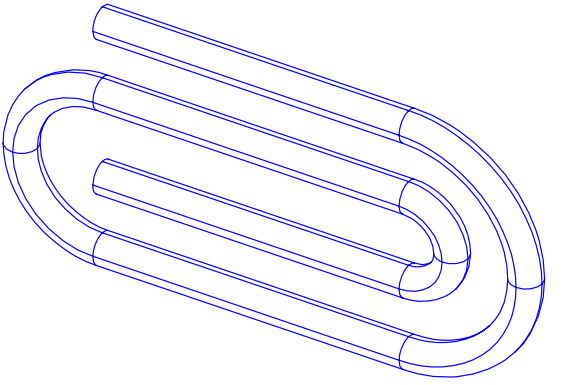
Step 2. Add three 2D fillets as shown.



Step 3. Draw a circle above the existing sketch.



Step 4. Sweep the circle over the path.



Tutorial wrap-up

You have completed the Creating Swept Features tutorial.

Delete or put away the part. This part is not used in any other tutorials.

See also...

For additional information on many of the concepts covered in this tutorial, see the following in the I-DEAS *Help* facility:

Help, Manuals, Table of Contents

Design User's Guide
Design Concepts
Modeling Parts
Surface Creation

Help, On Context

What's next?

After exiting, choose the Fundamental Skills tutorial that is next in the learning path you are following.

To exit this tutorial, select:

File
Exit

Warning!
Do not use the menu in the *I-DEAS Icons* window to exit. Use the menu in the Acrobat Reader window.

I-DEAS Master Series™ Online Tutorials

Structural Dynamics Research Corporation
2000 Eastman Drive
Milford, Ohio 45150
(513) 576−2400