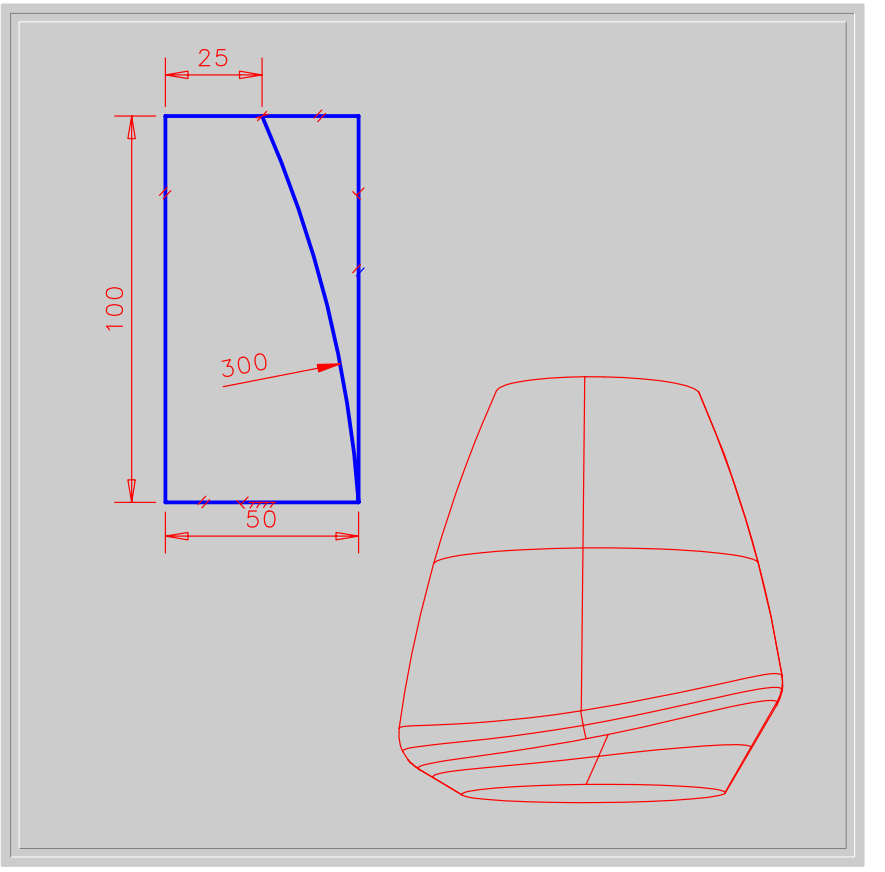


Performing Surfacing Operations

I-DEAS™ Tutorials: Fundamental Skills

Learn how to:

- project curves to surfaces
- trim surfaces
- create surfaces from wireframe boundaries
- stitch surfaces together

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
6. Creating Swept Features
7. Modeling Open Parts

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

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

Design, Manufacturing, or *Simulation*

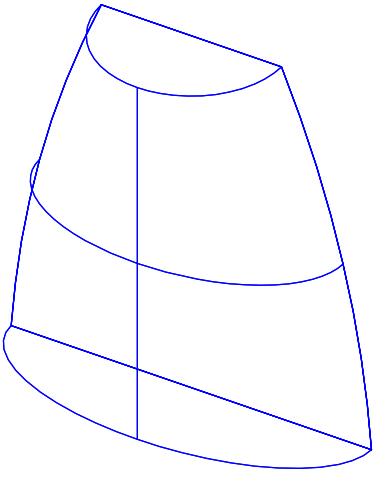
Master Modeler

Set your units to mm.

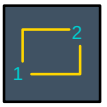
Options
Units

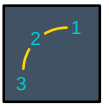
mm (*milli newton*)

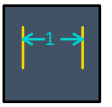
Next, create the basic bottle shape shown below, following the steps provided on the next few pages.

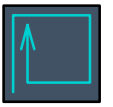


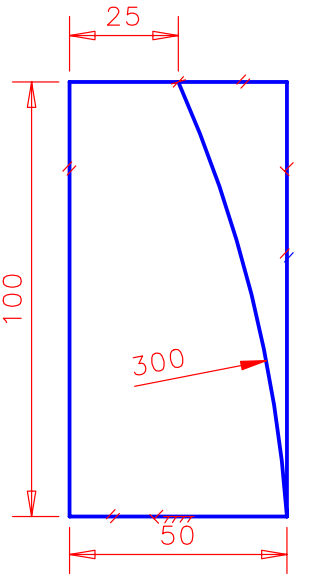
Step 1. Sketch a rectangle and an arc. Dimension as indicated below.



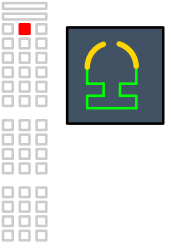


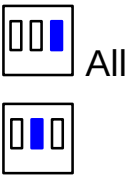


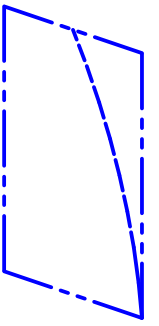




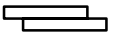
Step 2. Create reference curves from the wireframe geometry and switch to isometric view.







Save your model file.



File
Save

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

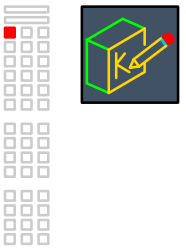
No

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

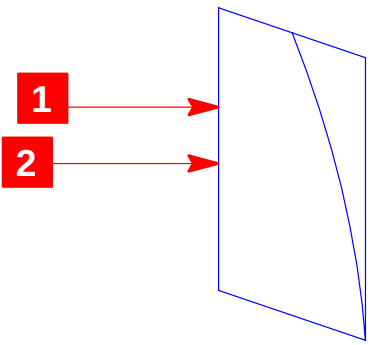
If you make a mistake at any time between saves and can’t recover, you can reopen your model file to the last save and start over from that point.

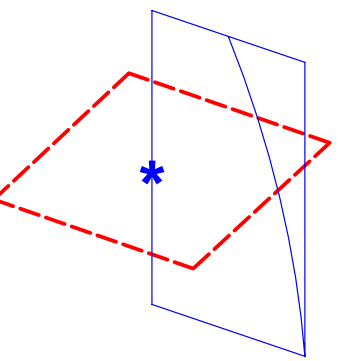
Hint
To reopen your model file to the previous save, press Control-z.

Step 3. Sketch on path as shown to create a plane perpendicular to the vertical line.

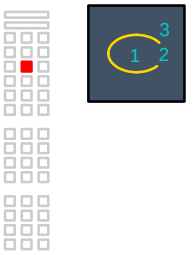


Sketch On Path



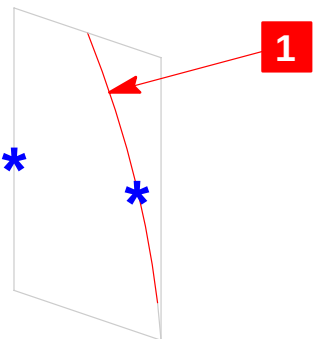


Step 4. Sketch an ellipse using *Intersect* to create a point where the arc pierces the plane.

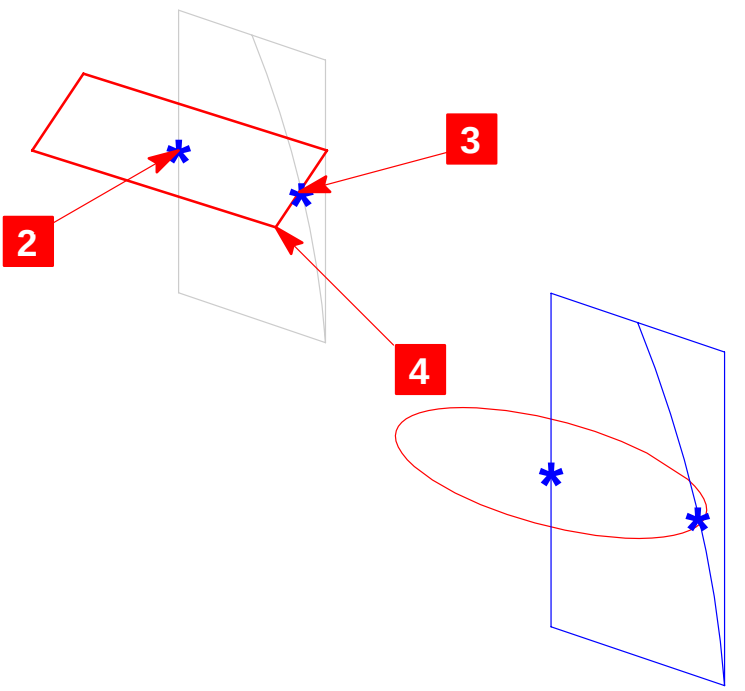


Intersect

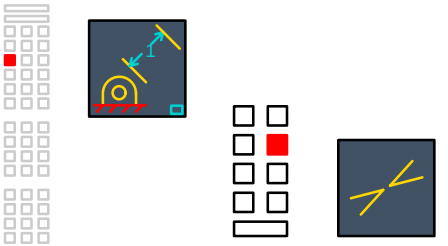
1

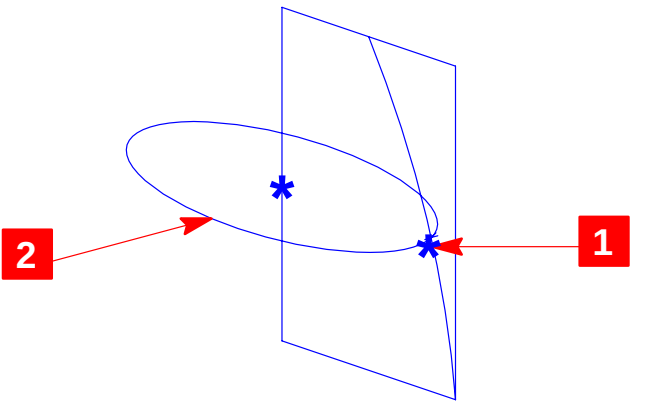


Pick points 2 through 4 to create the ellipse.



Step 5. Constrain the end of the ellipse to go through the intersect point so that when you use the variational sweep command, the ellipse will always pass through the rail.

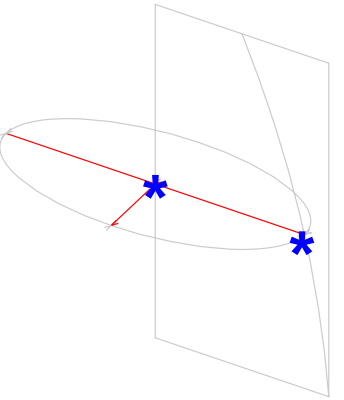




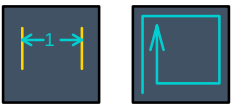
Recovery Point

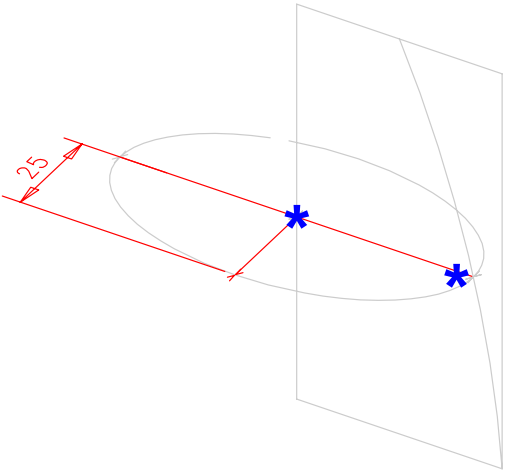
File
Save

Step 6. Draw two lines as shown below in order to add a dimension to the ellipse. (Make sure the two lines are perpendicular.) Fix the angle on the long line so it can't rotate.

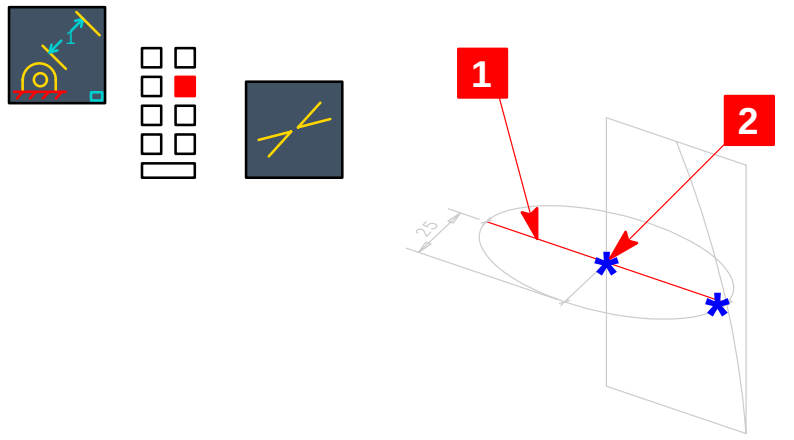


Step 7. Add the dimension as shown below, and modify its value to 25.





Step 8. Constrain the lines to pass through the center point.



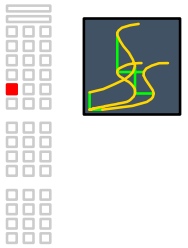
Hint

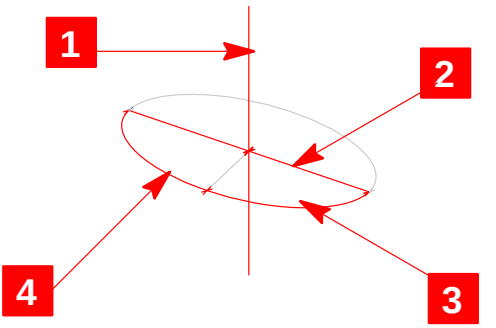
You can test that the geometry is properly constrained by modifying the 25mm dimension to a larger value. The elipse should remain centered, with the two lines intersecting at the centerpoint. Set the value back to 25mm before you continue.

Recovery Point

File
Save

Step 9. Use variational sweep to create half of the bottle shape.





 *Section Options...*

-  *Planar sections only* (on)
-  *Autochain* (off)

1

 *Section Options...*

-  *Autochain*
-  *Stop at intersections*

2

3

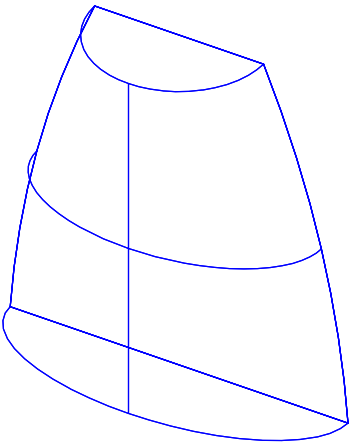
4

 (Done)

Create Surface form

OK

Result



Recovery Point

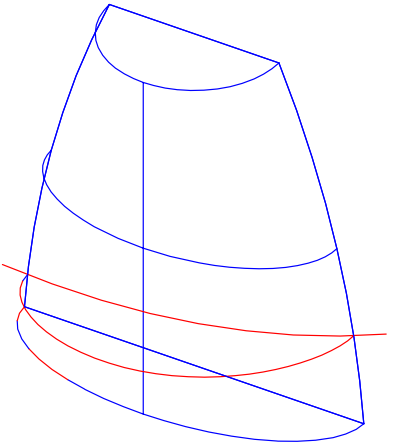
File
Save

In surfacing you often want to use curves on surfaces to trim surfaces. There are several different ways to create curves on surfaces.

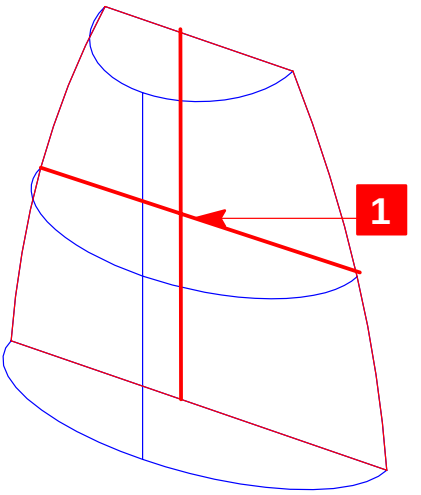
Some important ways are:

- create a curve at the intersection of two surfaces
- create a curve at the silhouette line (useful for mold design to create parting lines)
- project curves onto a surface
- create curves through points on the surface

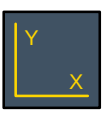
In this section, you will project curves onto the surface.

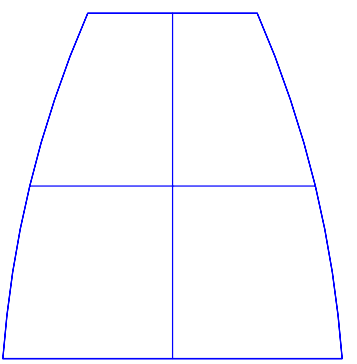


Sketch on the back plane of the bottle.

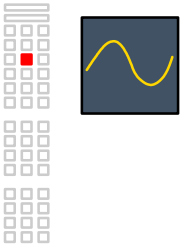


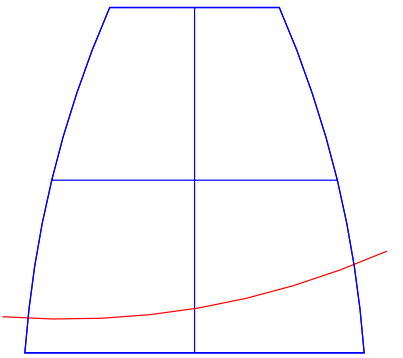
Switch to front view.



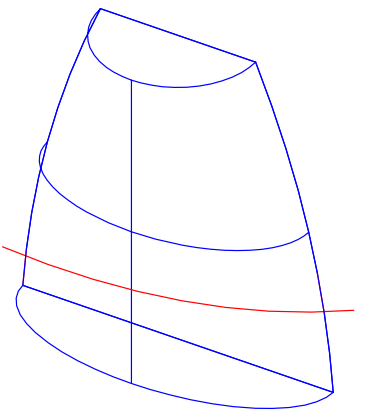


Sketch a spline on this plane as shown below.

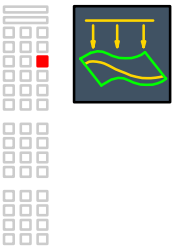




Switch to isometric view.

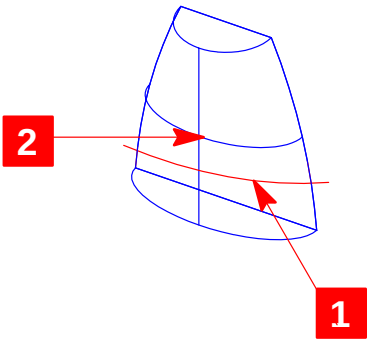


Project the spline curve onto the bottle surface.



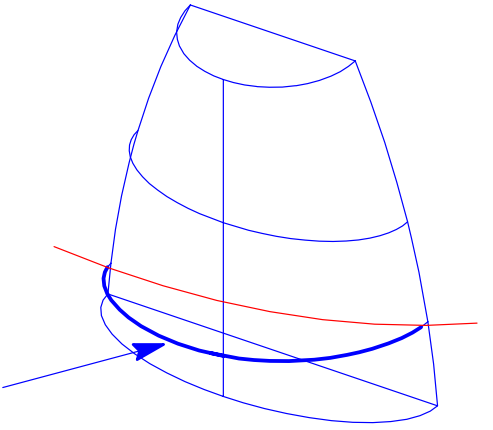
1 pick spline

2 pick front surface



Project Curve on Surface form

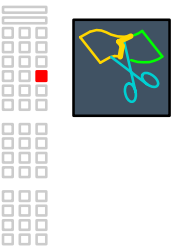
OK



Next, you will trim the front surface at the projected curve. The software will prompt you to pick:

- the surface to trim
- the curve to trim with
- then, the region(s) to keep on the surface

Trim the surface, keeping the upper side of the surface.



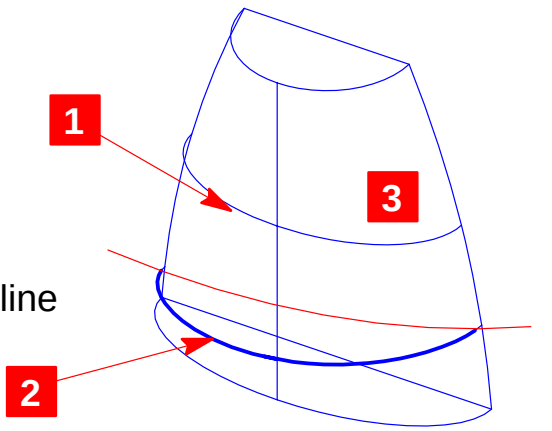
1

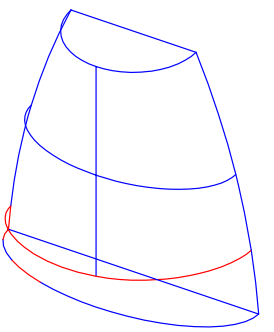
2

(done)

3 pick above the line

(done)





Use a hidden line removed or shaded image to verify that you have kept the upper region of the surface and trimmed away the bottom as shown above.

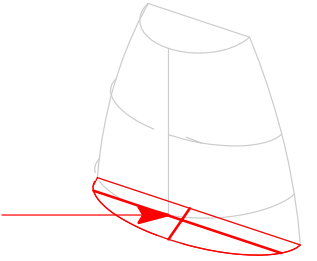
Recovery Point

File
Save

In this step you will trim the bottom surface of the bottle.

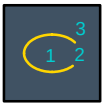
First sketch in place on the bottom surface.

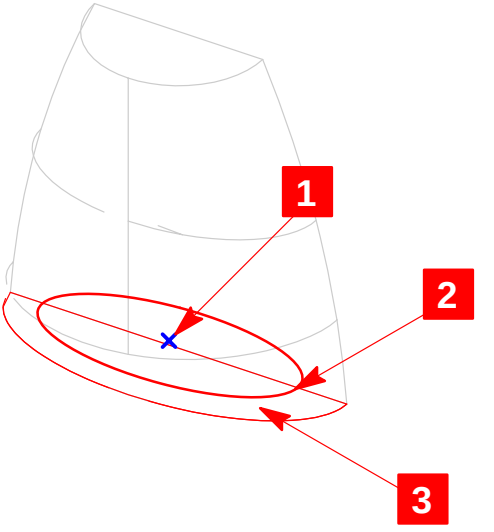
Hint



Use *Ellipse by Center* to define the bottom of the bottle.

Hint





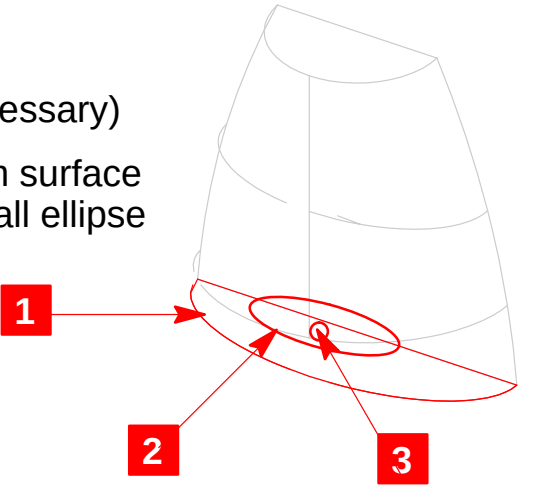
Trim the bottom surface. Keep the center region.

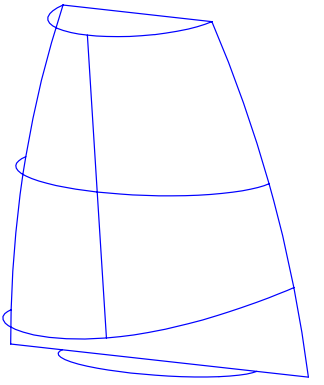
1

2

(Done, if necessary)

3 pick on bottom surface
inside the small ellipse





Recovery Point

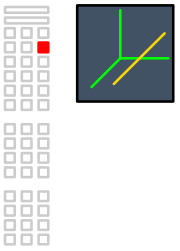
File
Save

There are several “bottoms-up” methods to create surfaces directly from wireframe curves:

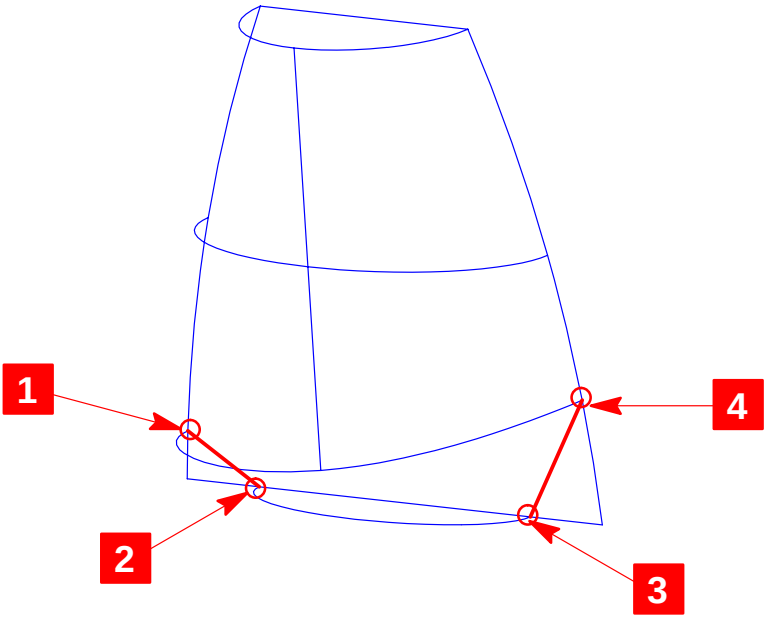
- *Mesh of Curves*
- *Surface by Boundary*
- *Sweep*
- *Variational Sweep*
- *Loft*

In this section, you will use *Surface by Boundary* to create a surface between the bottom and the side of the bottle.

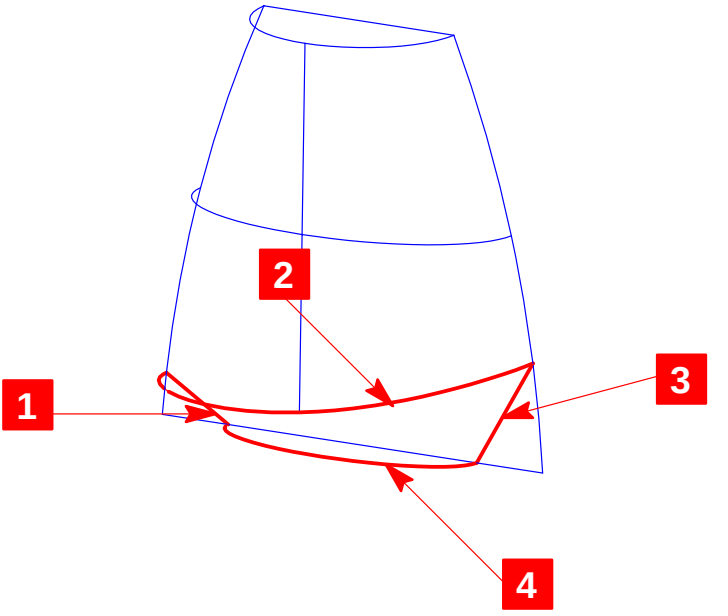
Create two 3D lines to connect the bottom surface to the front surface. These lines will be used as the boundary for a new surface.



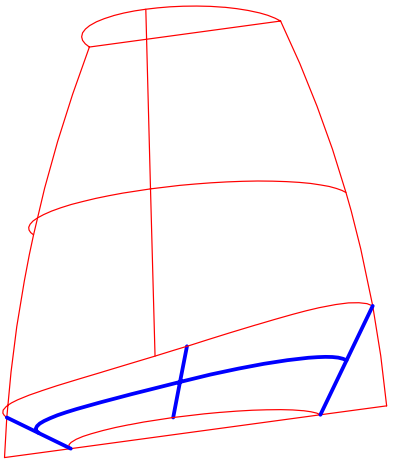
Single Line



Create a surface by using the *Surface by Boundary* command.

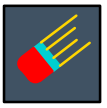


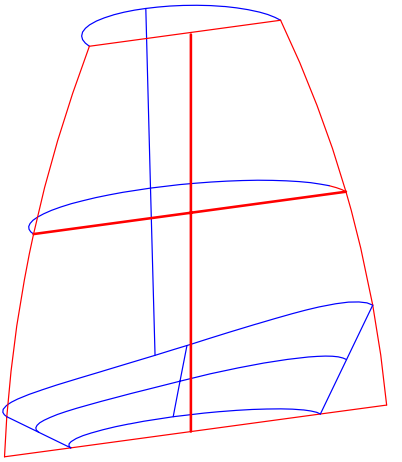
Yes

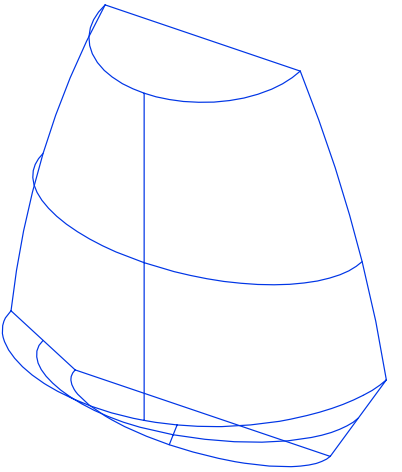


Delete the back face of the bottle.

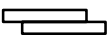
Hint







Recovery Point

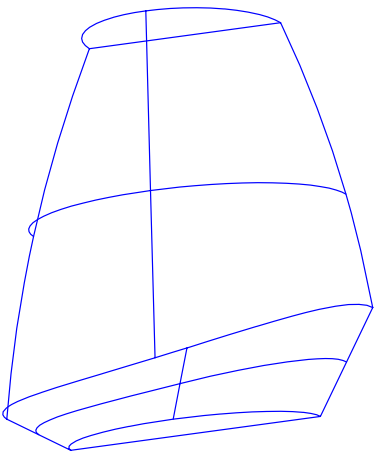


File
Save

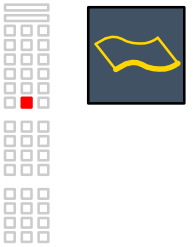
Stitch surfaces together 1 of 4

After creating surfaces you need to stitch them together into one part defining an enclosed volume.

In many cases (such as this bottle example), the software will automatically stitch the surfaces together. However, it is a good habit to check for free edges and stitch where needed.

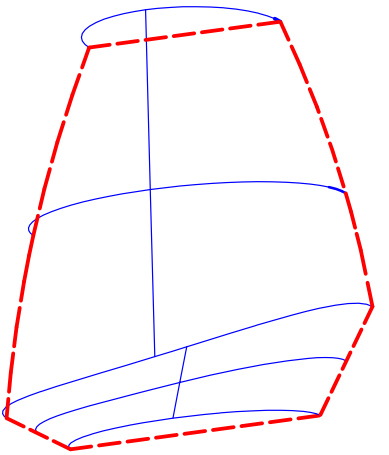


First, check for free edges.



All

(done)



Things to notice

Free edges of surfaces that are not stitched to another surface are highlighted. Notice that the surface you just created was already stitched to the bottom and front surfaces.

The only free edges should be the edges that connected to the back face that you just deleted.

Exploding the display is useful to find out if you have any small sliver surfaces that were unintended, or were too small to see in a line display.

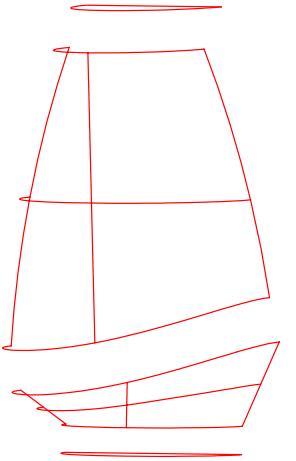
All

Surface

(Done_with_All)

(Done)

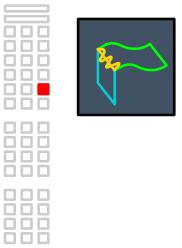
(accept default)



Things to notice

Notice that there are four surfaces.

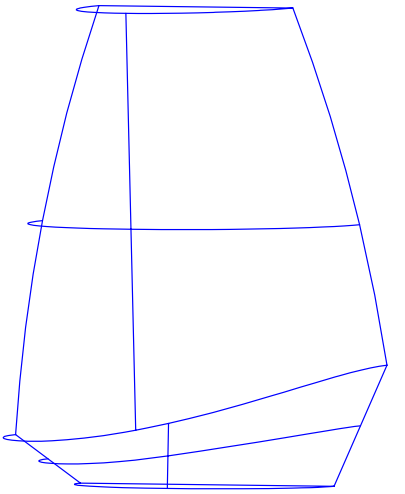
If necessary, follow these steps to stitch together the adjacent unstitched surfaces.



 *Pick Surfaces*

 *All*

 (done)

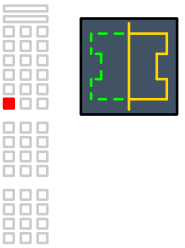


Things to notice

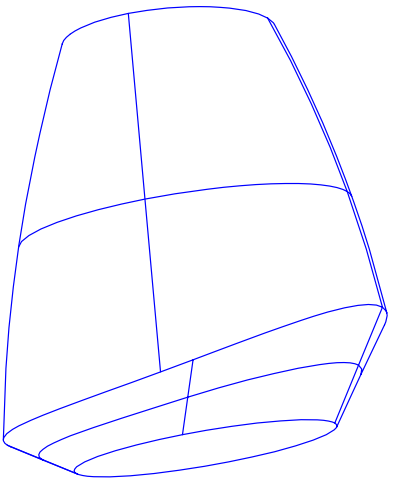
An I-DEAS error should state that there are no edges that overlap.

 *Continue*

Finish creating the bottle. To finish creating the bottle, use the *Reflect* command.

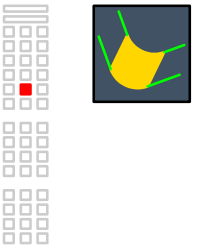


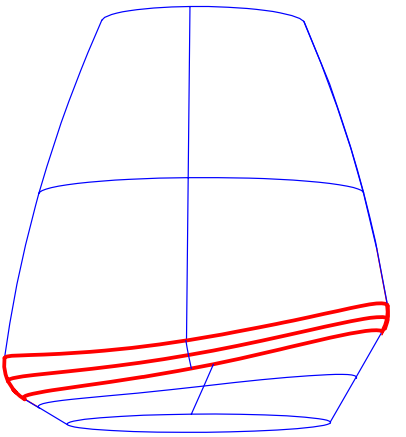
Pick a plane using the *Three-Point* method.



Next fillet the intersections shown below.

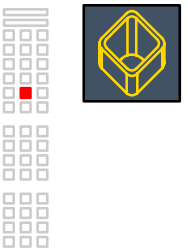
Hint

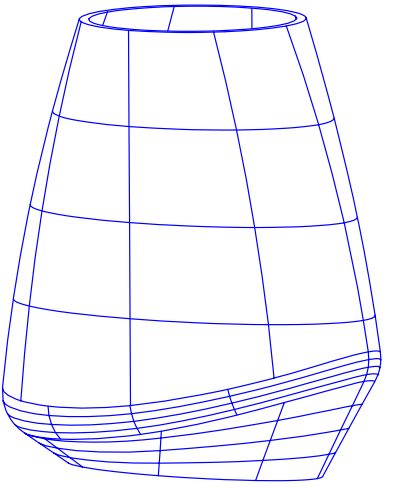




Optional: Shell the bottle. Leave the top open.

Hint





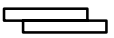
Tutorial wrap-up

You have completed the Performing Surfacing Operations tutorial.

Delete or put away the parts. These parts are 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

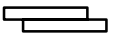
Design User's Guide
- Design Concepts
  - Modeling Parts
  - Surface Creation
- I-DEAS Design Techniques and Examples
  - Feature Examples
    - Surfacing Techniques
    - Variational Sweep Techniques
    - Shape Design Techniques

Design Reference Guide
- Surfacing
  - Surface Creation

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.

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