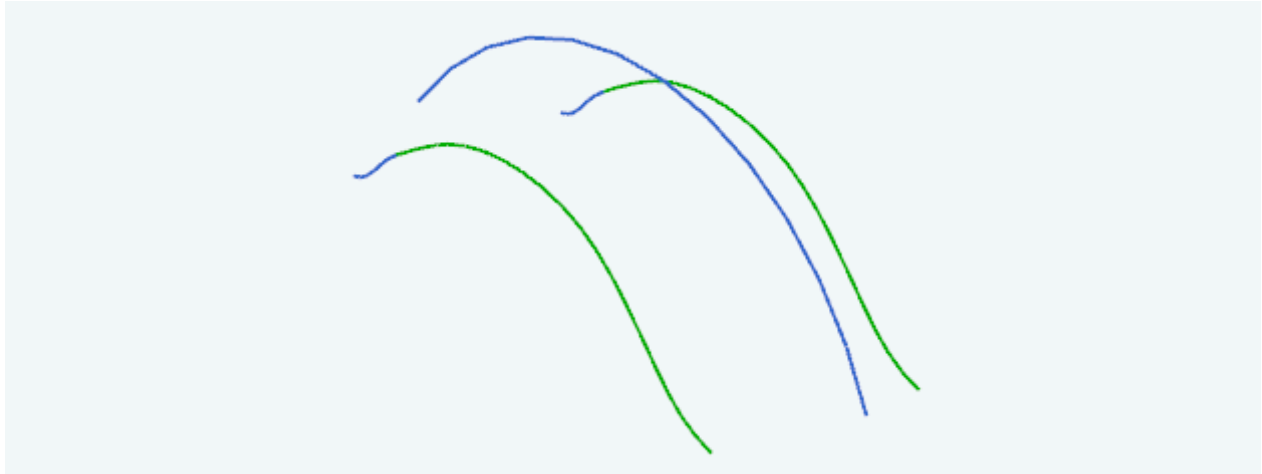

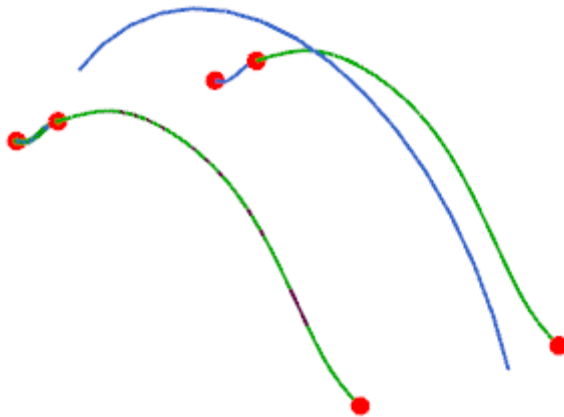


Create the Through Curves surface


1. Open *ffm4_mc_fender*.



2. Select all three strings, and then on the **Analyze Shape** toolbar, click **Show End Points** .

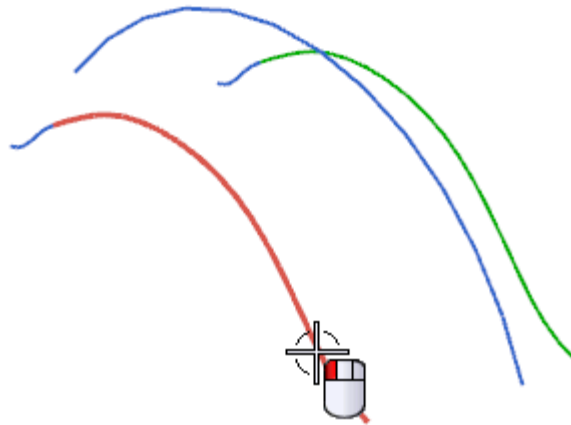


Notice there are two curves in the strings on the left and on the right, but only one curve in the middle string. Take note of where the curves in the front of both the left and right strings end.

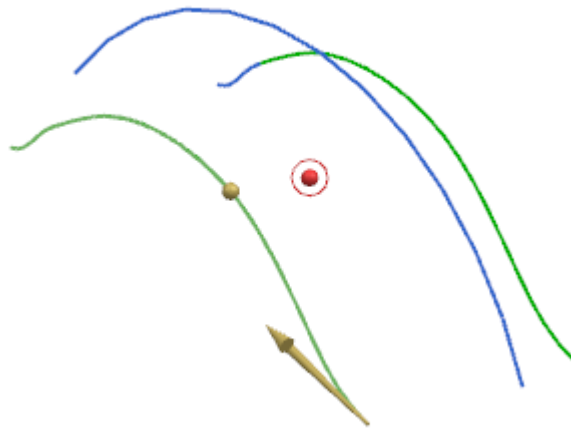
3. Press the Escape key to deselect the curves.
4. On the **Surface** toolbar, click **Through Curves** .
5. In the **Through Curve** dialog box, from the **Alignment** list, ensure that **Parameter** is selected.
6. Select the **Preserve Shape** ☒ check box.
7. In the **Sections** group, highlight **Select Curve or Point**.

8. On the **Selection** bar, from the **Curve Rule** list, select **Tangent Curves**.

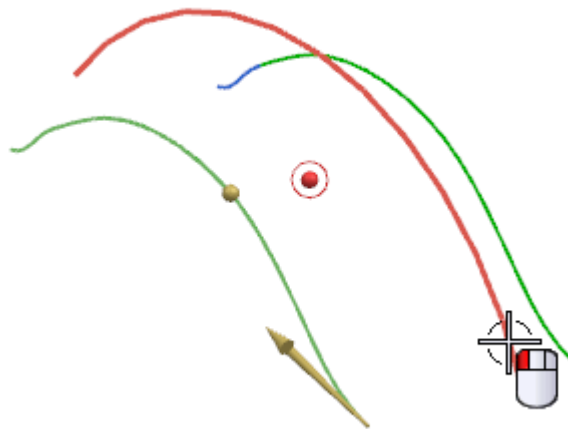
9. Select the curve as shown.



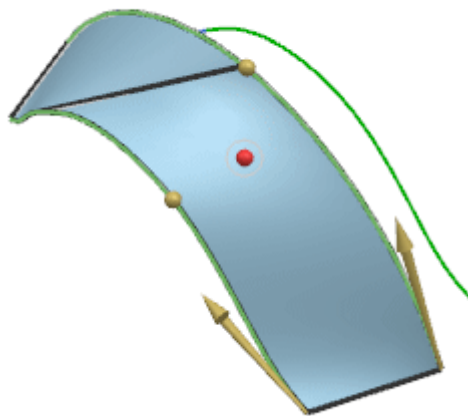
10. Click the middle mouse button to advance.



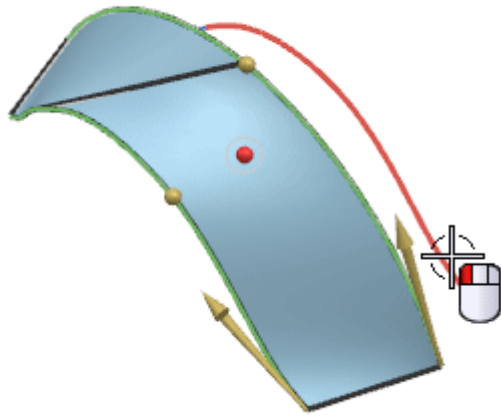
11. Select the second curve as shown.



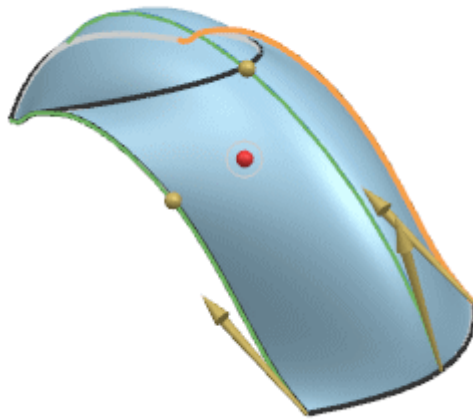
12. Click the middle mouse button to advance.



13. Select the final curve as shown.



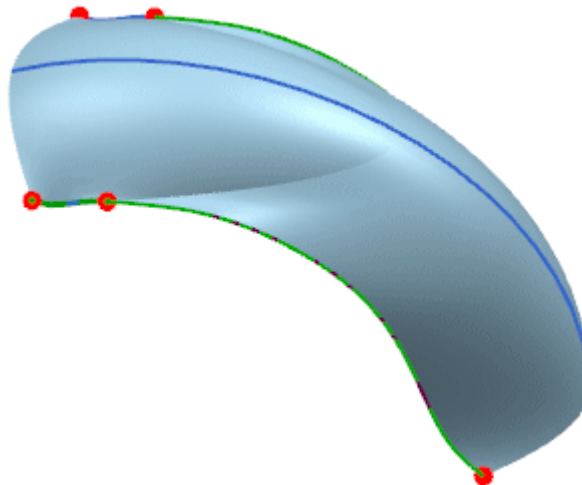
The preview of the surface is displayed




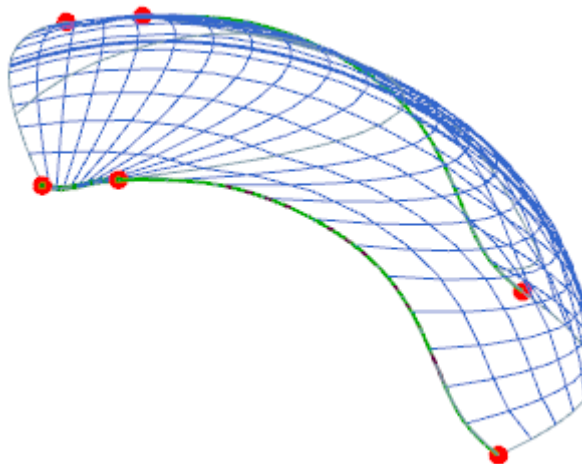
14. Click **OK**.

Edit the surface alignment

1. In the view background, right-click and choose **Rendering Style→Shaded**.
2. Rotate the part and notice the irregularity of the shape.

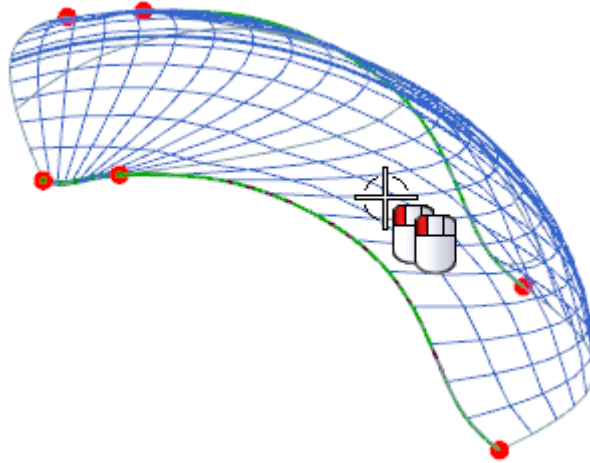


3. On the **Utility** toolbar, click **Edit Object Display** .
4. In the **Class Selection** dialog box, select the surface and click **OK**.
5. In the **Edit Object Display** dialog box, expand the **Wireframe Display** group, and in the **U** and **V** boxes, type **10**.
6. Click **OK**.
7. In the view background, right-click and choose **Rendering Style→Static Wireframe**.



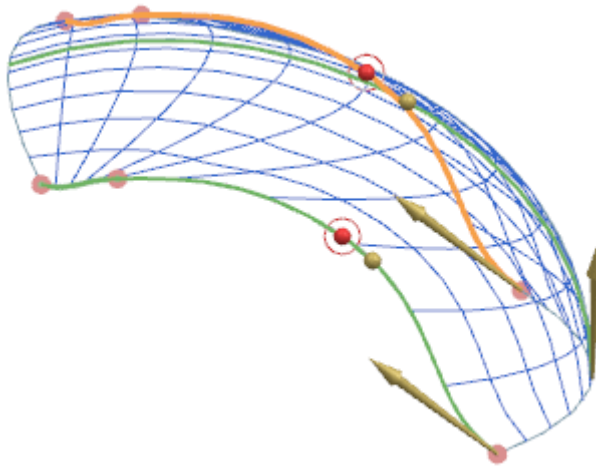
Notice how **Parameter** alignment and **Preserve Shape** affect the isoparameter lines of the surface.

8. Double-click the surface as shown.

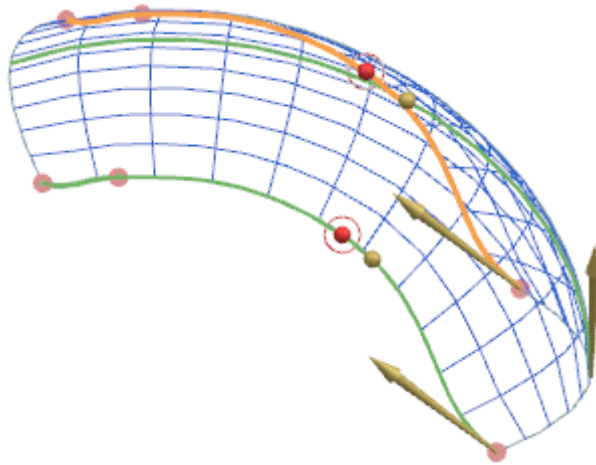


The Through Curves dialog box is displayed.

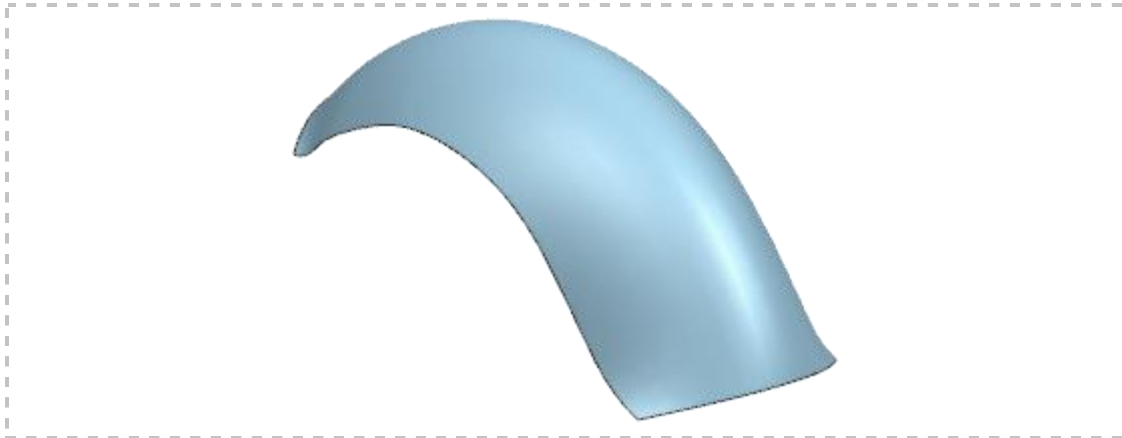
9. In the **Settings** group, clear the **Preserve Shape** ☐ check box.




10. In the **Alignment** group, from the **Alignment** list, choose **Arc Length**.



11. In the view background, right-click and choose **Rendering Style**→**Shaded with Edges**.
12. Click **OK**.
13. Hide all the curves and sketches.

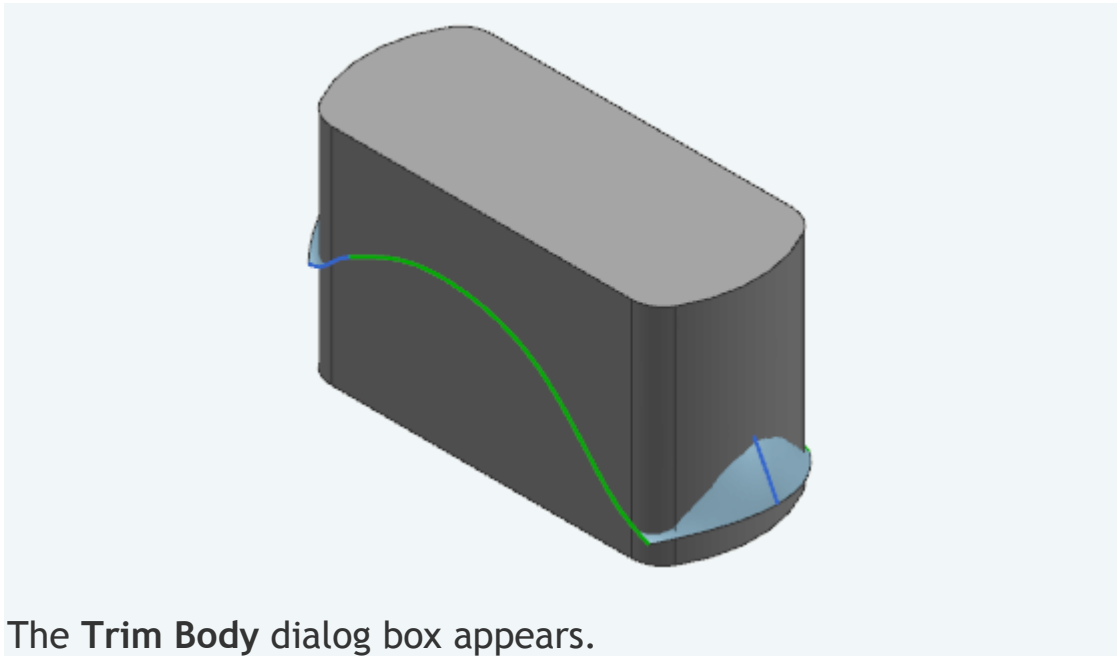


Tip On the **Utility** toolbar, click **Show and Hide** .


- In the **Hide** column, click the Negative signs “-” for **Sketches** and **Curves**.
- click **Close**.

Trim the solid body to the surface

1. In the Part Navigator, right-click **Extrude (8)** and choose **Show**.

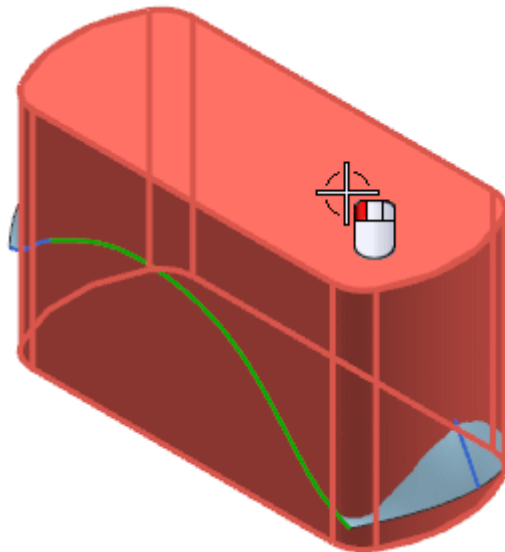


The **Trim Body** dialog box appears.

2. On the **Feature** toolbar, click **Trim Body** .

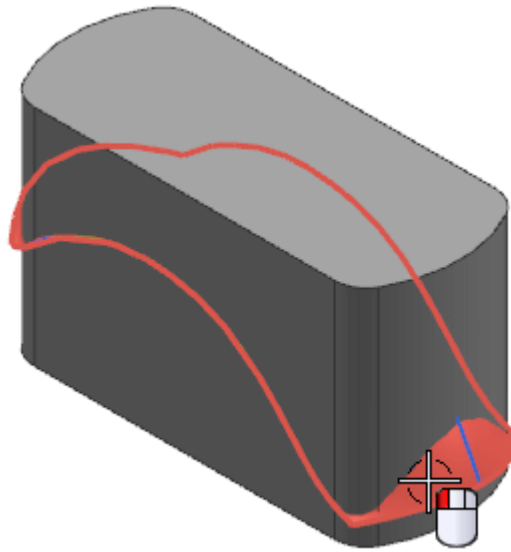
The **Trim Body** dialog box is displayed.

3. Select the solid body as shown.

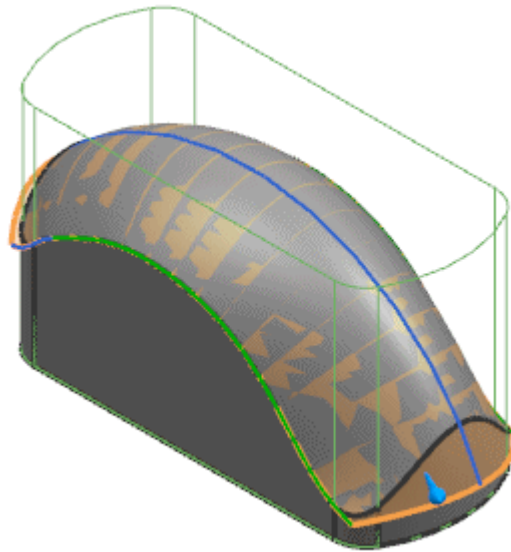


4. Click the middle mouse button to advance to the **Tool** selection.

5. Select the **Tool** body as shown.



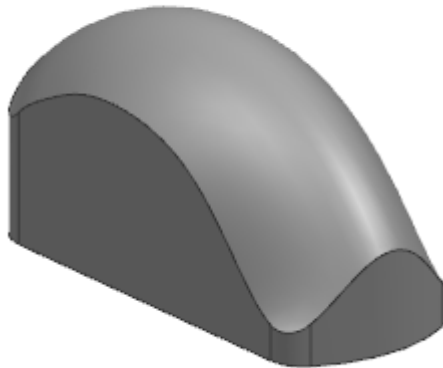
6. If your part does not appear as shown, click **Reverse Direction**.




7. Click **OK**.

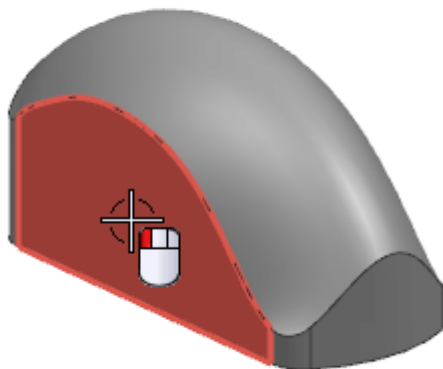
8. On the **Utility** toolbar, click **Show and Hide** .

- In the **Show and Hide** dialog box, select the minus **Hide** symbol for Curves, Sketches, and Sheet Bodies.
- Click **Close**.



Create a shell feature

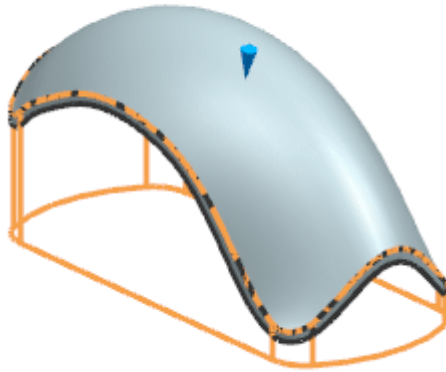
1. On the **Feature** toolbar, click **Shell** .
2. On the **Selection** toolbar, from the **Face Rule** list, select **Tangent Faces**.
3. Select the face as shown.



If you get an Alerts message, you can dismiss it.

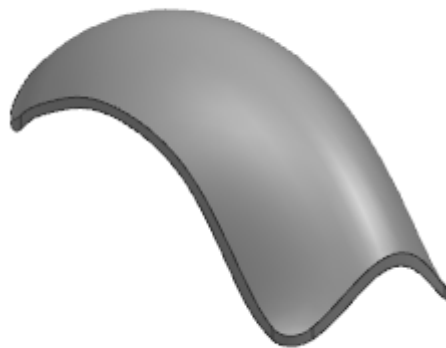
4. Select the bottom face of the part.

The preview is displayed.



5. In the **Thickness** group, in the **Thickness** box, type **5**.

6. Click **OK**.



Other features would be added to complete the part.

7. Close the part.



You completed the activity.

Use parameter alignment

1. Open *ffm4_thru_curves_2*.



You will use the four sets of sketch curves to define the shape of the surface.

2. On the **Surface** toolbar, click **Through Curves** .
3. At the top of the **Through Curves** dialog box, click **Reset** .
4. Make sure the following settings are selected:
 - In the **Continuity** group, **First Section** and **Last Section** = **G0 (Position)**.
 - In the **Alignment** group, **Alignment** = **Parameter**.
 - In the **Output Surface Options** group, **Patch Type** = **Multiple**.
 - **Construction** = **Normal**.
 - **Normal to End Sections** = cleared ☐.
 - In the **Alignment** group, **Preserve Shape** = cleared. ☐.
 - **Lofting Degree** = **3**.

✓ 2 of 3 ▼ ✓

Create a surface using By Points alignment

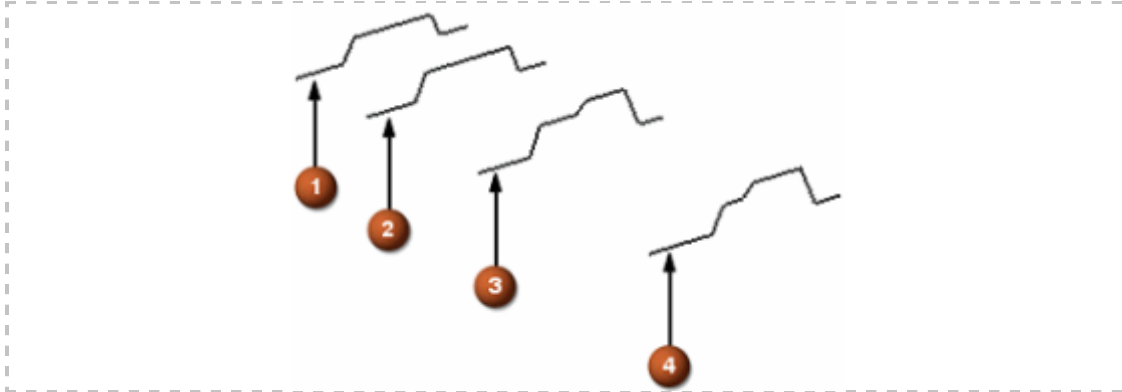
Select the section curves

1. In the **Sections** group of the dialog box, make sure **Select Curve or Point** is active.

2. Expand the **List** so you can follow the selection of sections.

3. From the **Curve Rule** list select **Feature Curves**.

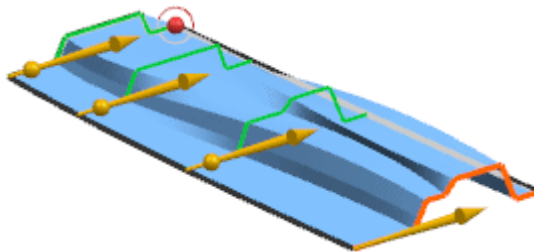
4. Select the first section at the left end, and click the middle mouse button or click **Add New Set**  to complete the selection of the first section.



5. Select the second section at the left end and click the middle mouse button.

6. Select the third and then the fourth sections at their left ends and click the middle mouse button after each selection.

Your vectors should display like this.



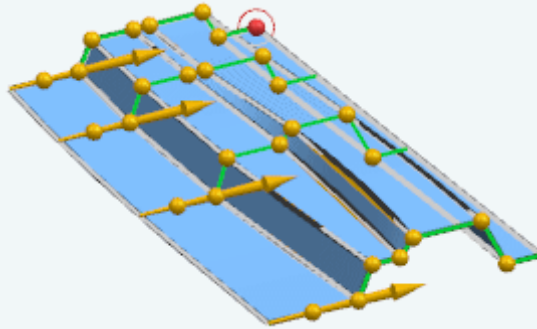
✓ ✓

- 1 - Use parameter alignment
- 2 - Select the section curves
- 3 - Change to By Points alignment

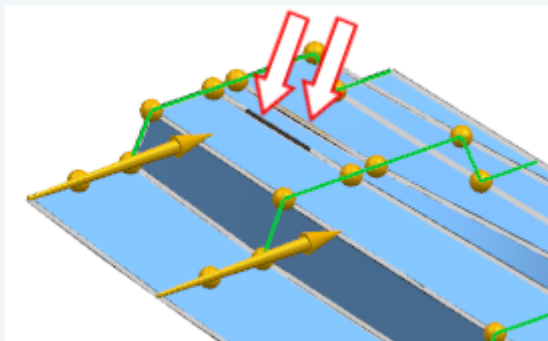
Change to By Points alignment

1. In the **Alignment** group, from the **Alignment** list, select **By Points**.

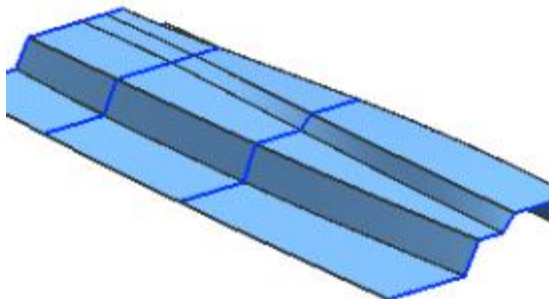
The alignment points for each section are calculated and they are connected with lines.



The alignment is now better than with parameter alignment, but you want to change the location of the points on sections 1 and 2 to provide a better transition shape for the upper angled face, and how it washes out.



2. In the **Alignment** group, make sure **Specify Point** is active, drag the four alignment points for the sections indicated above so it looks something like the following, and then click **OK**.

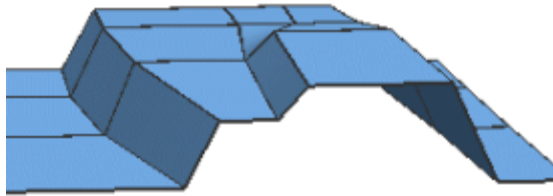


Separate faces are formed between the sharp corners in this part.

3. In the graphics window, double-click the surface you just created.

In the **Setting** group, the **Lofting Degree** value is **3**.

4. In the **Lofting Degree** box, type **1** and click **OK**.
5. Rotate the view so you are looking at the part as shown below.

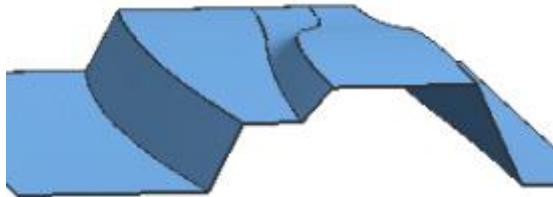


Notice that the shape of the surface between section curves is now linear (degree 1), and that there are new faces and edges at the sections.

This would be more clear if the sketches were hidden.

6. Double-click the surface again and change the **Lofting Degree** to **2**.

The shape of the surface is now better, and there are no separate faces at the section curves.



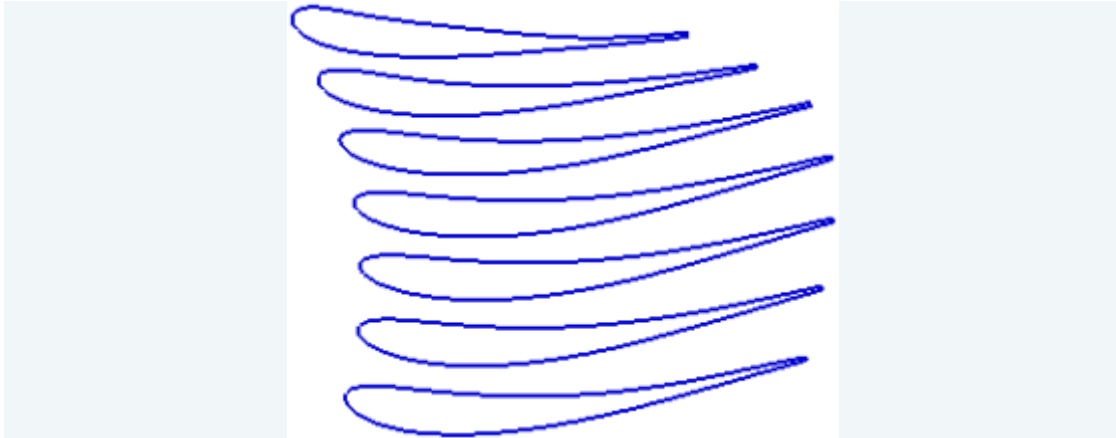
7. Close all parts.



You completed the activity.

Create a solid body using Spline Points alignment

Open the part and start the feature


1. Open *ffm2_thru_curves_4* and start the Modeling application if it is not already active.

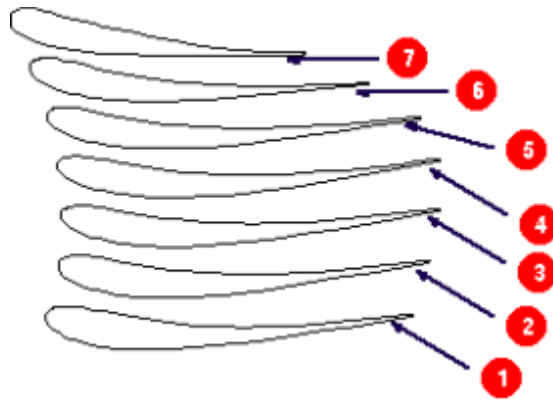


2. On the **Surface** toolbar, click **Through Curves** .
3. At the top of the **Through Curves** dialog box header, click **Reset** .

When you use the Spline Points construction method, the section curves must be single B-curves each with the same number of defining points. In this part, the section curves meet these conditions.

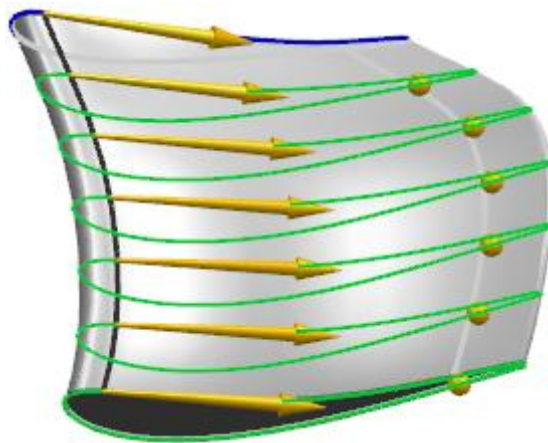
4. In the **Alignment** group, select the **Preserve Shape** ☒ check box.
5. On the Selection bar, from the **Curve Rule** list, select **Single Curve**.
6. In the **Sections** group of the dialog box, make sure **Select Curve or Point** is active, select each of the sections (at the locations indicated by the arrowheads) as shown in the graphic below

Note: Make sure to click the middle mouse button or click **Add New Set**  after each selection.



Tip You can expand the list in the dialog box to better follow your selection process.

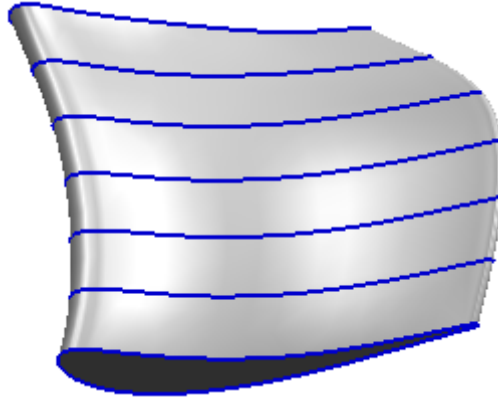
7. Make sure the direction vectors point in the same direction, otherwise your part will be twisted.



Specify the alignment

1. In the **Output Surface Options** group, from the **Construction** list, select **Spline Points**.
2. In the **Alignment** group, clear the **Preserve Shape** ☐ check box.
Notice that the edge (face division) disappeared.

3. Click **OK** to create the body.



If you were to create this feature using the Normal Construction, you would have a higher number of faces and patches, making the faces more complex. Using spline points simplifies the faces while maintaining zero tolerance at the spline points.

4. Close all parts.