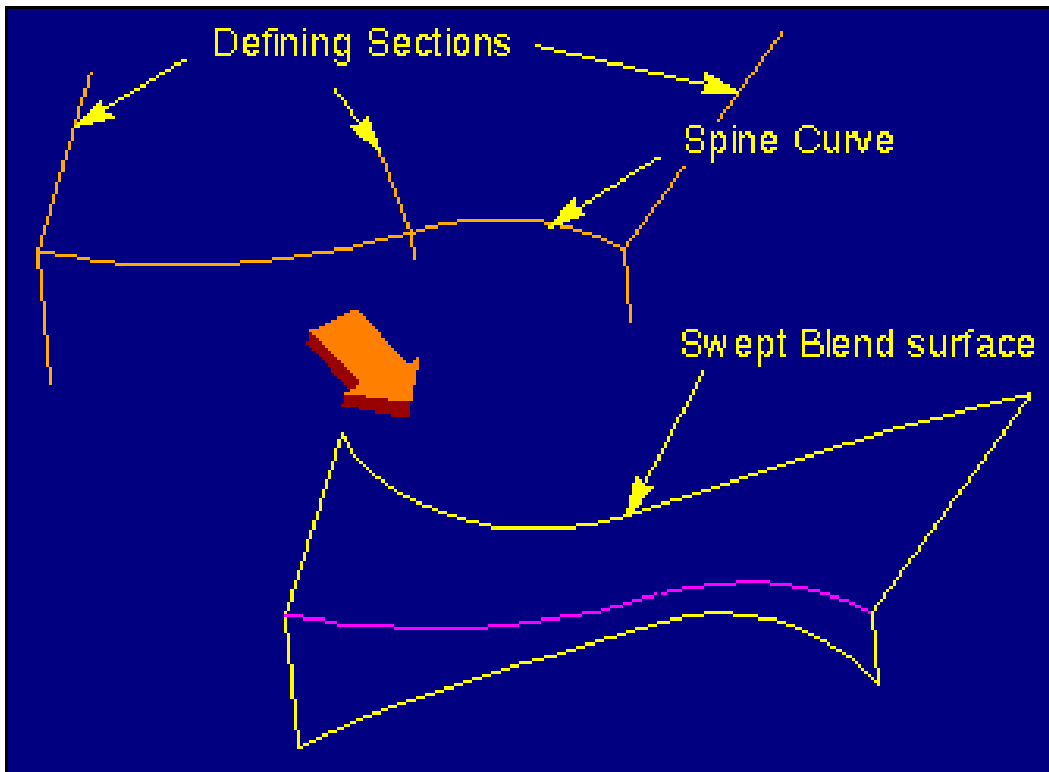


Swept Blend—Creates a quilt using swept blend geometry.

A surface can be defined by a set of cross-sections located at various points along a controlling Spine Curve. In **Pro/SURFACE**, this is known as a *Swept Blend* surface. Swept Blend surfaces are defined very much like Variable Section Sweep surfaces.



As shown above, Swept Blend surfaces are created with a Spine Curve, just like Variable Section Sweep surfaces. However, the shape of Swept Blend surfaces is controlled by the defining cross-section curves, rather than by optional Trajectory curves.

A **swept blend** requires a single trajectory (the Origin Trajectory) and multiple sections. To define the Origin Trajectory of the swept blend, you can either sketch a curve or select a chain of datum curves or edges. You sketch the sections to be blended at specified segment vertices or datum points on the Origin Trajectory. To orient a section, you can specify the rotation angle about the Z-axis, and/or use the **Pick XVector** or **Norm to Surf** options.

Note the following restrictions:

- A section cannot be located at a sharp corner in the Origin Trajectory.
- For a closed trajectory profile, sections must be sketched at the start point and at least one other location. Pro/ENGINEER uses the first section at the endpoint.
- For an open trajectory profile, you must create sections at the start and end points. There is no option to skip placement of a section at those points.
- Sections cannot be dimensioned to the model, because modifying the trajectory would invalidate those dimensions.
- A composite datum curve cannot be selected for defining sections of a swept blend (**Select Sec**). Instead, you must select one of the underlying datum curves or edges from which a composite curve is determined.
- If you choose **Pivot Dir** and **Select Sec**, all selected sections must lie in planes that are parallel to the Pivot Direction.

You can control swept blend geometry by using an area graph and by controlling the perimeter of the feature between the sections. An area graph represents the exact area of the cross section of the swept blend at selected locations on the Origin Trajectory. You can add or remove points on the Origin Trajectory at which to specify the swept blend sectional area. You can also change the graph value at user-defined points.

Terminology

The following table lists terminology common to variable section sweeps and swept blends.

Term	Definition
Normal To Origin Trajectory	The section plane remains normal (perpendicular) to the origin trajectory throughout its length. The generic sweep behaves this way.
Normal To Trajectory	Two trajectories must be selected to determine the location and orientation of the section. The origin trajectory determines the origin of the section along the length of the feature. The section plane remains normal to the normal trajectory along the length of the feature.
Pivot Direction	The section plane remains normal to the origin trajectory as it is viewed along the pivot direction. The upward direction of the section remains parallel to the pivot direction.

To Create a Swept Blend (basic)

To create a swept blend, you can define the trajectory by sketching a trajectory, or by selecting existing curves and edges and extending or trimming the first and last entity in the trajectory.

1. Click **Insert>Swept Blend** and then click the type of swept blend you want. The **BLEND OPTS** menu appears.

2. Click **Select Sec** or **Sketch Sec**.

Select Sec—Select existing curves or edges to define each section using the **CRV SKETCHER** menu.

Sketch Sec—Sketch new section entities to define each section.

3. Click **NrmToOriginTraj**, **Pivot Dir**, or **Norm To Traj**.

NrmToOriginTraj—Select the Origin Trajectory.

Pivot Dir—Use the **GEN SEL DIR** menu to specify the Pivot Direction. The options are as follows:

- **Plane**—Select a plane or create a new datum plane to which the direction will be normal.
- **Crv/Edg/Axis**—Select as the direction an edge, curve, or axis. If you select a non-linear edge or curve, the system prompts you to select an existing datum point on the edge or curve to specify a tangent.
- **Csys**—Select an axis of the coordinate system as the direction.

Norm To Traj—Select the Origin Trajectory and an additional trajectory to which the section will remain normal.

Note: For a Norm To Traj swept blend, the system checks if the normal plane to the selected trajectory has a defined intersection with the Origin Trajectory. If the intersection cannot be found, the system issues a warning so you can redefine the normal trajectory.

4. Click **Done** A **Swept Blend** dialog box appears with the following elements:

Pivot Dir—(If selected) Specify the Pivot Direction.

Normal Traj—(If selected) Select the normal trajectory.

Origin Traj—Specify the trajectory that defines the section origin.

Sections—Define the sections.

Blend Control—(Optional) Define how to control the blend geometry along the Origin Trajectory.

Tangency—(Optional) Specify tangency conditions for the feature.

5. Define the type of Origin Trajectory by choosing an option from the **SWEEP TRAJ** menu:

Sketch Traj—Sketch the Origin Trajectory.

Select Traj—Define the Origin Trajectory using existing curves and edges. Choose **Done** from the **CHAIN** menu when finished defining the chain. The Origin Trajectory can have sharp corners (a discontinuous tangent to the curve), except at the endpoint of a closed curve. At non-tangent vertices, Pro/ENGINEER mitres the geometry as in constant section sweeps.

6. If you selected the **NrmToOriginTraj** option, the system brings up the **SEC ORIENT** menu. Select one of these options, followed by **Done**:

Pick XVector—Select an axis, straight edge/curve, or plane normal to determine the section's positive X-axis. Use options in the **GEN SEL DIR** menu to select a horizontal reference. The system displays a red arrow, indicating the positive direction for the X-vector. Choose **Flip** or **Okay** to determine the direction for the operation.

Note: The **Pick XVector** option is available only for the trajectories defined with the **Select Traj** option.

Automatic—The system automatically determines the section's orientation.

If you select this option for the first section, then the X-axis is determined by the curvature vector at the beginning of the Origin Trajectory. When you select **Automatic** for a section other than the first, the system determines the X-vector automatically based on the previous section orientation and the behavior of the Origin Trajectory.

Norm to Surf—Use the adjacent surface section normal to determine the section upward direction. If you select this option for the first section, then all sections use the same reference surfaces as the upward direction.

If the Origin Trajectory has only one adjacent surface, then the system automatically selects this surface, highlighted in blue, as the reference for the section orientation. A red arrow appears, indicating the upward direction. Choose **Flip** or **Okay** to specify the upward direction. If the Origin Trajectory has two adjacent surfaces, the system prompts you to select a surface for the section orientation. The default surface is highlighted in blue. You can accept the default surface or select the other one. A red arrow appears, indicating the upward direction. Choose **Flip** or **Okay** to specify the upward direction.

7. The system highlights endpoints and vertices along the Origin Trajectory. Use options in the **CONFIRM** menu to select points at which you want to specify additional sections.

Accept—Sketch or select a section at this highlighted location.

Next—Go to the next point.

Previous—Return to the previous point.

8. If you chose **Norm To Traj** in Step 6, select the trajectory to which the section will be normal. Choose an option in the **SEC ORIENT** menu, followed by **Done**:

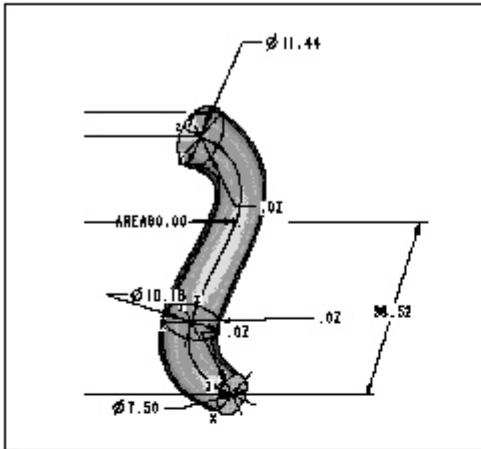
Norm to Surf—Select a surface that determines the section's upward direction, then select or sketch the trajectory that defines the section plane normal. Choose **Flip** or **Okay** to select the upward direction. This option is available only if the Origin Trajectory belongs to a surface.

Use Norm Traj—Select a trajectory that defines the section plane normal.

9. For each vertex or datum point where you define a section, specify the section's rotation angle about the Z-axis (with a value between -120 and +120 degrees).
10. Select or sketch the entities for each section, depending on whether you chose **Select Sec** or **Sketch Sec**, respectively. Choose **Done** to exit Sketcher.
11. When all cross-sections are sketched or selected, unless you want to define optional elements, select **OK** in the dialog box to generate the swept blend feature.

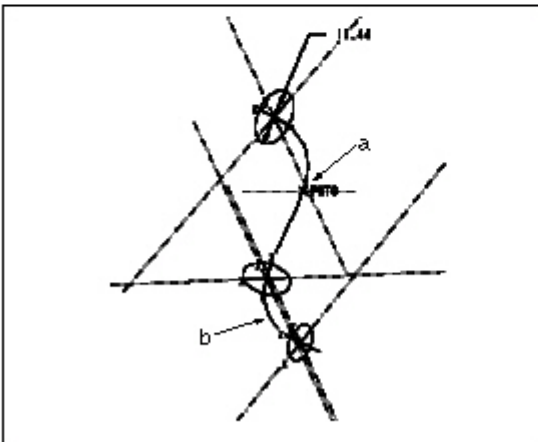
Example: Creating a Swept Blend

Completed Swept Blend



Section Definition

The sections must be sketched at the first and last Origin Trajectory points.



a. This point was added using an Area Graph.

b. Origin Trajectory

Note: Each section remains displayed as the next section is created.

To Control the Perimeter of a Swept Blend

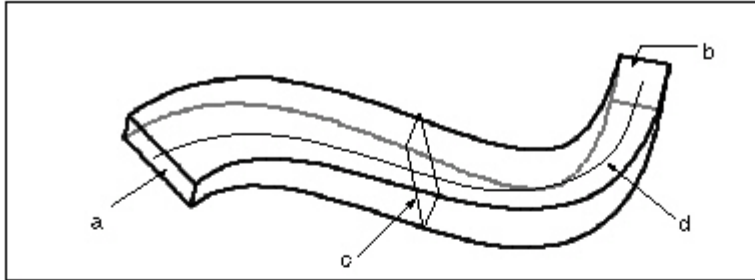
The **Blend Control** element lets you select a method for controlling the shape of the swept blend between its sections. When you choose **Blend Control** and **Define** from the dialog box, the **BLEND CONTROL** menu appears with the following options:

- **Set Perimeter**—Control the shape of the feature by controlling its perimeter between the sections. If two consecutive sections have equal perimeters, the system attempts to maintain the same cross-section perimeter between these sections. For sections that have different perimeters, the system uses smooth interpolation along each curve of the trajectory to define the perimeter of the feature between its sections. You cannot specify both perimeter control and tangency conditions for the swept blend—only one of these conditions is allowed.

- **Area Graph**—Control the shape of the feature through control points and area values.
- **None**—Do not set any blend control for the feature.
- **Center Crv**—Show a curve connecting the centroids of the feature's cross-sections. This option is available only with the **Set Perimeter** option.

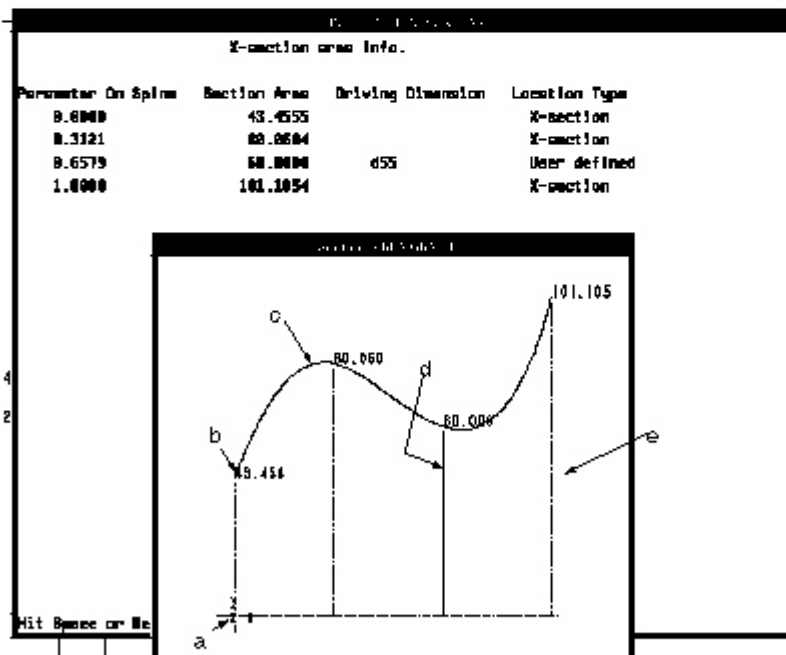
Example: Controlling the Perimeter of a Swept Blend

Using the Set Perimeter Option



- Section 1, Perimeter 1
- Section 2, Perimeter 2
- Perimeter 3. If Per. 1 = Per. 2, then Per. 3 = Per. 1 = Per. 2.
- Origin Trajectory

Sample Area Graph and Information Window



- csys
- Area values
- Area graph
- Solid lines at user-defined locations

