

Autodesk®

Introduction to Panel Gap

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Introduction

This document provides an introduction to the **Panel Gap** tool which is currently under development in the Alias product (both Surface and Automotive). Because this tool will not be completed in the current release, we will hide it behind an environment variable in the final release of Alias 2011.

During the ongoing Beta phase, the tool is exposed in order to gather feedback that will help further development. This guide describes the tool as it exists in the Beta 1 version of Alias 2011.

Purpose of the tool





Panel Gap is a complex tool that aims to create the many surfaces involved in the construction of a panel gap within a single step.

Consistent minimal gaps between component panels, both interior and exterior are features that distinguish a quality automotive product. Once the main surfaces of a design are established, the detailing of individual components begins. This includes defining the gaps between components, the flanges (that define the edges) and the radii (fillets) between the main panel and the edges.



The main goals of the tool are efficiency (through a well designed interface) and accuracy.

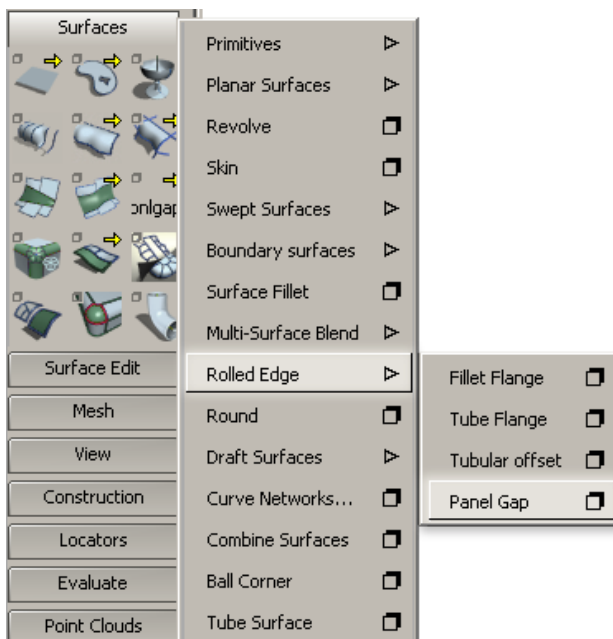
There are several *variations* on panel gaps as shown below.

| | |
|---|--------------------------------|
|  | 1. Flange/Flange - with bottom |
|  | 2. Flange/Flange - no bottom |
|  | 3. Flange-Rolled Edge |
|  | 4. Rolled Edge-Rolled Edge |

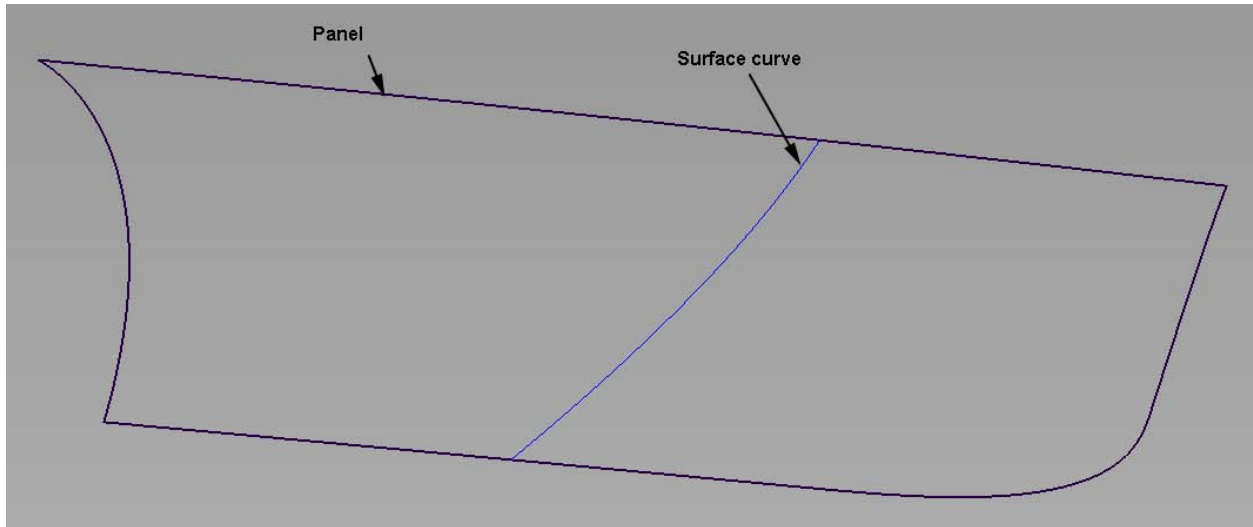
In the current version of the software, we have developed variation 4: Rolled Edge – Rolled Edge. A rolled edge consists of a fillet and a flange (linear extension) that is tangent continuous to the fillet.

Basics

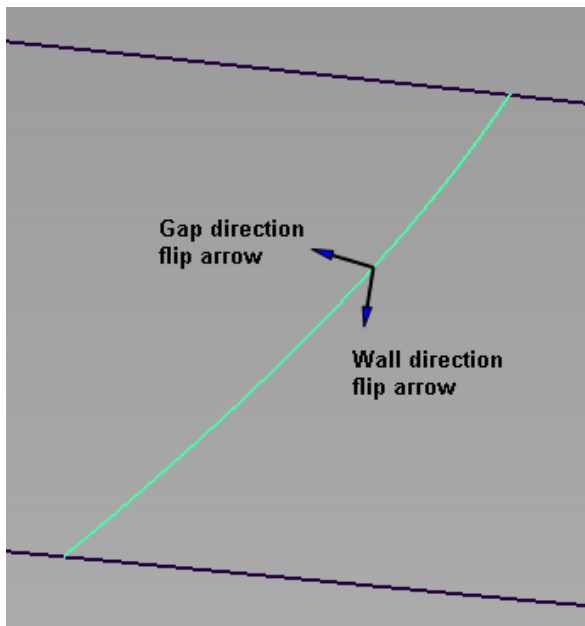
The **Panel Gap** tool is located in the **Surfaces > Rolled Edge** sub-palette.



The **input** to the tool can be a curve-on-surface, an isoparm, or a patch precision line. This curve defines one side of the gap (primary fillet and flange). You can select additional surface curves if they are connected, or use **Chain Select** to select several tangent continuous curves at once.

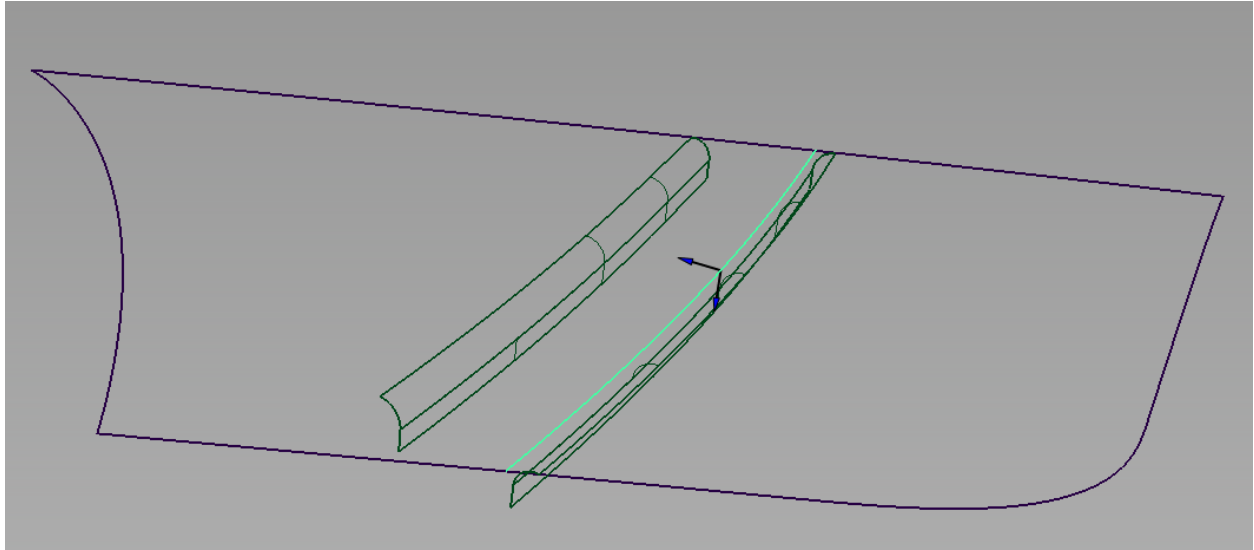


When a curve is selected, two blue *flip* arrows appear. The one normal to the panel surface controls the direction of the wall (see below). The other determines on which side of the curve the gap will be located. Click an arrow to flip its direction. Each arrow also has a corresponding **Flip** checkbox in the control window.



After all your curves are selected, click the **Build** button.

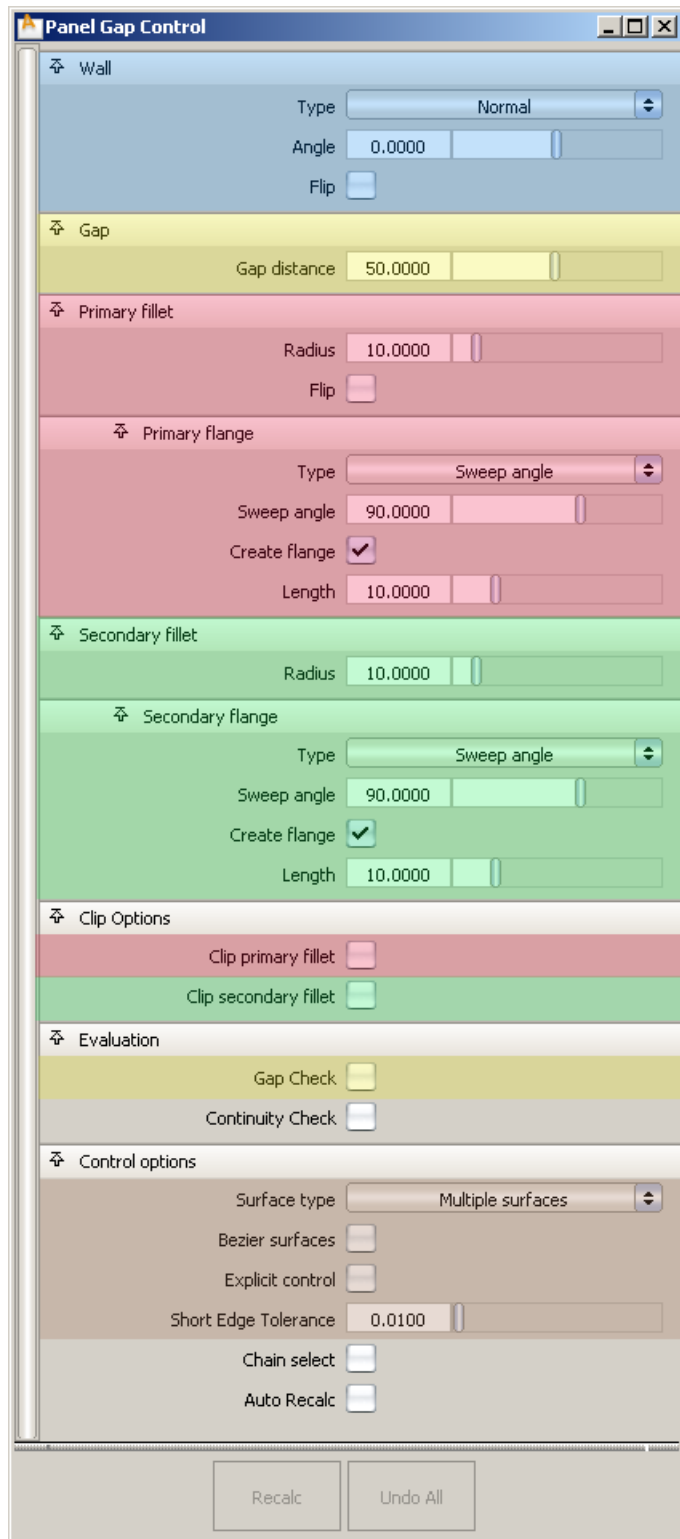
The **output** of the tool consists of two *rolled edges*, each made up of a fillet and a flange, similar to those created by the **Fillet Flange** tool. The two fillet flanges are separated by a gap of the specified width. All four surfaces have construction history.



Besides the gap width, the control window lets you specify all the parameters of both fillets and flanges.

User Interface

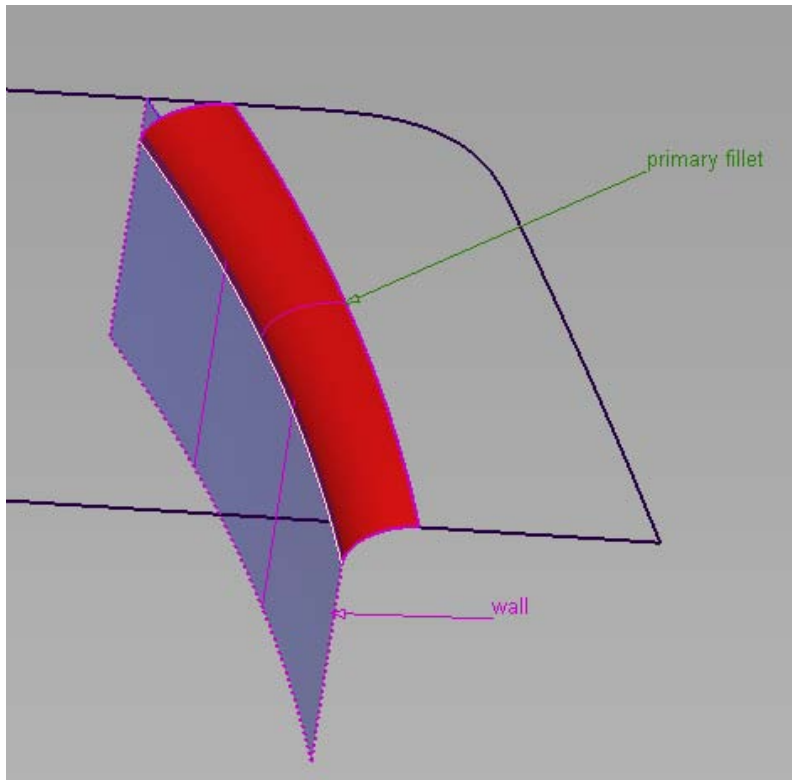
The control window is clearly organized into logical blocks. The first four blocks correspond to individual geometric component of the panel gap. Each block of options is described below.



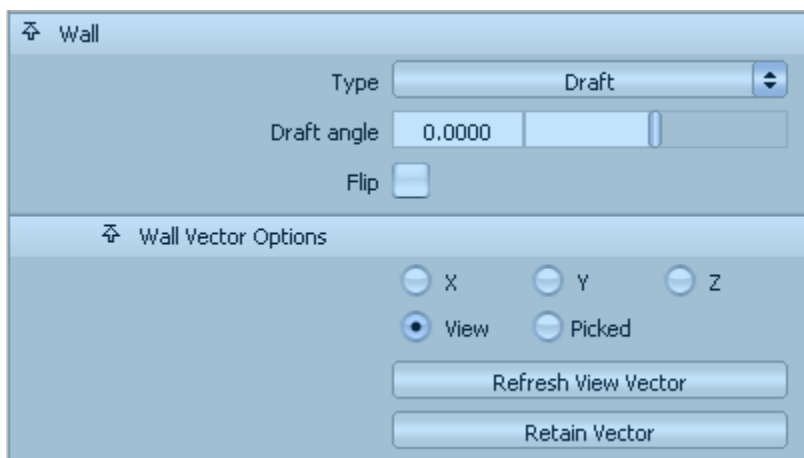
Wall

Just like with the **Fillet Flange** tool, the **wall** is an imaginary surface built off the surface curve, to help define the primary fillet. (The wall is not actually added to the model.)

This wall can be based on a pull direction vector (Type = **Draft**) or on the surface normal (Type = **Normal**) at the selected curve.



The Wall options are the same as with **Fillet Flange**, including vector options to define a draft direction if **Type** is set to **Draft**.



The **Flip** checkbox reverses the direction of the wall. It has the same effect as clicking the blue arrow that appears normal to the panel surface.

Gap

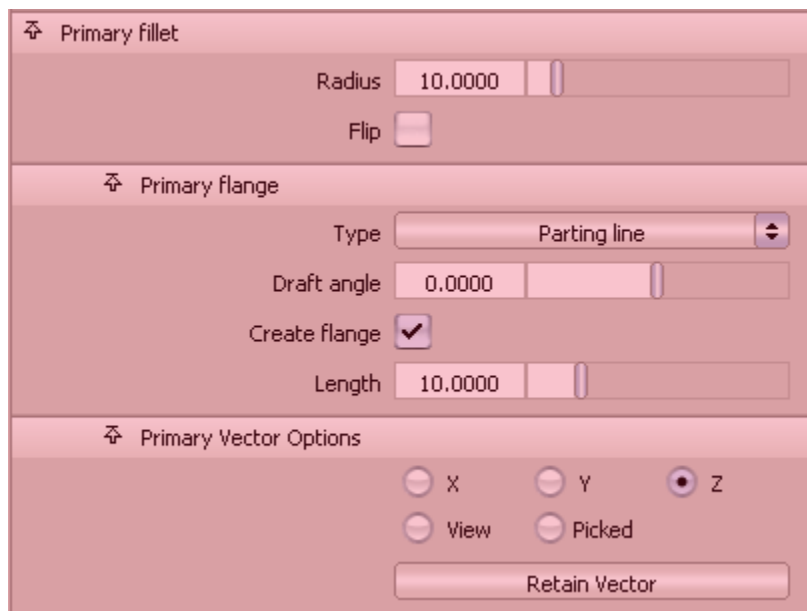
At the moment, the width of the panel gap is kept constant and controlled through the **Gap distance** option. The gap corresponds to the shortest distance between the primary and secondary rolled edges.

Primary fillet (and flange)

The primary fillet and flange are created in the same way as in the **Surface > Rolled Edge > Fillet Flange** tool.

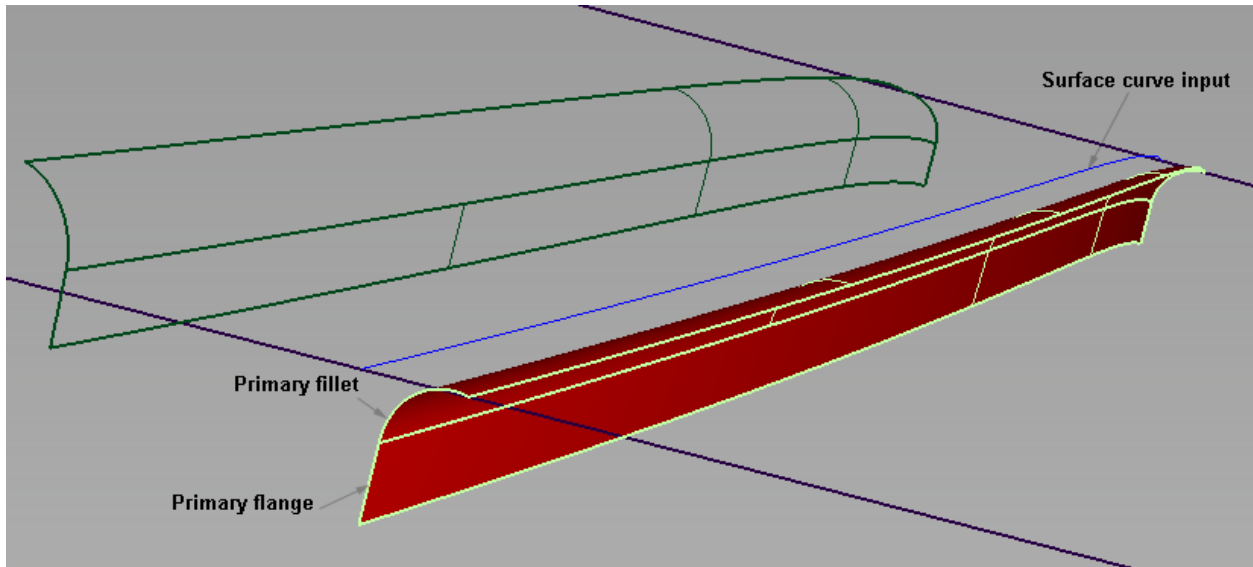
The primary fillet is always a circular fillet (constant radius fillet) and tangent continuous with the panel surface. You can specify the **Radius** in the control window. The fillet is built between the panel surface and the (imaginary) wall.

The **Flip** checkbox lets you switch the direction of the fillet in order to position the gap on the other side of the surface curve. There is a corresponding blue arrow on the model that you can click to switch the direction as well.



The primary flange offers the same options as in **Fillet Flange**. It can be defined by a **Sweep Angle** or a **Parting line** direction (specified through the **Primary Vector Options**) plus a **Draft angle**.

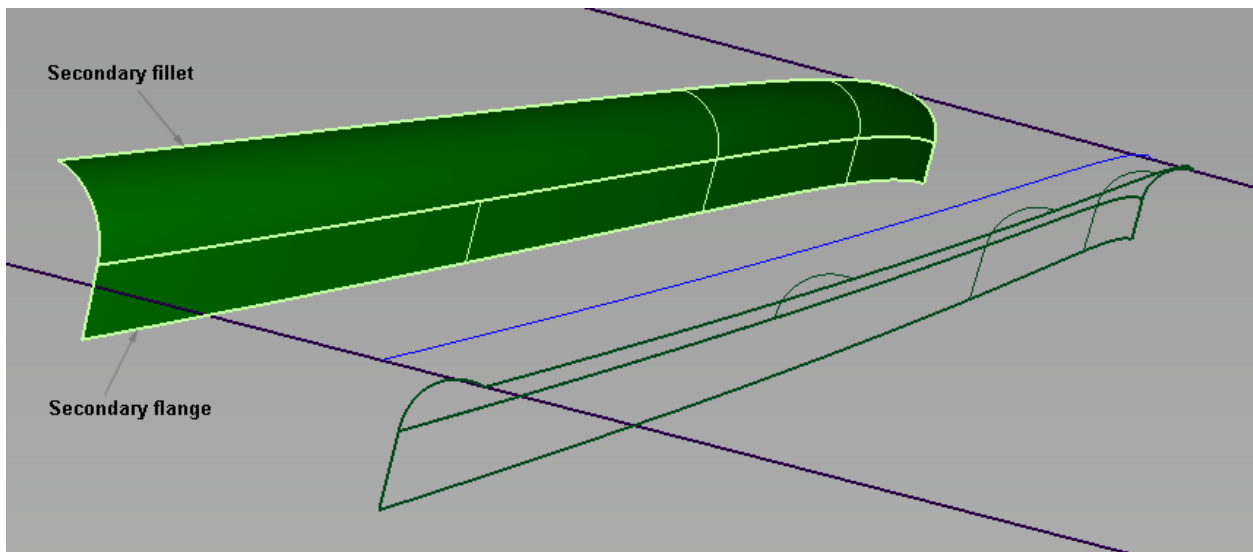
If **Create Flange** is off, no flange surface is created.



The **U Degree**, **V Degree** and **Maximum spans** for both the fillet and flange can be modified by turning on **Explicit Control** in the **Control options** and adjusting the appropriate sliders. Note that these controls apply to both primary and secondary fillets and flanges simultaneously.

Secondary fillet (and flange)

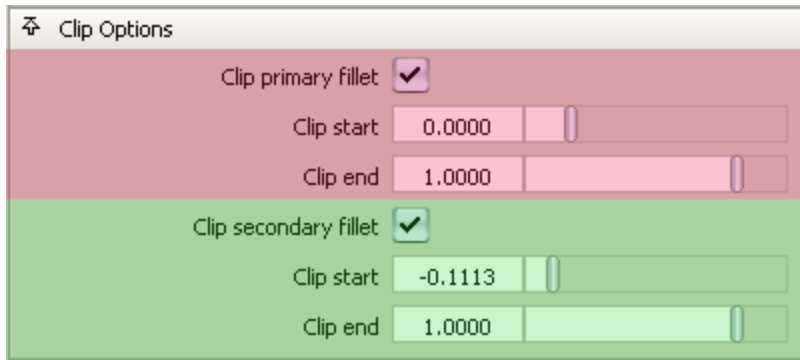
The options for the secondary fillet and flange are exactly the same as for the primary (with the exception of the **Flip** option).



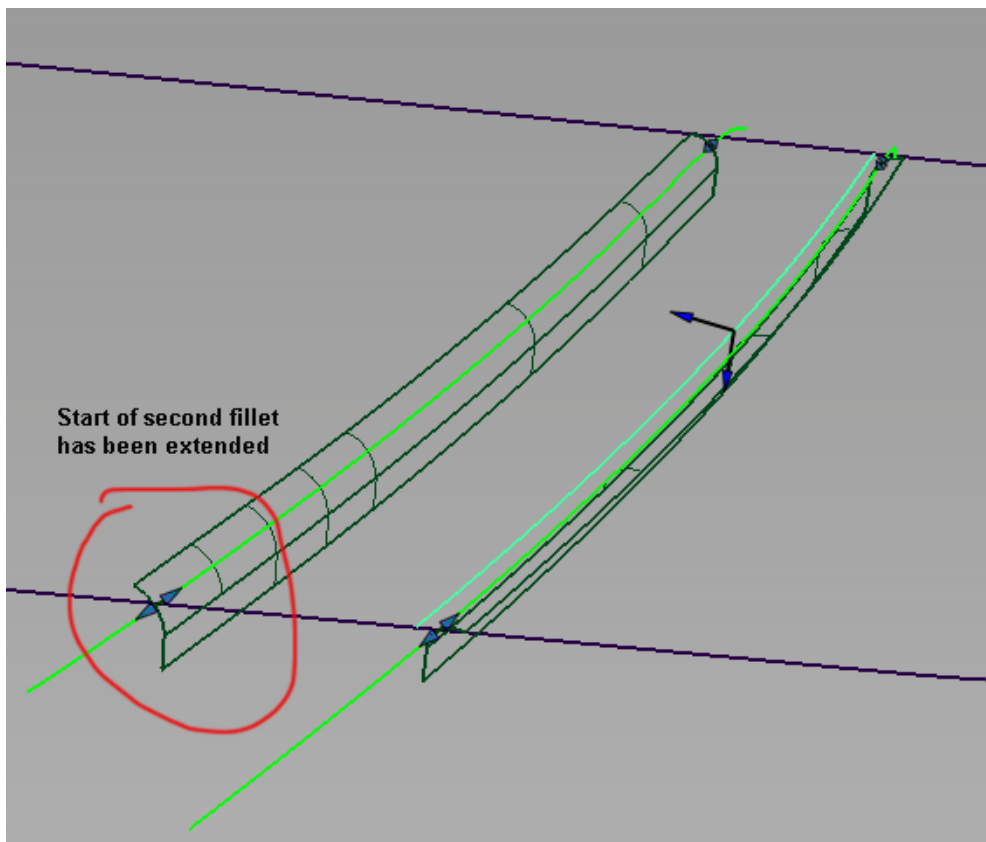
The location of the secondary fillet is calculated from the values of the Primary fillet **Radius**, **Gap distance**, and Secondary fillet **Radius** provided in the control window.

Clip options

Turn on **Clip primary fillet** and/or **Clip secondary fillet** to control the extent of the fillets and flanges across the main panel.



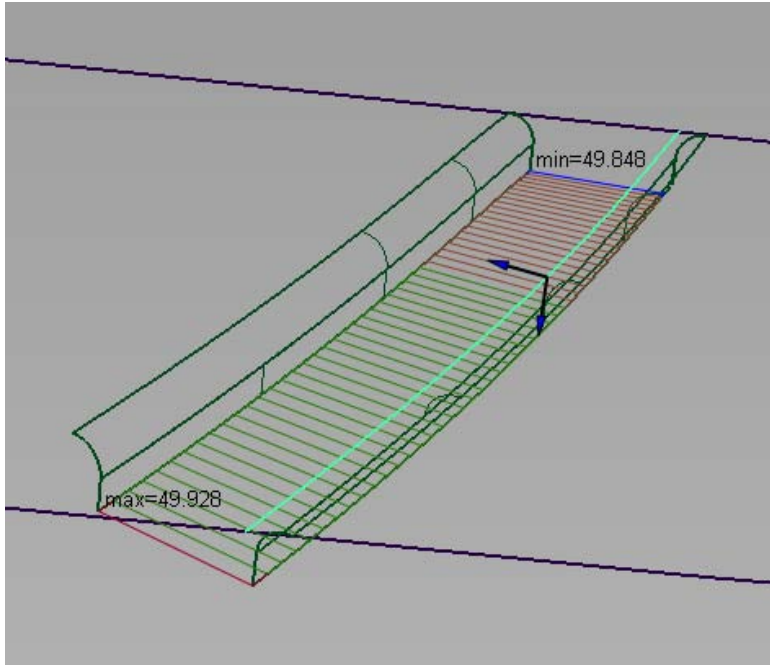
Arrow manipulators appear on the fillets and can be dragged. You can also use the **Clip start** and **Clip end** sliders in the control window to achieve the same effect.



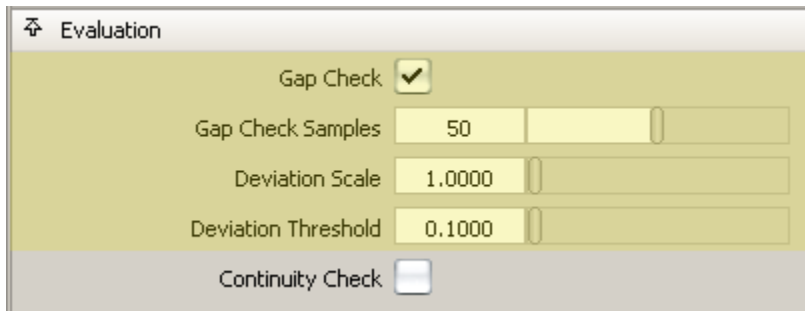
Evaluation

Gap check:

Turn on this option to show a deviation comb, as well as minimum and maximum deviation at the gap location.

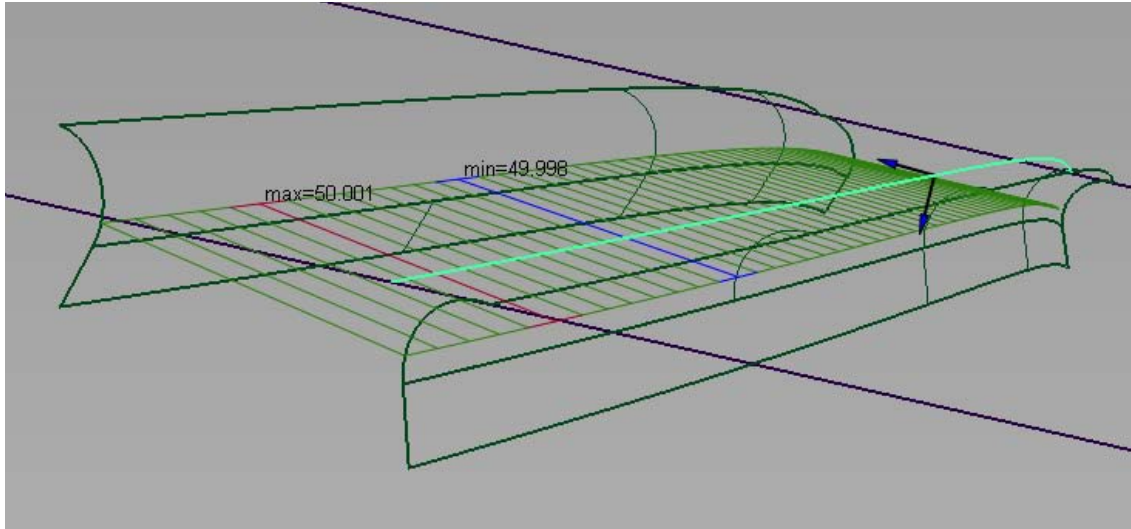


Additional options appear to let you control the deviation locator.



The **Deviation Threshold** acts as a tolerance. If the gap is within that value of the requested **Gap distance**, the deviation quill is green, otherwise it is red.

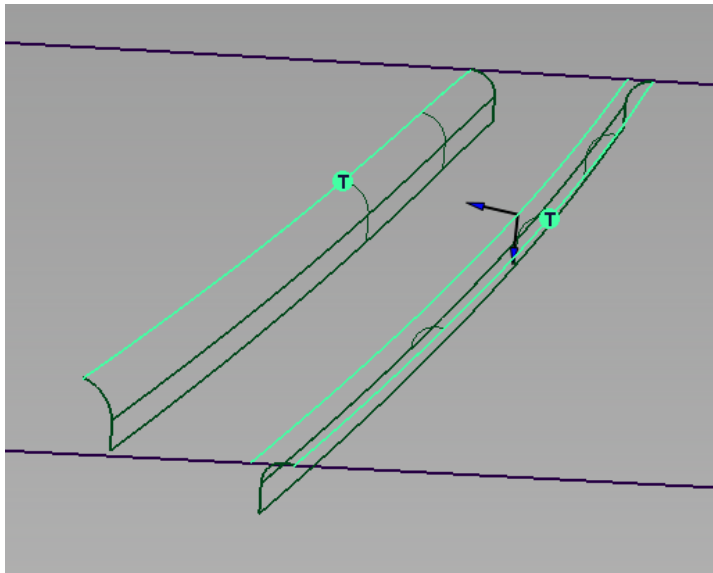
For the gap to maintain the requested width, it must be located between the fillets (not between the flanges, or between a flange and a fillet). Turn on the **Gap Check** option to see the location of the gap, and modify the fillets **Sweep Angle** values until the gap deviation comb appears between the fillet surfaces.



In the image above, the fillet sweep angles were set to 110 degrees.

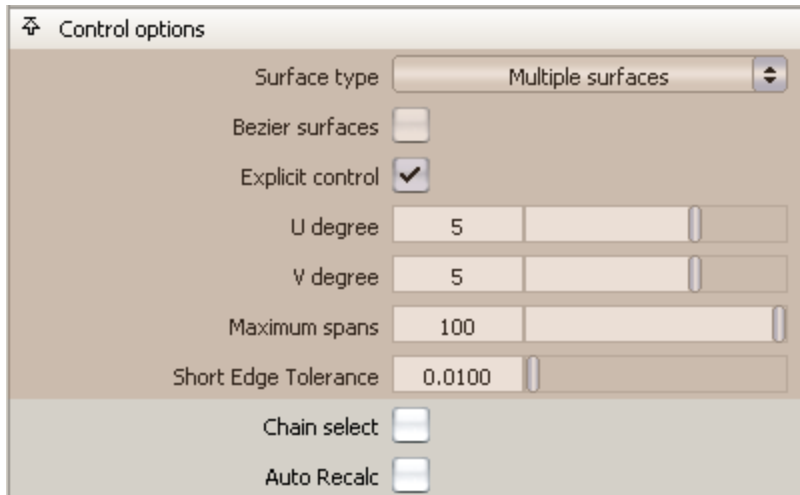
Continuity check:

Turn this option on to display continuity locators between the panel surface and both fillets. The locators show whether the surfaces meet with tangent continuity (green) or not (yellow).



Control Options

The **Control Options** (with the exception of **Chain Select** and **Auto Recalc**) apply to both fillets and both flanges. They are the same as in **Fillet Flange**.



Buttons

Undo All removes the fillet and flange surfaces and returns the model to the state it was in before entering the Panel Gap tool.

Recalc does the usual and recalculates the surfaces after some options have been modified. If **Auto Recalc** is turned on, this button is grayed out.

Workflow

Here is the basic workflow:

1. Choose the **Panel Gap** tool and open the control window
2. Pick a surface curve
3. Click the **Build** button

Primary and secondary fillets and flanges are built.

4. Modify options in the control window
5. Click the **Recalc** button

The four surfaces are recalculated.

6. Exit the tool
7. Modify the surface curve

The fillets and flanges update.

8. Choose **ObjectEdit > Query Edit** and pick one of the output surfaces (fillets or flanges)

The **Panel Gap** tool is re-entered and the control window opens.

Notes

The tool will eventually create a curve-on-surface on the panel at the location of the secondary fillet, and provide the option to auto-trim the panel along both curves-on-surface to create the gap.