

Complex Topology and Class-A Surface Modeling with Inventor

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Class summary

From 'Hack and Whack' to 'Planned and perfect' complex topology with Autodesk Inventor.

Learning Objectives

- Learn how to use the language of curvature continuity with confidence
- Discover Inventor software's hidden surfacing tools
- Learn how to build complex topology from individual surface patches
- Learn how to convert surfaces into a solid model



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DEVELOP3D



AUTODESK UNIVERSITY 2015

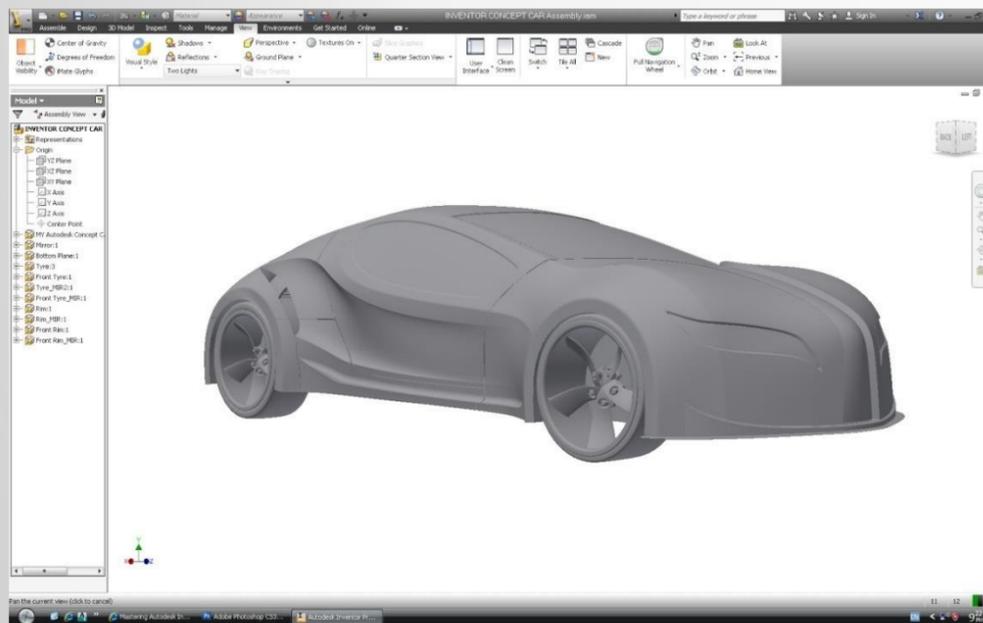


What is surfacing?



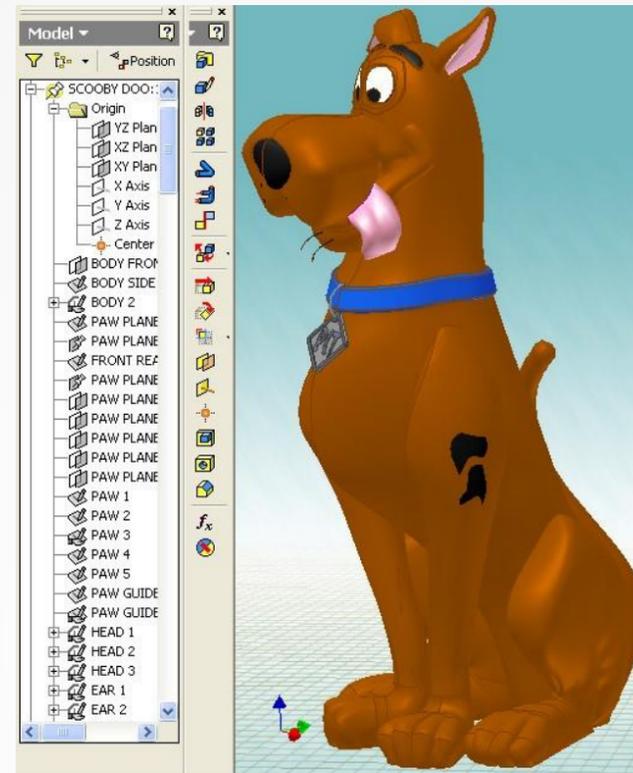
Mindagus Petrikas

<http://a-dezign.blogspot.com/>



Ellipses blog

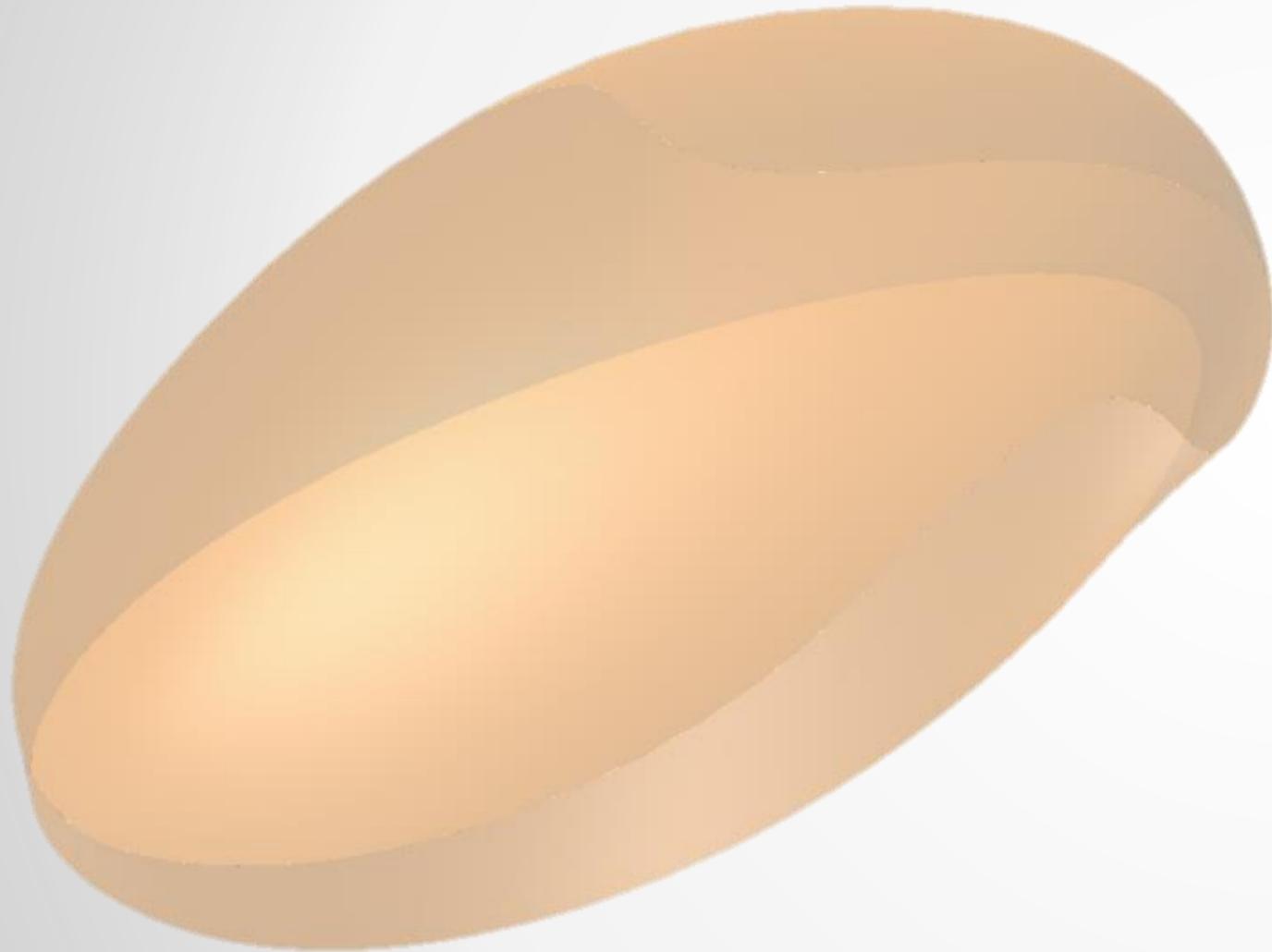
J.D Mather



A method of creating complex shapes with your CAD package, one surface patch at a time.

What is a surface?

an infinitely thin 'skin' stretched between boundary geometry.

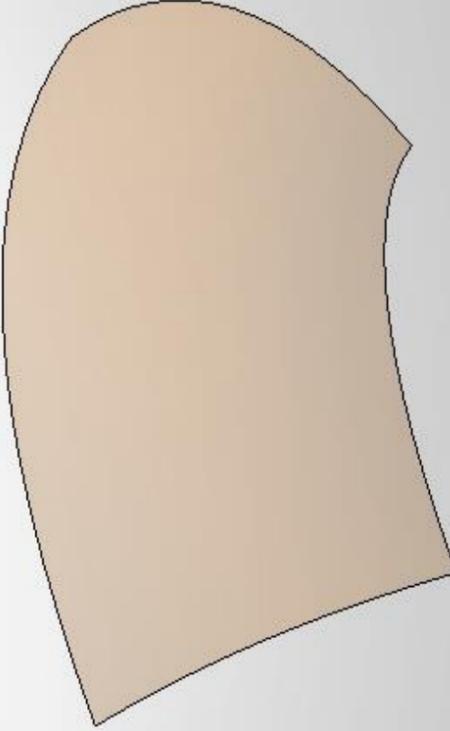
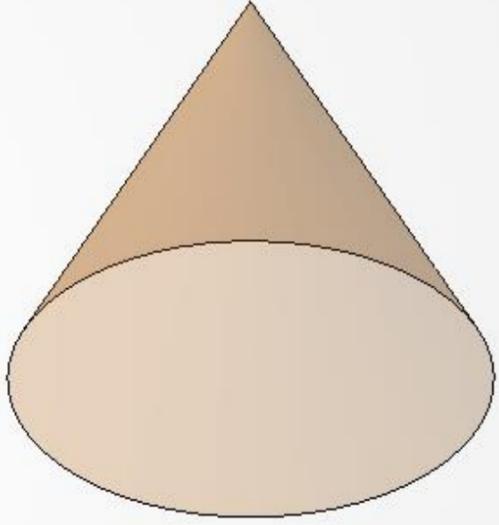
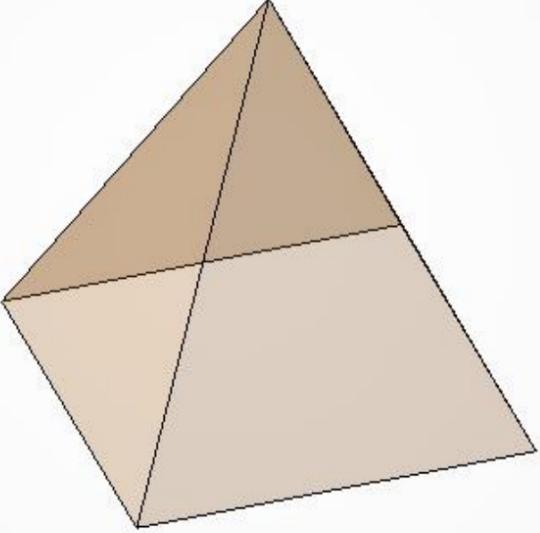
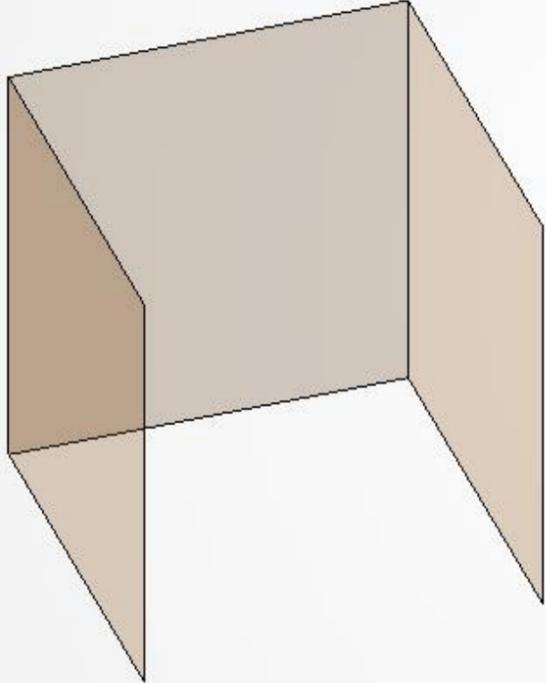
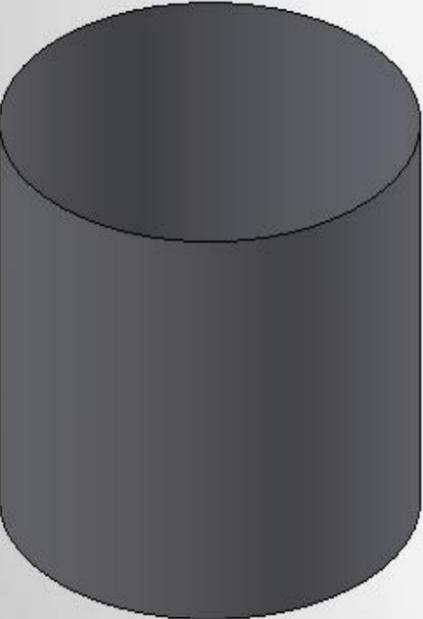


What is a solid?

An enclosed volume, completely surround by faces



Prismatic Vs Nurbs surfaces

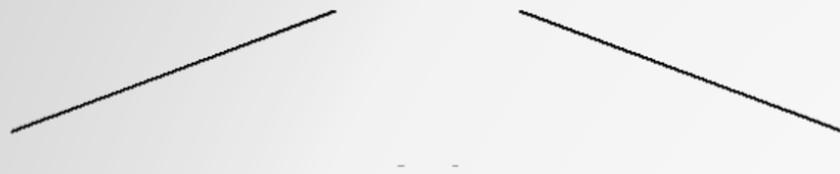


Why Inventor?

Because that's all we've got!

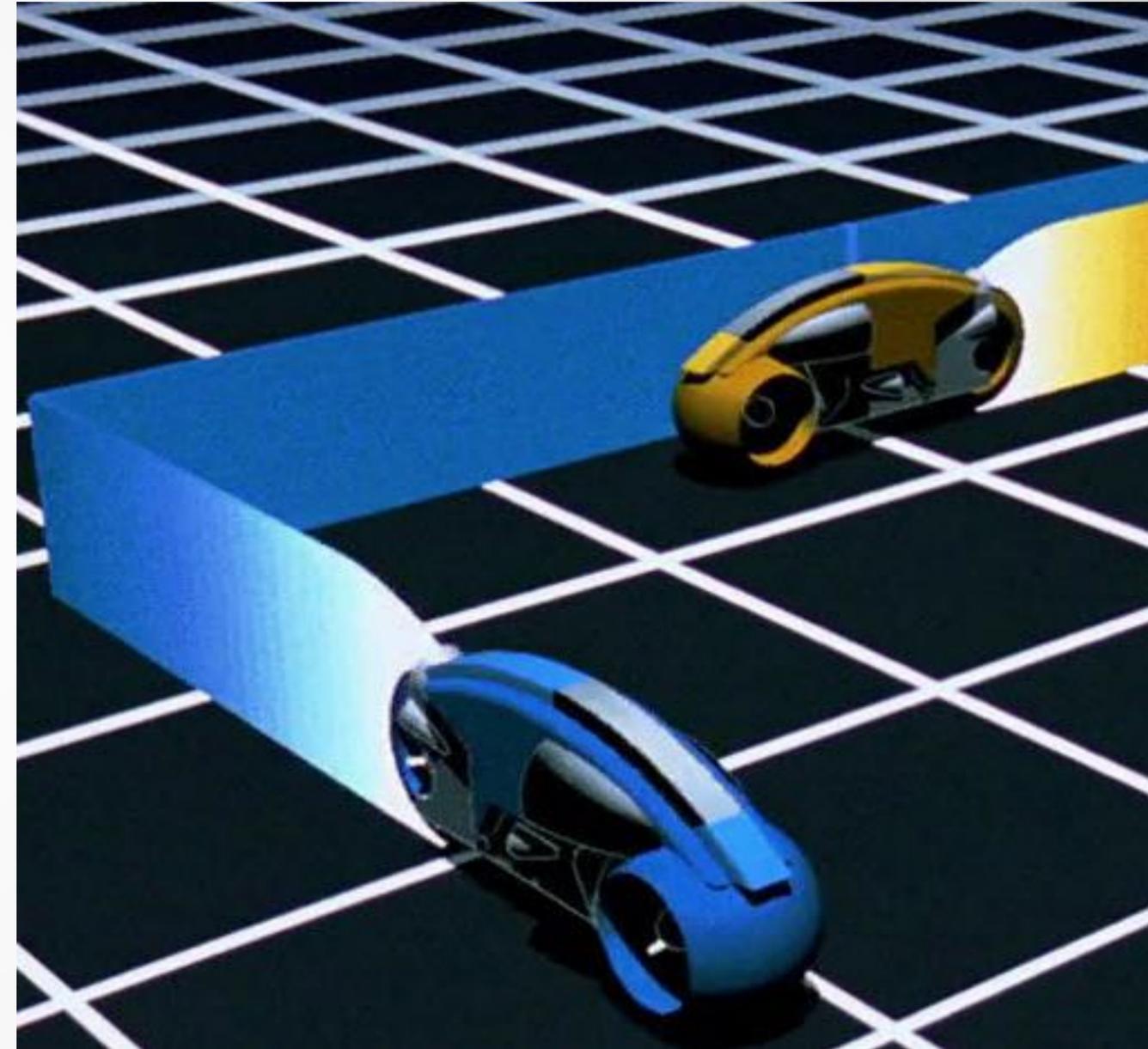
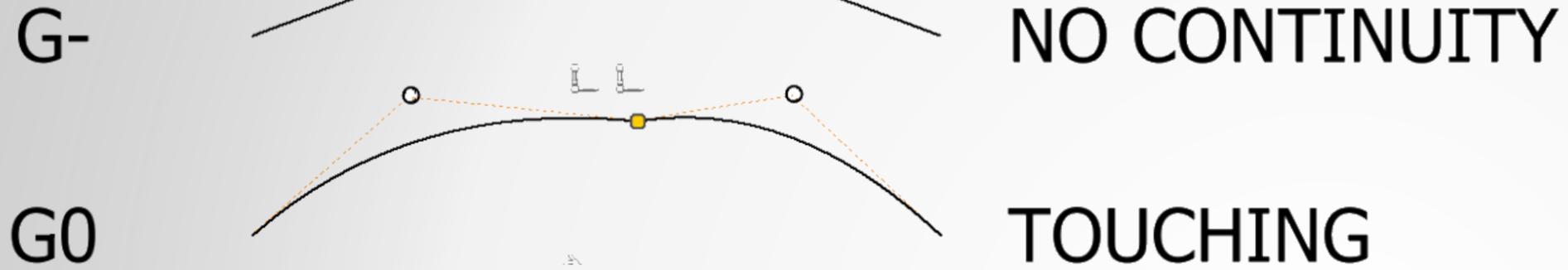
The Language of surface continuity

2D Curvature Continuity

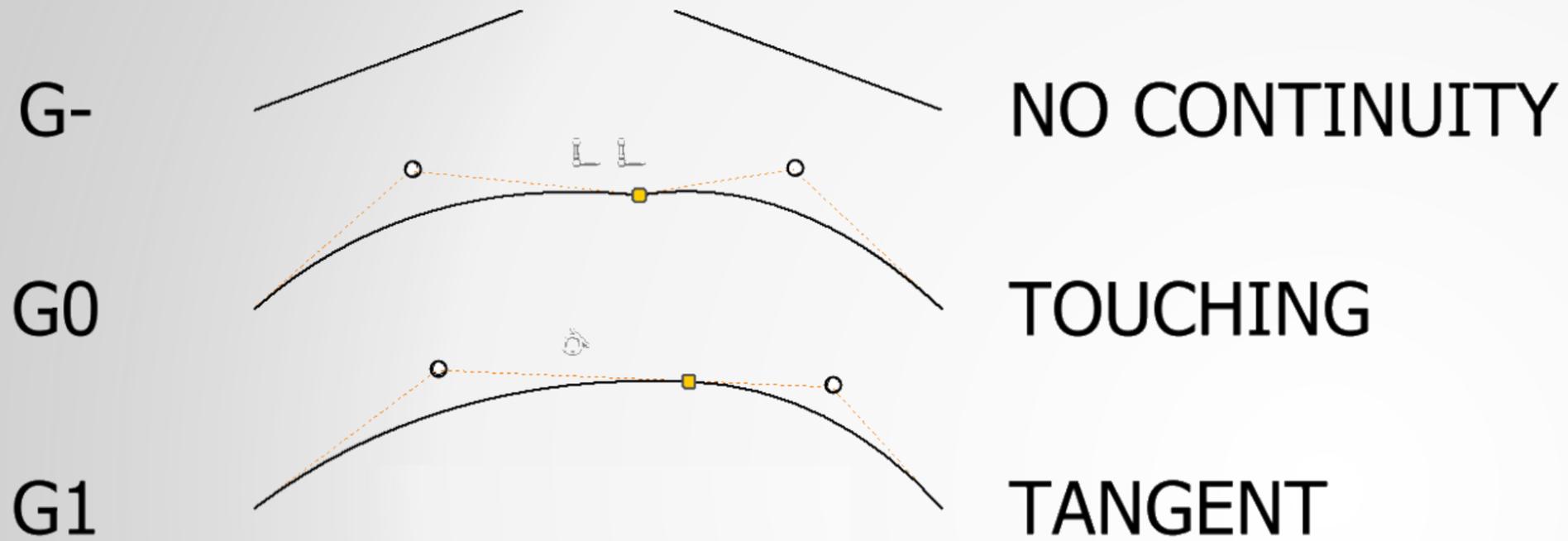
G-  NO CONTINUITY



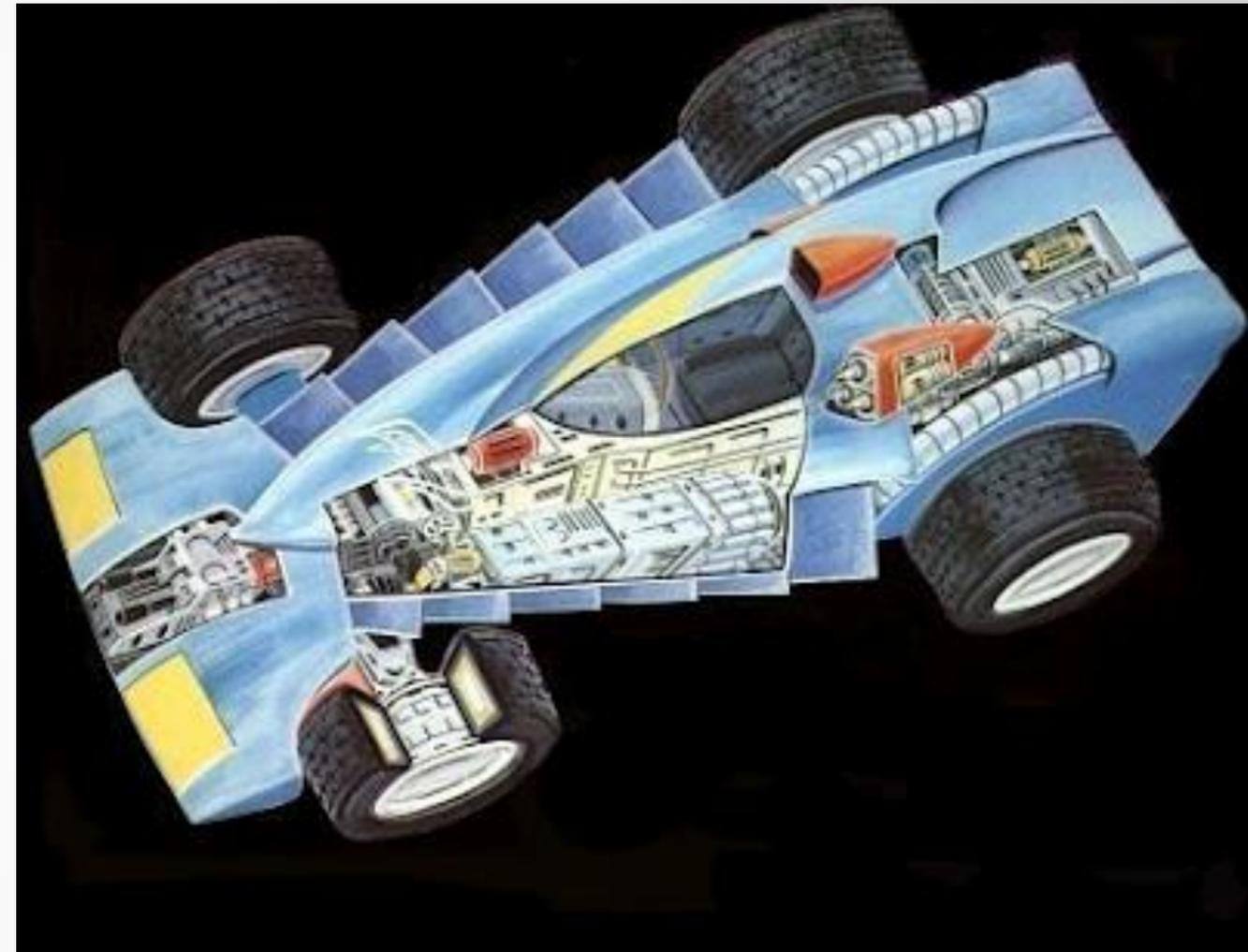
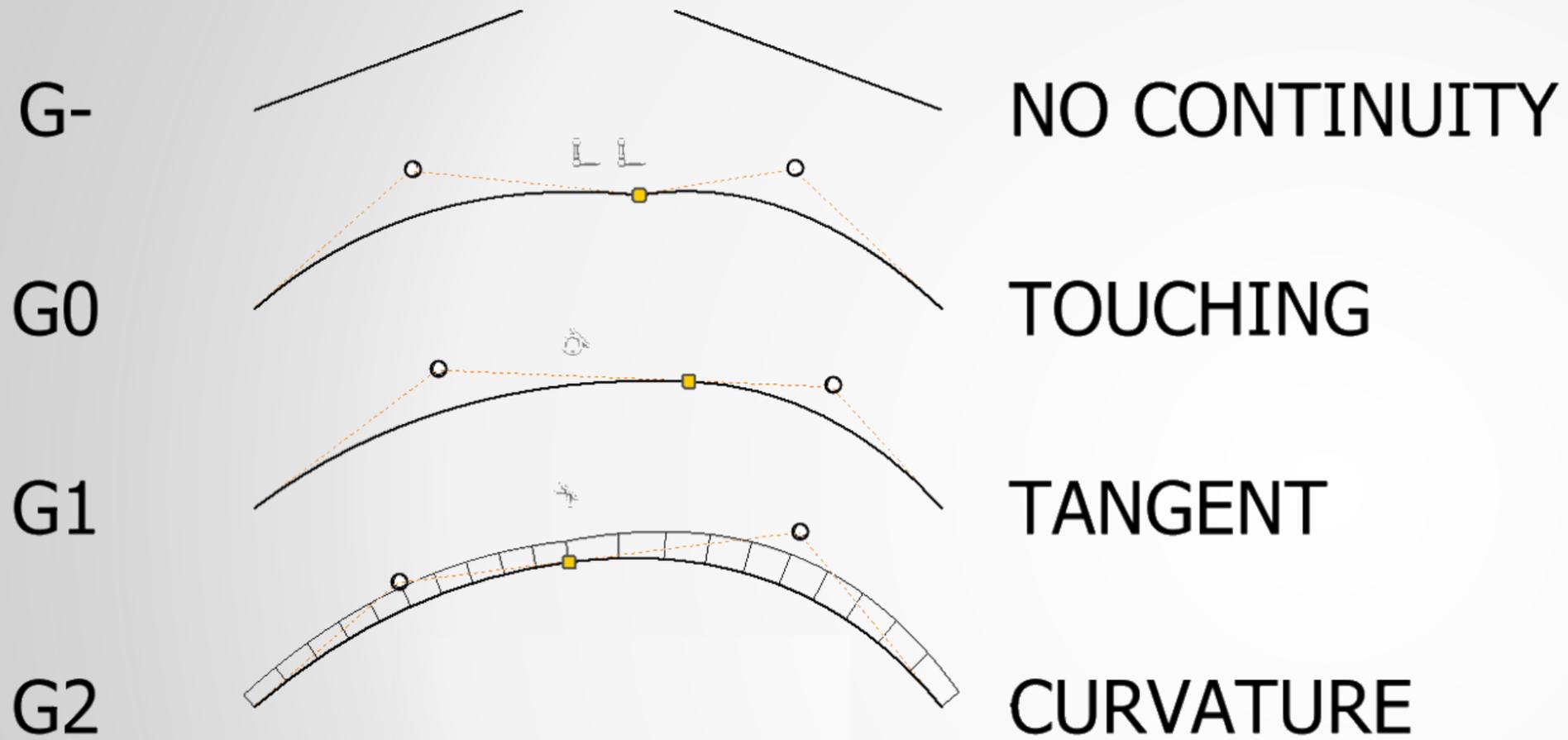
2D Curvature Continuity



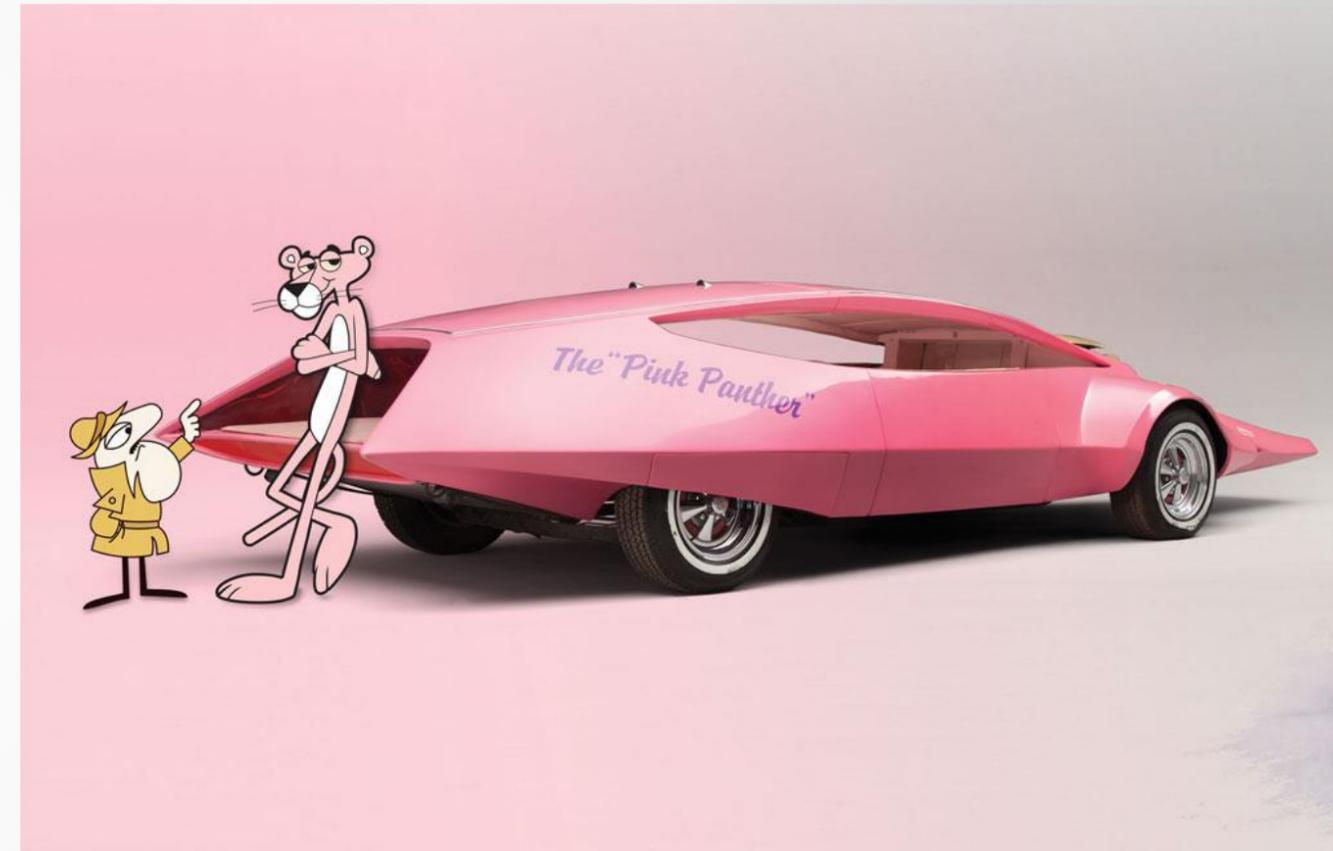
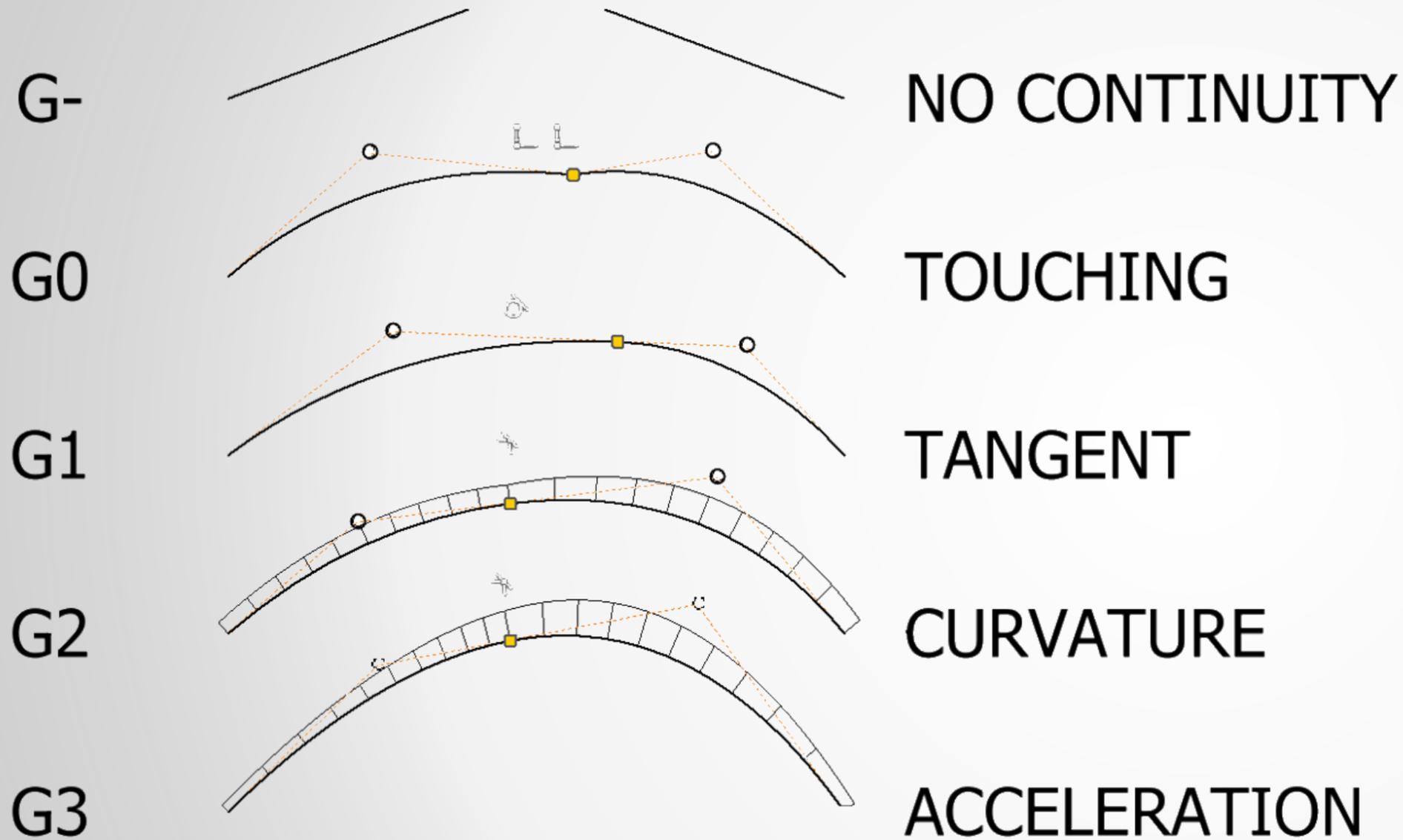
2D Curvature Continuity



2D Curvature Continuity



2D Curvature Continuity

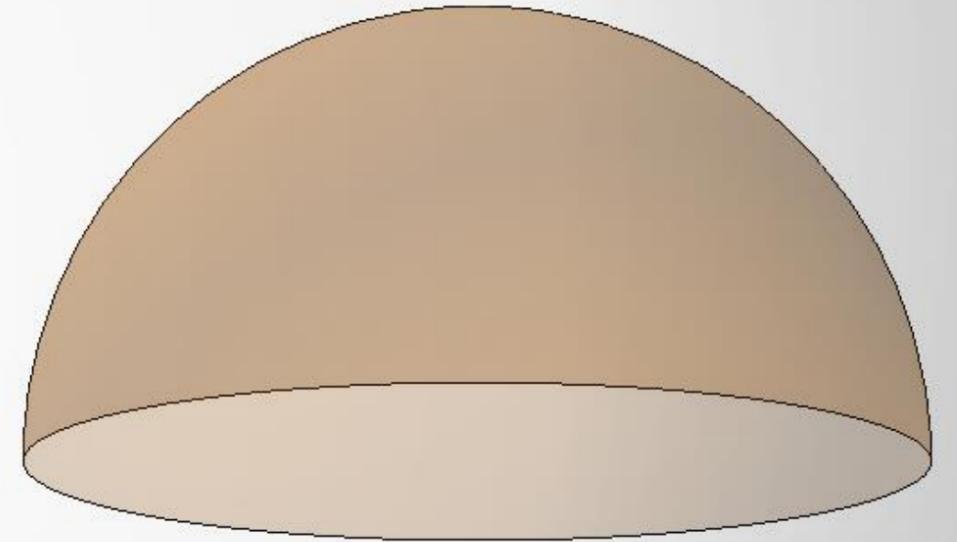
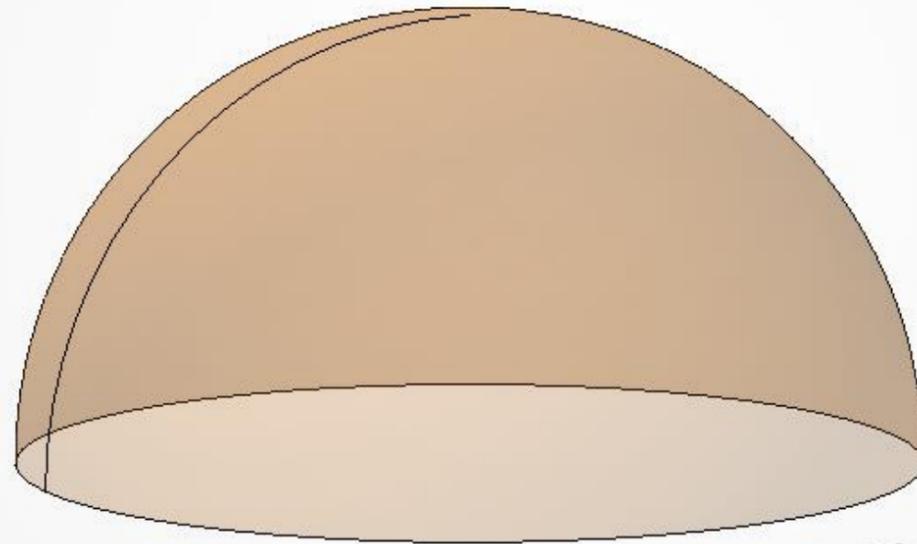
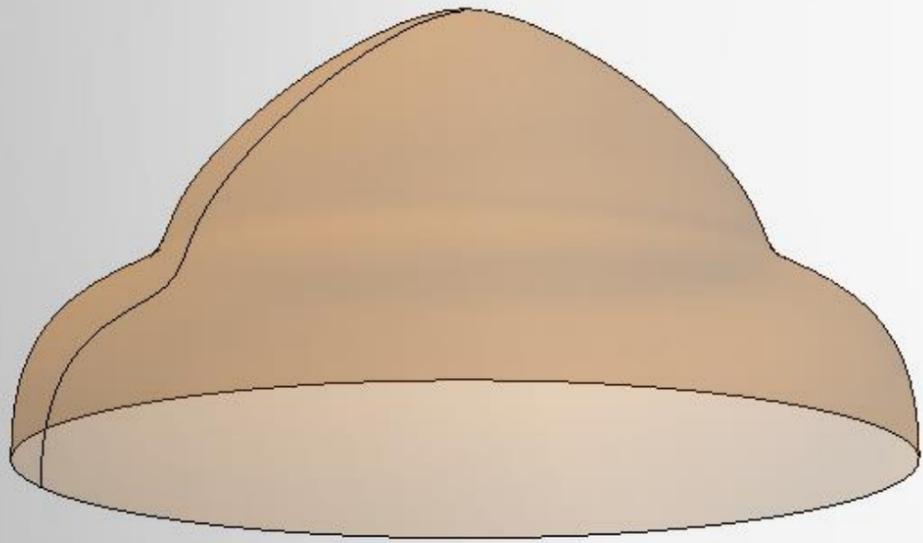


3D Curvature Continuity



Geometry V's topology

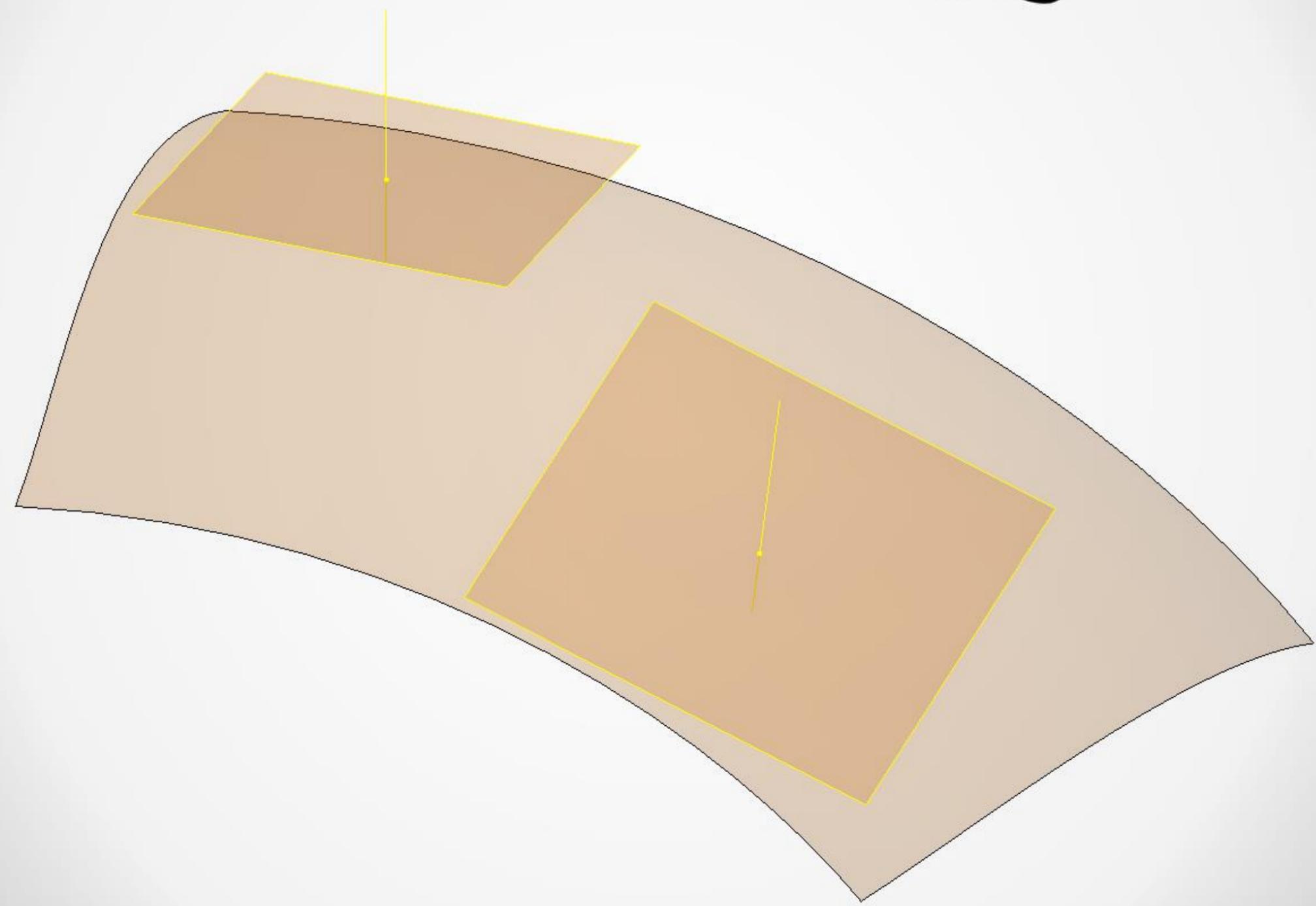
SAME TOPOLOGY



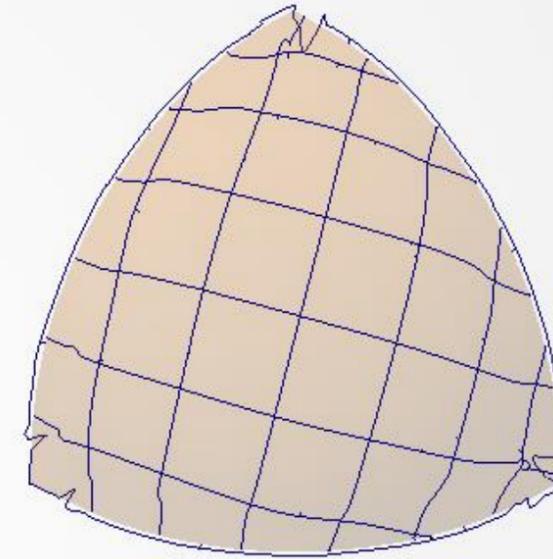
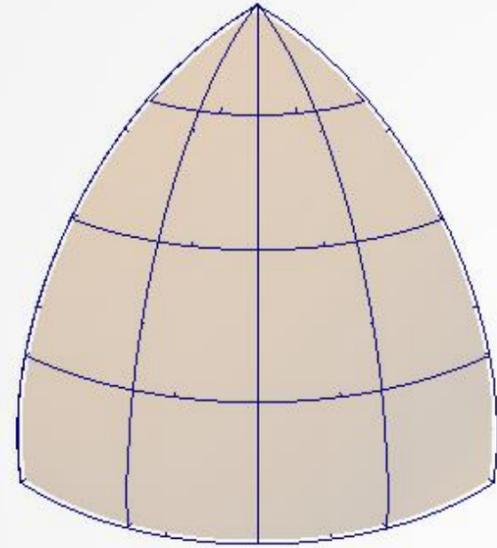
SAME GEOMETRY

Normals

SURFACE NORMALS



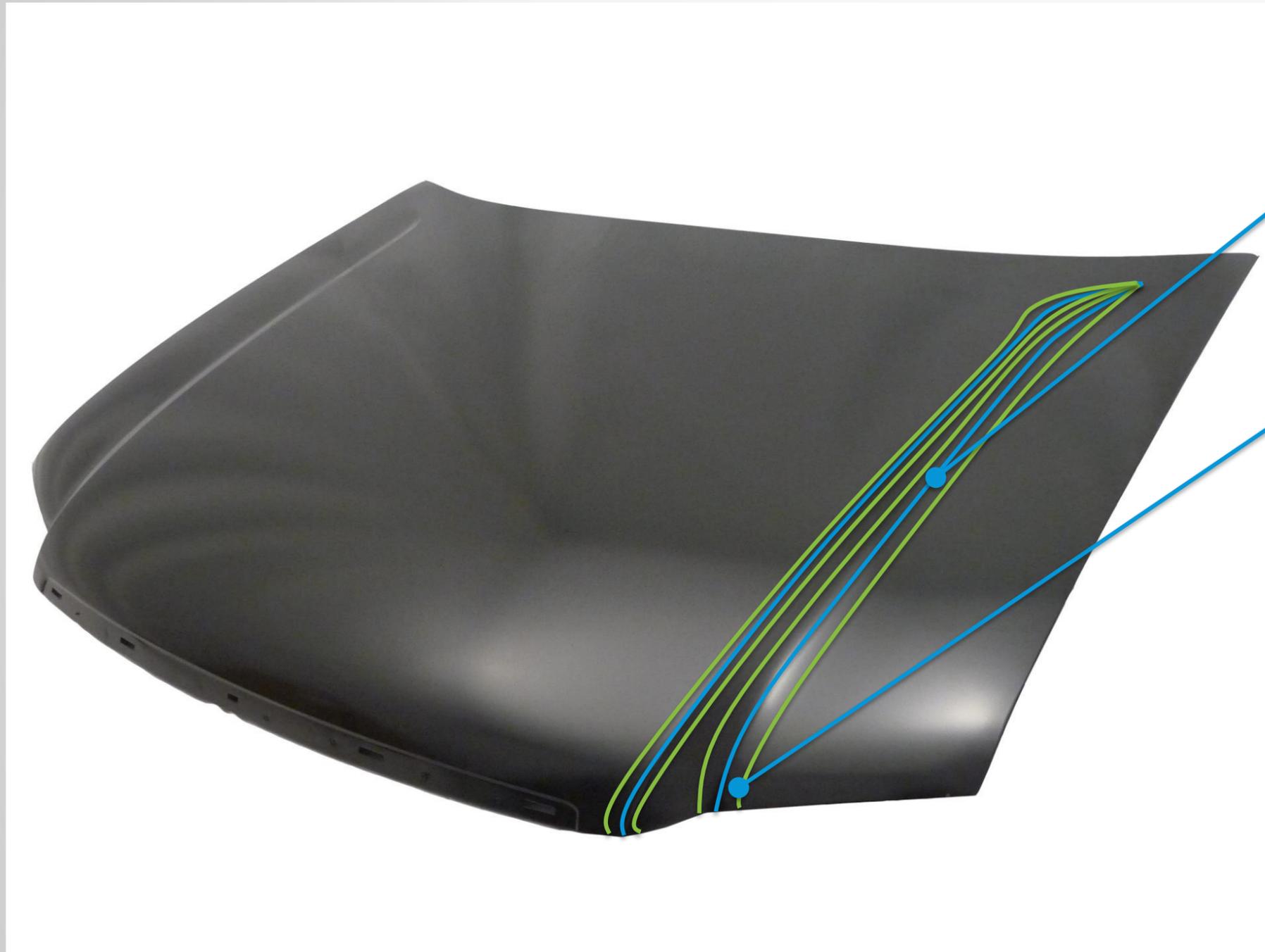
Isoparms



ISOPARMS

Patch layout

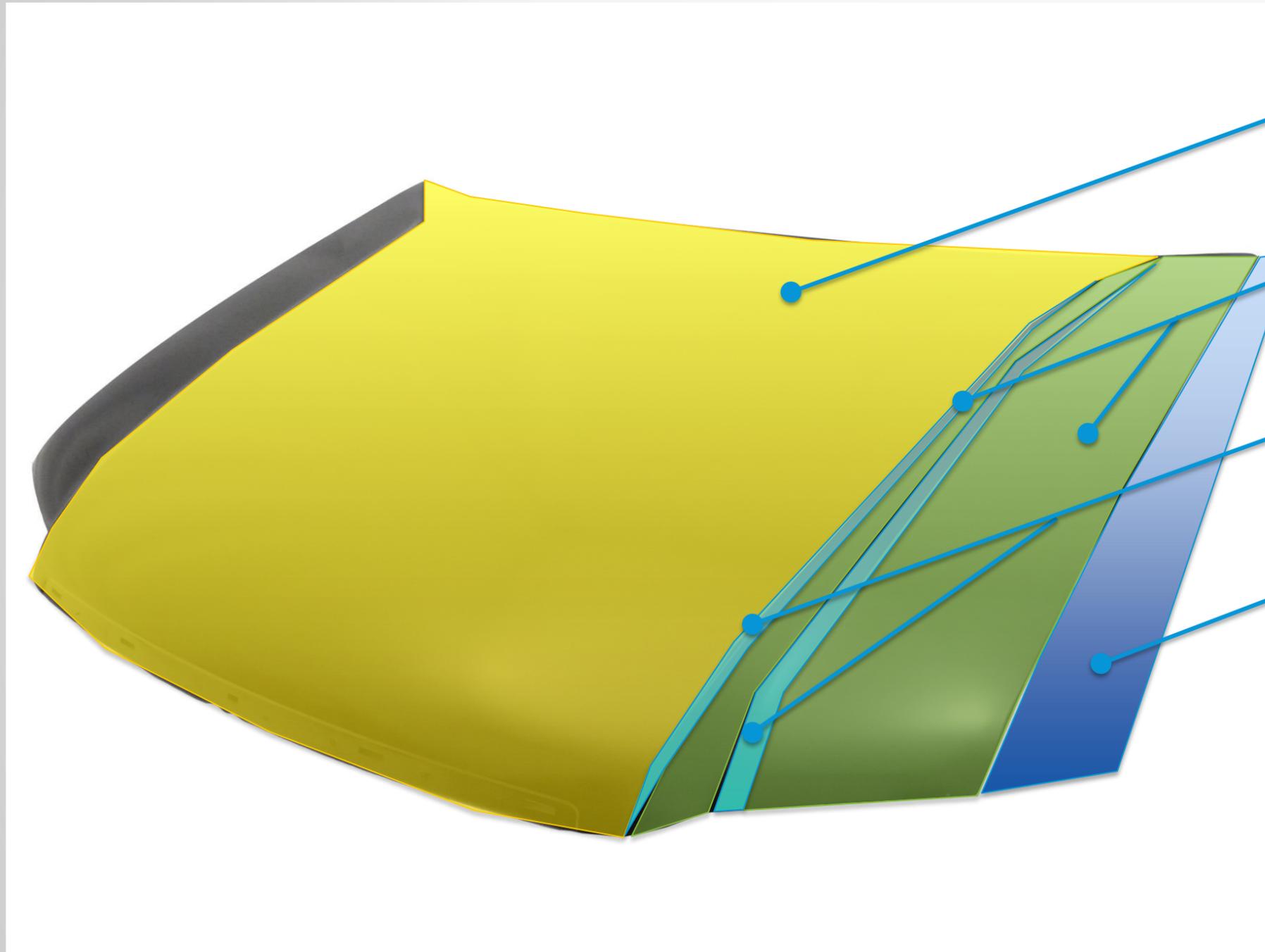
Theoretical sharp edges



Where edges would meet

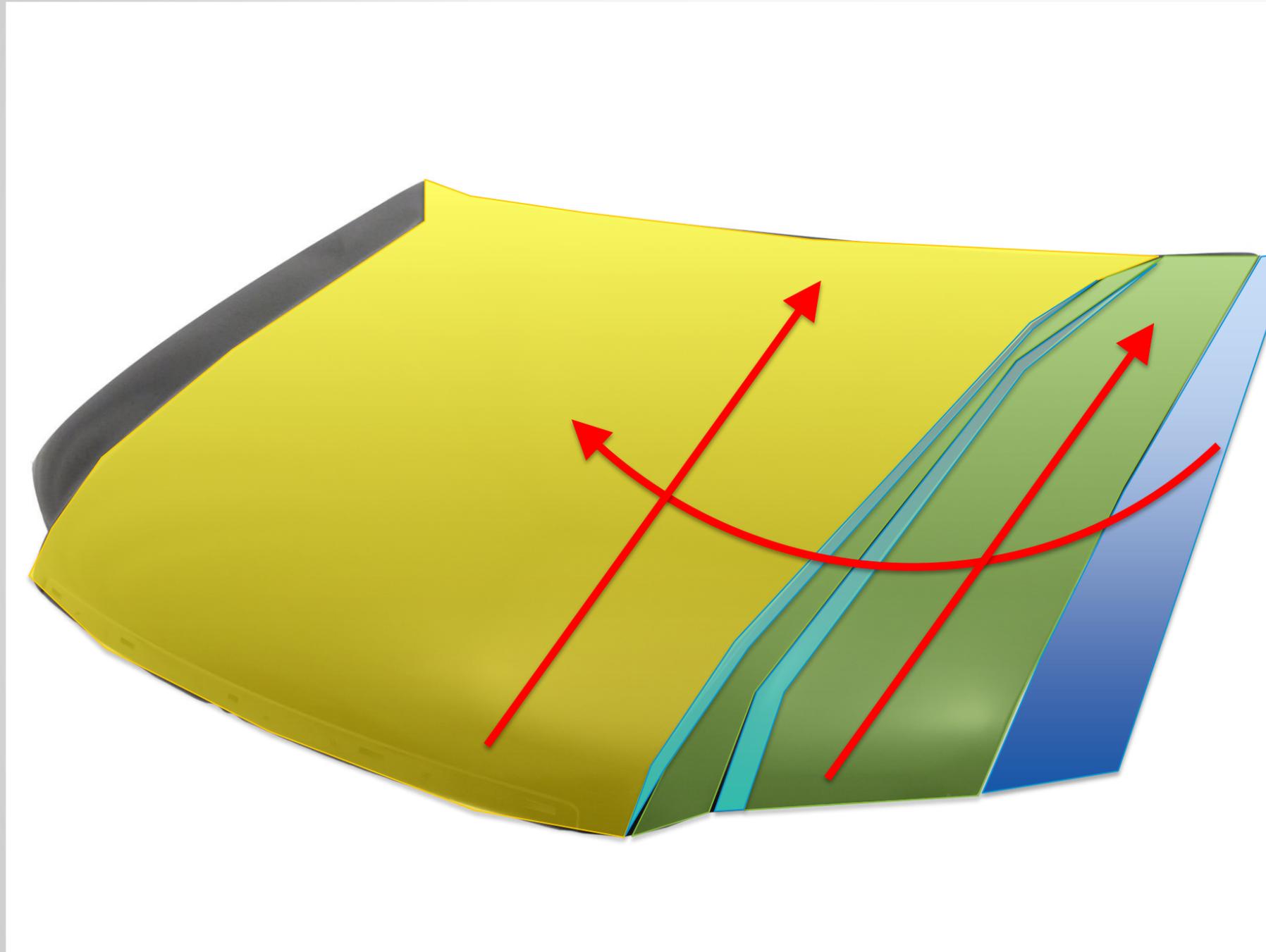
Where Blends start

Patch layout



- Primary
- Secondary
- Tertiary (blend)
- Construction

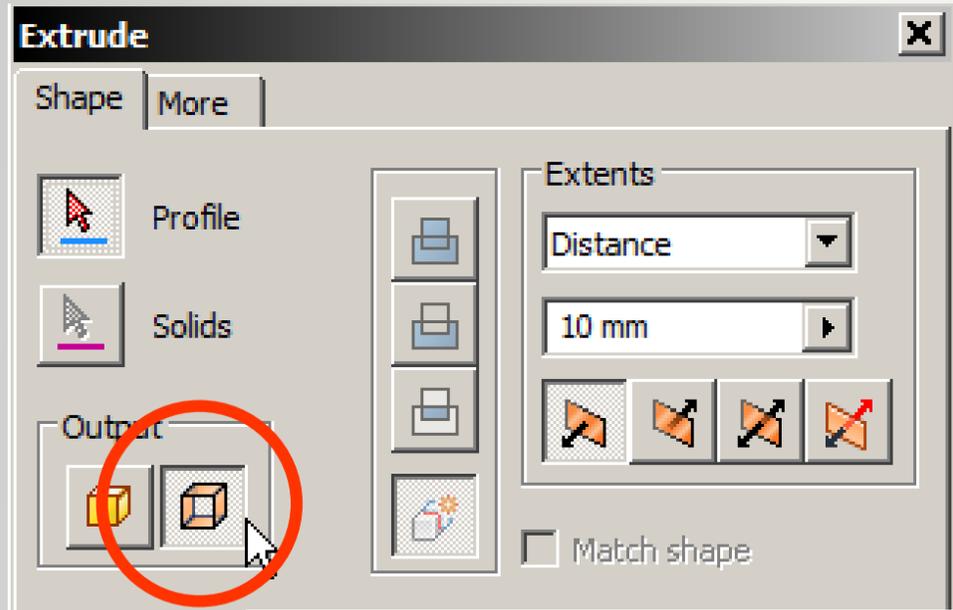
Flow



- Keep your Lofts flowing in the same direction

Creating surfaces

How do I create surfaces?



Extrude

Shape | More

Profile

Solids

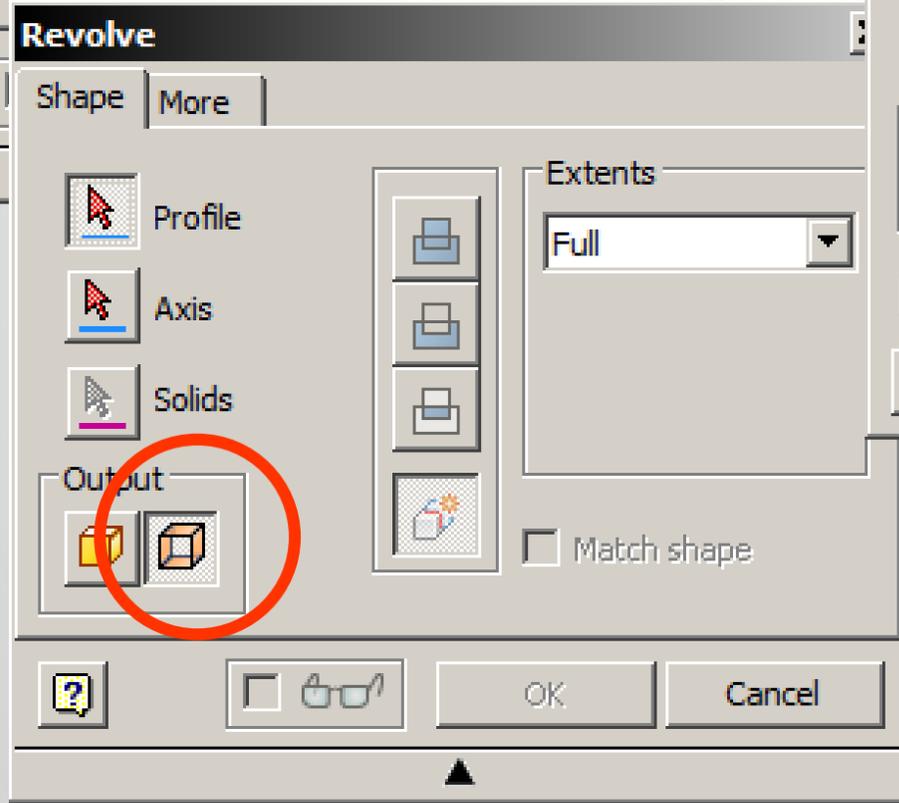
Output

Distance

10 mm

Match shape

The Extrude dialog box shows options for creating a solid by extruding a profile. The 'Output' section has two icons: a yellow cube and a white cube with a red outline. The red-outlined icon is circled in red.



Revolve

Shape | More

Profile

Axis

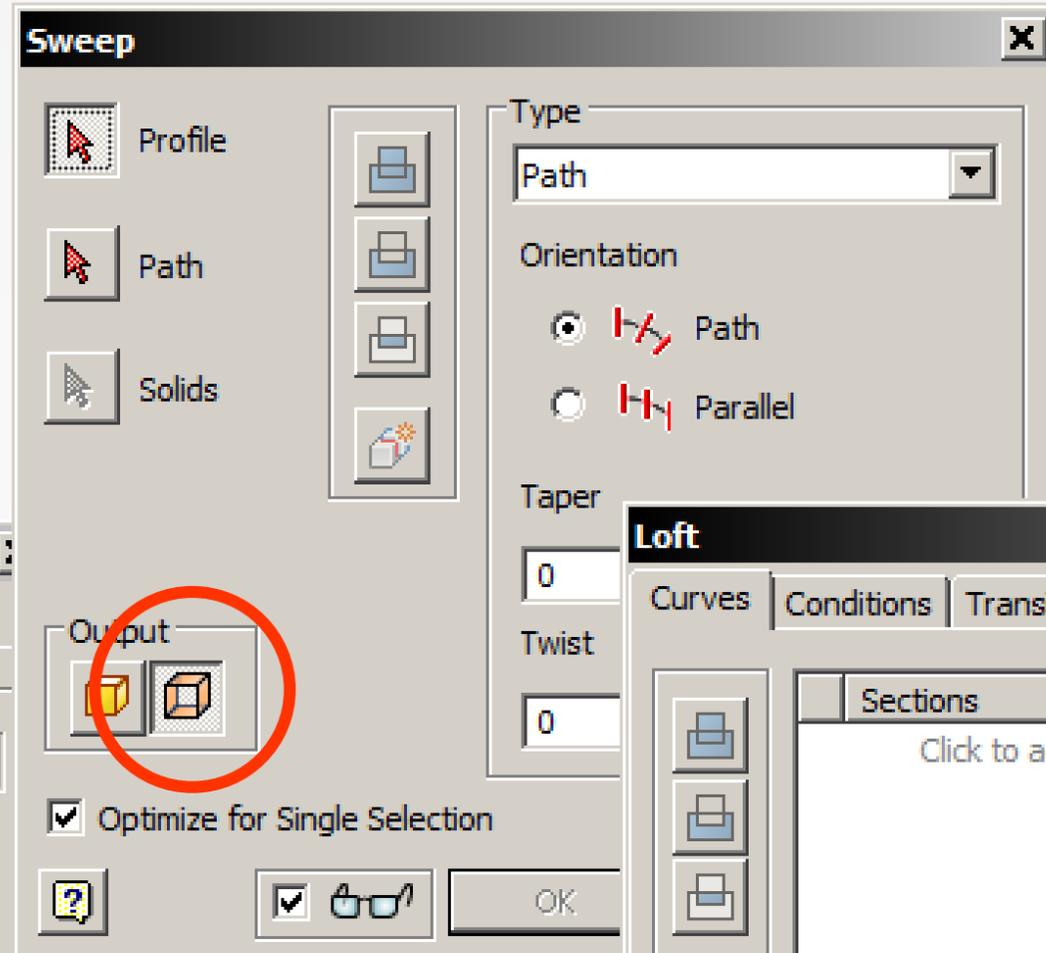
Solids

Output

Full

Match shape

The Revolve dialog box shows options for creating a solid by revolving a profile around an axis. The 'Output' section has two icons: a yellow cube and a white cube with a red outline. The red-outlined icon is circled in red.



Sweep

Profile

Path

Solids

Type

Path

Orientation

Path

Parallel

Taper

0

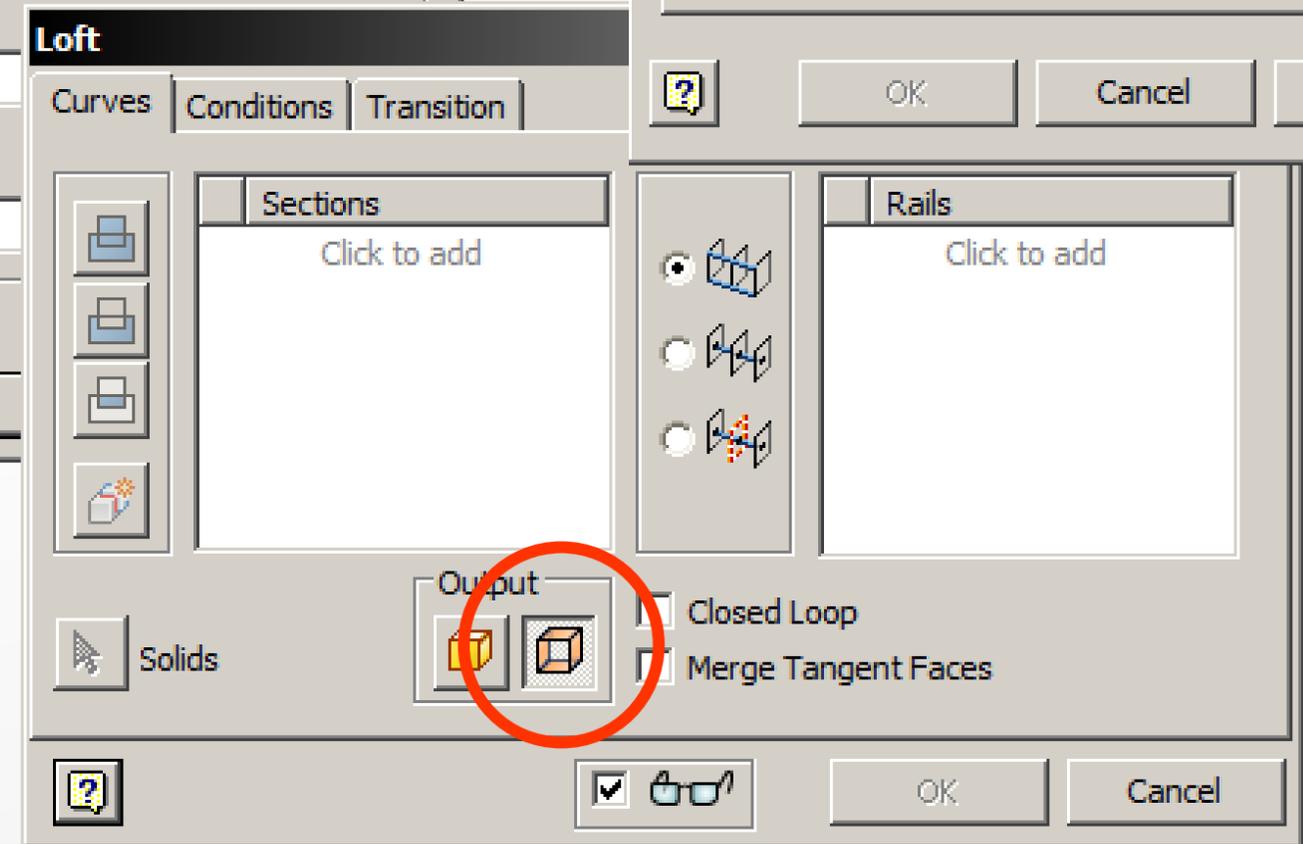
Twist

0

Output

Optimize for Single Selection

The Sweep dialog box shows options for creating a solid by sweeping a profile along a path. The 'Output' section has two icons: a yellow cube and a white cube with a red outline. The red-outlined icon is circled in red.



Loft

Curves | Conditions | Transition

Sections

Click to add

Rails

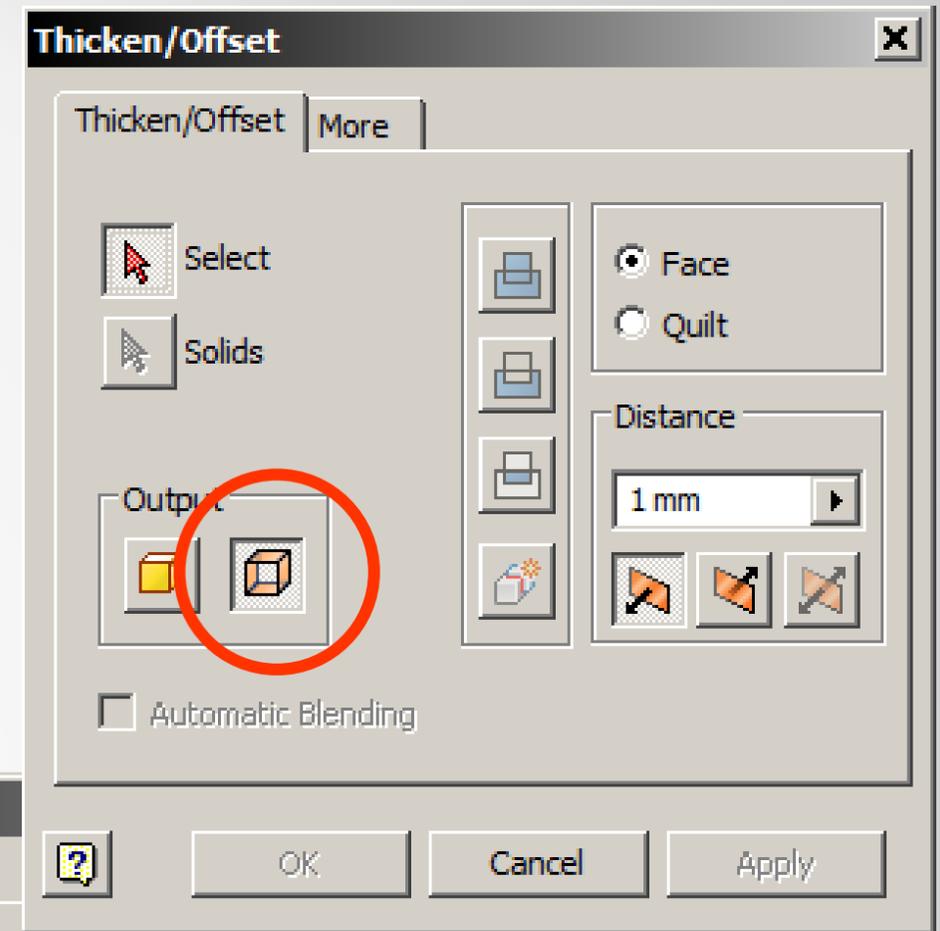
Click to add

Output

Closed Loop

Merge Tangent Faces

The Loft dialog box shows options for creating a solid by lofting between two profiles. The 'Output' section has two icons: a yellow cube and a white cube with a red outline. The red-outlined icon is circled in red.



Thicken/Offset

Thicken/Offset | More

Select

Solids

Output

Face

Quit

Distance

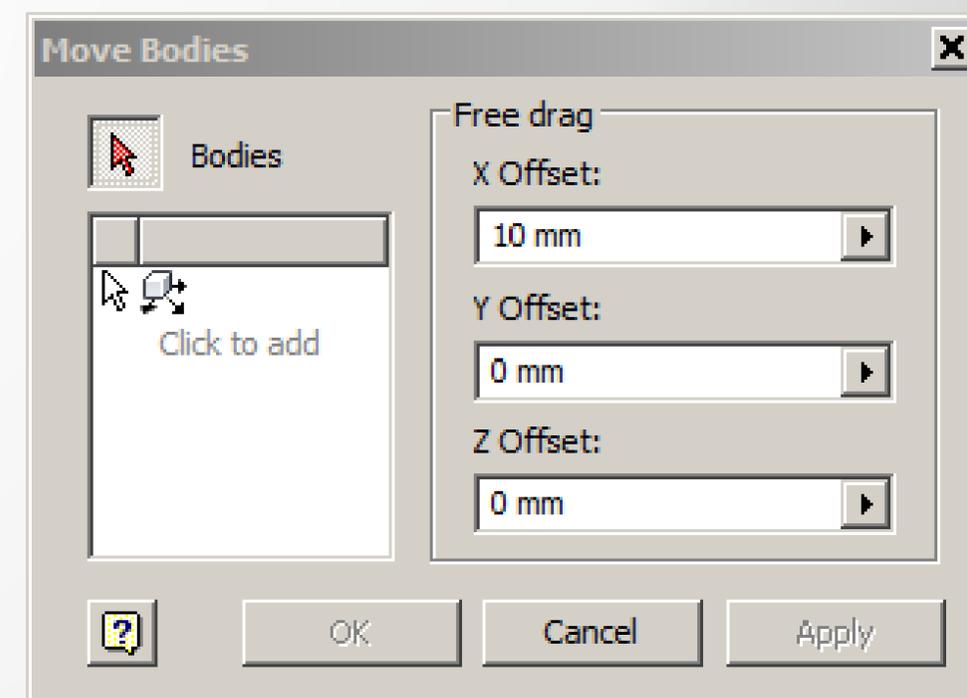
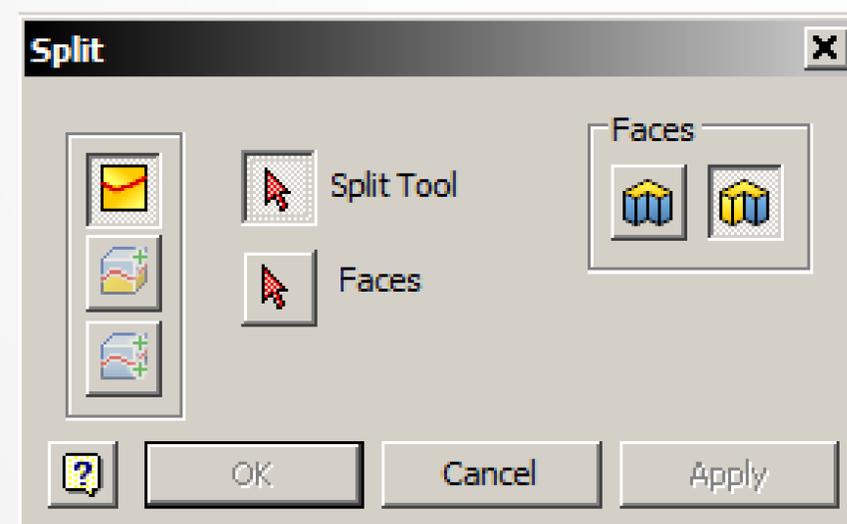
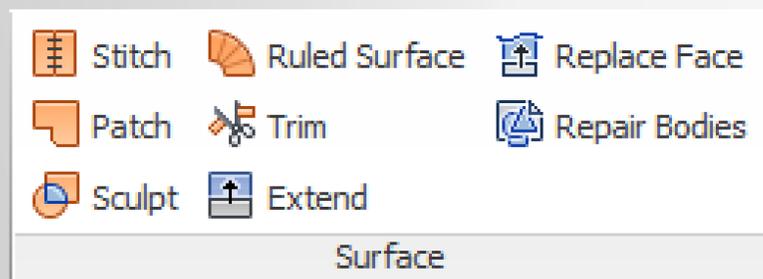
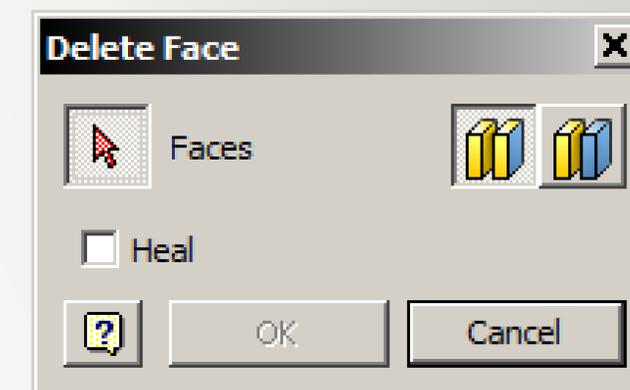
1 mm

Automatic Blending

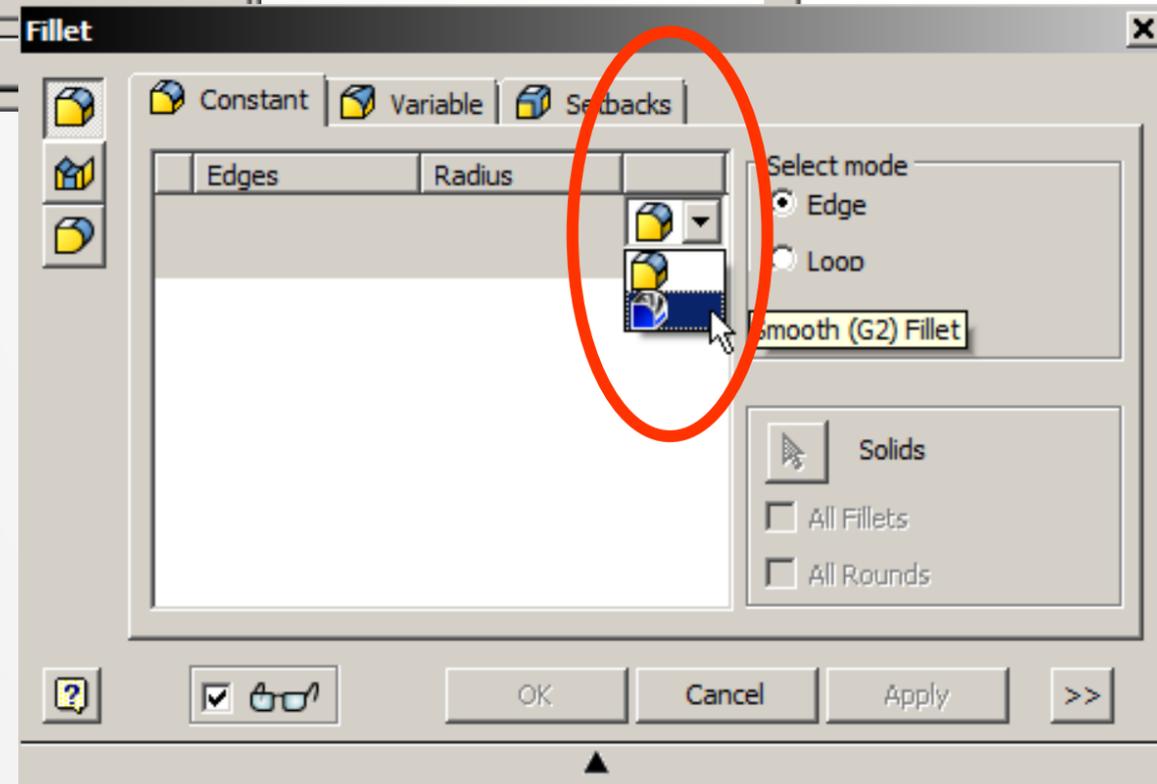
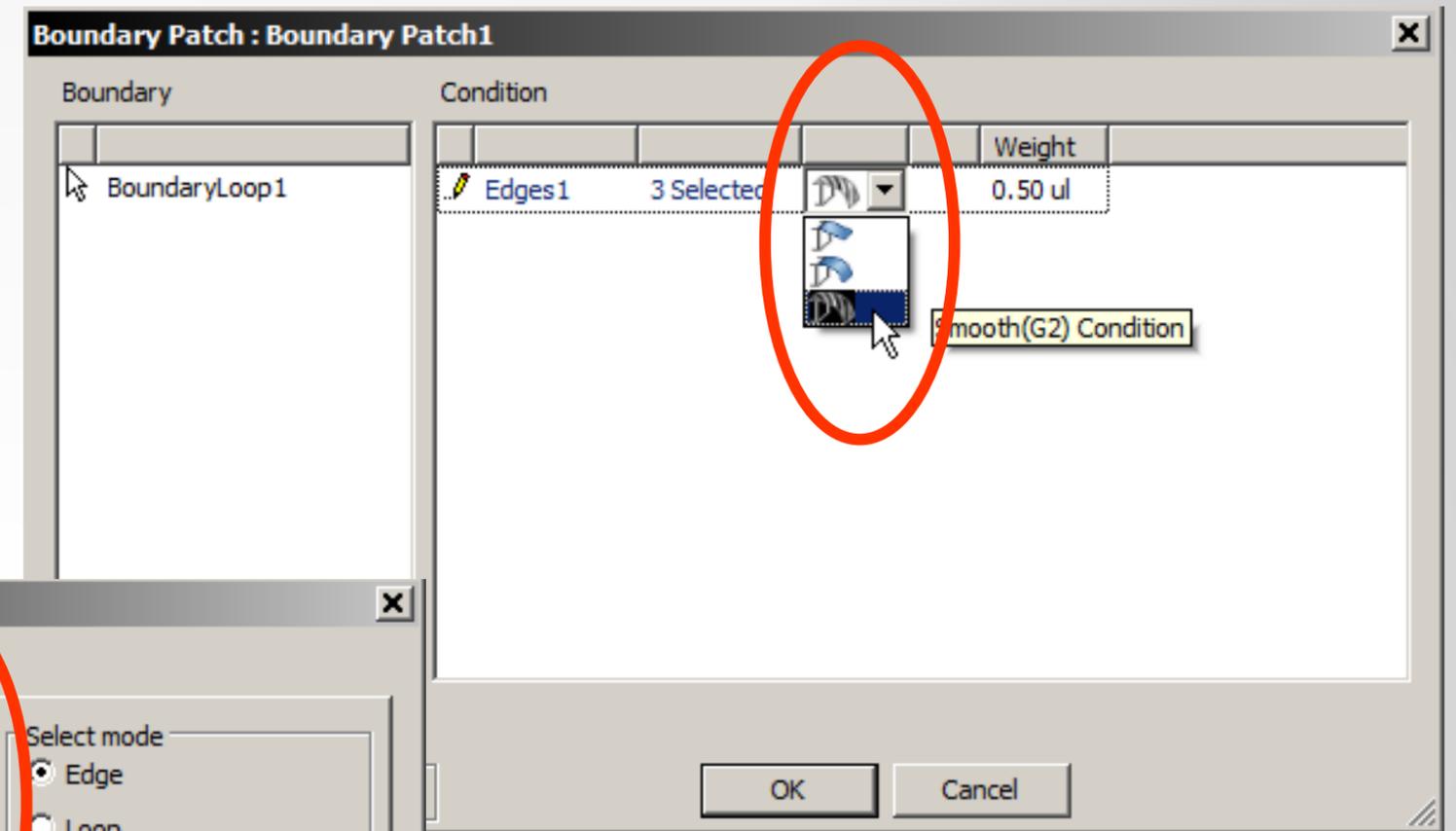
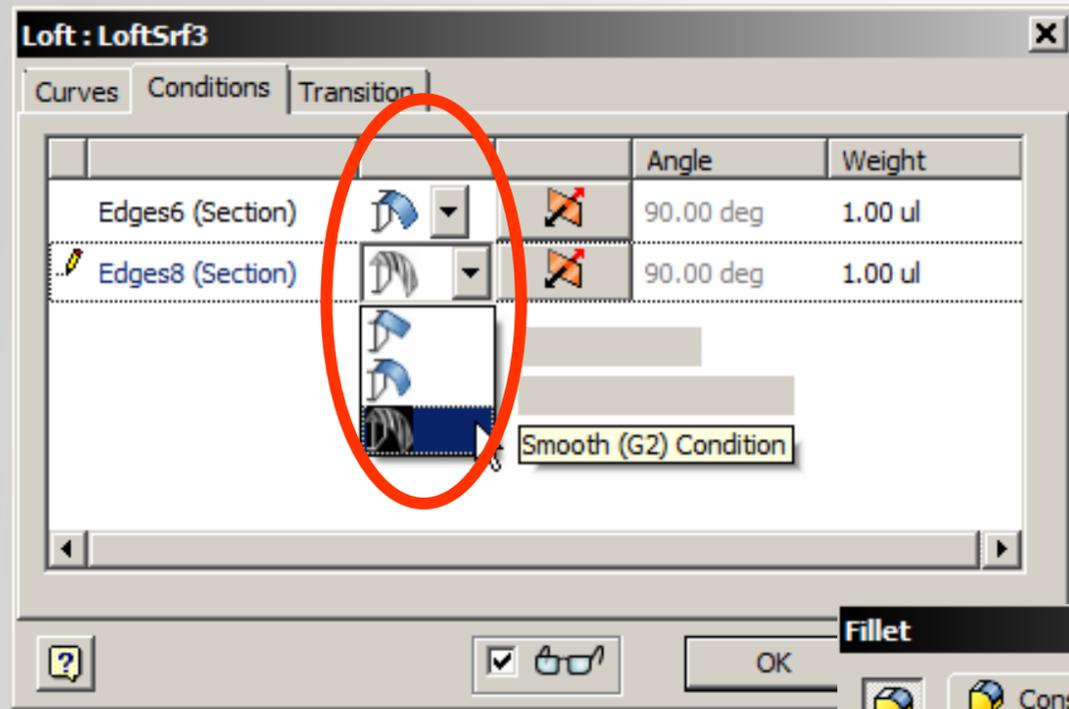
The Thicken/Offset dialog box shows options for thickening or offsetting a face. The 'Output' section has two icons: a yellow cube and a white cube with a red outline. The red-outlined icon is circled in red.

How do I edit surfaces?

- Trim = Trim surface
- Split = Split face tool
- Copy = Thicken/Offset tool
- Move = Move body
- Extend = Make the surface bigger
- Rule surface = Create a perpendicular or tangent surface from an edge.
- Delete



Surface continuity controls



2D and 3D Splines

- 2D Interpolation Splines
- 2D CV Splines
- 3D Splines
- Projected Geometry

Let's try it...

Surface Analysis

- Chrome
- Zebra stripes
- Curvature

Let's try it...

Surfacing Gotchas

- High Curvature
- Near Tangency
- Sliver Faces
- Degradation

Let's try it...

Surfaces to solids

- Thicken
- Sculpt
- Stitch

Let's try it...

Examples

- Spoon
- Knife
- Mouse

Let's try it...

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