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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What is surfacing?

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

G-  NO CONTINUITY

G0  TOUCHING
2D Curvature Continuity

G-  NO CONTINUITY
G0  TOUCHING
G1  TANGENT
2D Curvature Continuity

G-  NO CONTINUITY
G0  TOUCHING
G1  TANGENT
G2  CURVATURE
2D Curvature Continuity

- **G-**: No Continuity
- **G0**: Touching
- **G1**: Tangent
- **G2**: Curvature
- **G3**: Acceleration
3D Curvature Continuity
Geometry V’s topology

SAME TOPOLOGY

SAME GEOMETRY
Normals

SURFACE NORMALS
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?
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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