Product Surfacing with T-Splines and Parametric Modeling Tools

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Background

A little bit about myself:

Undergraduate degree in Color Design for Product and Graphic Design
MFA in 3D Studio for Jewelry and Digital Animation

I always have been very curious about 3D in general

Faculty Industrial Design at Wayne State University
Research Assistant in BioMedical Engineering
studioKuhnen LLC

Focus: Digital design tools and workflows for product development and rapid digital prototyping combining different programs into on cohesive design approach.

Class summary

Description:

This class will demonstrate a workflow that uses the T-Splines Module in Fusion 360 software to create NURBS-like surface patches based on existing sketches and sculpting the desired surface flows via CV direct modeling.

The resulting boundary representations (BREPs) can be further manipulated with solid and surface modeling tools inside Fusion 360’s parametric timeline.

The class will also focus on proper T-Spline mesh topology to improve resulting BREP patch layout quality.

Key learning objectives

At the end of this class, you will be able to:

- Create T-Splines surfaces via sketches and primitives
- Sculpting T-Spline surfaces and maintain proper topology layouts
- Use T-Splines with other modeling tools in the parametric timeline
- Understand best practices and parametric surfacing strategies
- Understand how to exchange data with other 3rd party applications

NURBS vs T-Splines

NURBS

- Precise
- Curvature graph
- Single 4 sided patch
- Poly surface for complex topology
- Insert isoprams or change degree while keeping the shape

- Cannot refine density locally (only on complete patch)

- To round edges fillet command has/ can to be used

T-Splines

- Precise
- Curvature graph (with limitations)
- Single 4 sided patch and NGons
- Single surface for complex topology
- Insert loop-cuts while keeping the exact shape

- Insert edge on a face where needed for local density change

- Fillets can be sculpted via edge loops and mesh topology on the fly

NURBS

- **Advantage:**
- Clean light weight geometry
- Control over patch layout

- **Disadvantage:**
- Very labor intensive for smooth shapes
- Requires perfect profile layouts

- Design adjustments require manual sketch and surface re-alignments

T-Splines

- **Advantage:**
- Incredible easy to sculpt
- Organic flows can be modeled with irregular topology layouts

- **Disadvantage:**
- Patch layout can get messy when T-Splines mesh count is high

- Achieving smooth curvature is harder than blending between NURBS surfaces

Conclusion

Think about T-Splines like NURBS:

- Think and treat T-Splines like NURBS that combines the best for NURBS and polygon modeling together into one workflow

- Maintain slim mesh density like in a NURBS sculpting workflow
- But make use of mesh topology freedom from Sub-D modeling

- Then you have NURBS CV cage editing in Fusion 360

Excited? So lets get started!

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