MFG469165

Generative Design Masterclass

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Learning Objectives

- Preserves and Obstacles
- Synthesis Resolution
- Starting Shapes
- T-Spline Tips
- Part Hollowing

Description

Modeling pro tips and advanced skills for generative design workflows.

Speaker(s)

James Neville is a Principal Business Consultant for Autodesk Global Consulting Delivery. He focusses his efforts on Advanced Design and Make solutions with a particular interest in Generative Design and CFD. James joined Autodesk in 2011, through the acquisition of Blue Ridge Numerics and has holds a degree in mechanical engineering from Virginia Tech.

# Tips and Tricks

Preserves and Obstacles

Generative design outcomes that involve form bodies tend to work best with rounded preserve and obstacle geometry. The transition between preserves and a form body is more robust and more accepting of post-processing when the preserve has been pre-filleted or rounded. Rounding obstacle geometry helps to avoid creases, interferences, and gives the generative design some "breathing room".

Restricting the design space available for a generative outcome can have its benefits. It eliminates the chance of unwanted contact with other components and allows extra room for stress response and deflection. The upfront setup effort required for obstacle offsets is faster and more elegant than post-processing an outcome after the generative study has completed.
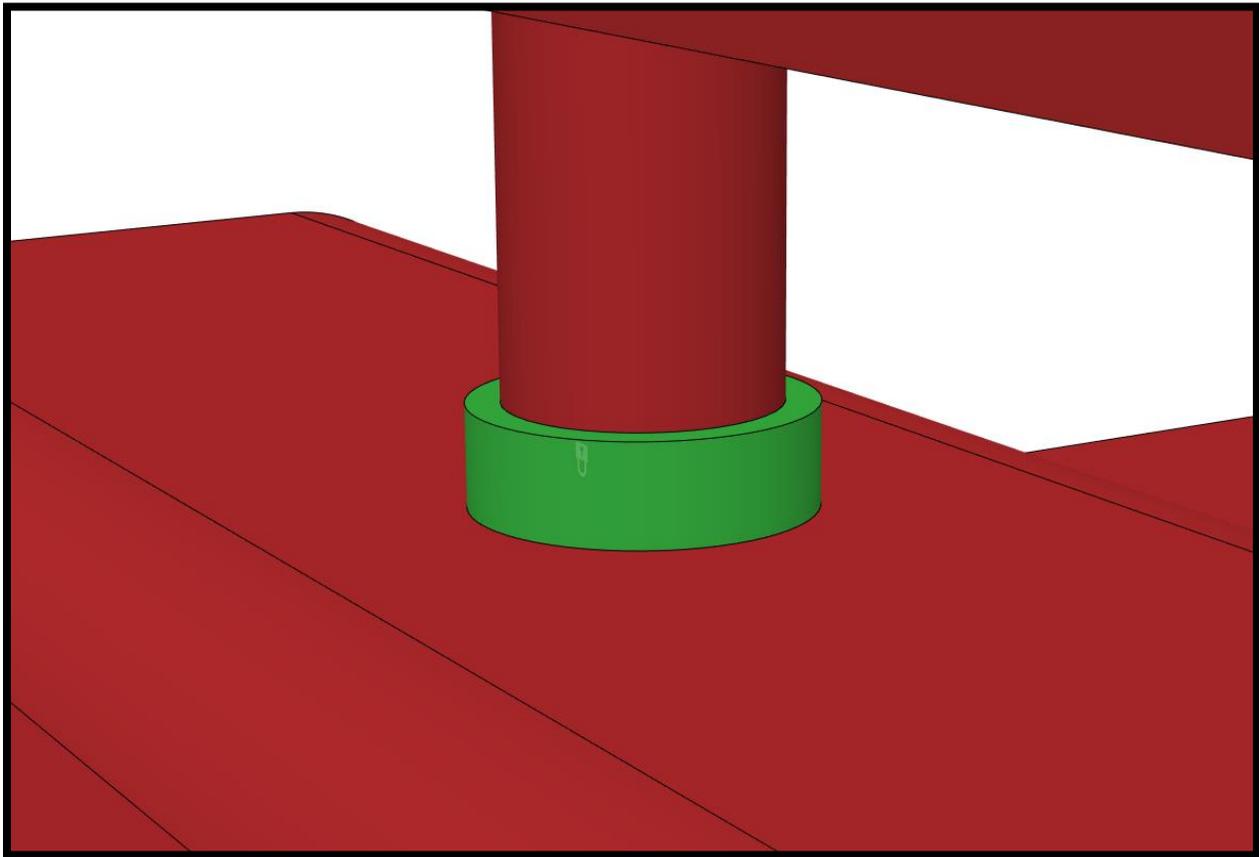

BEFORE PRESERVE ROUNDING.
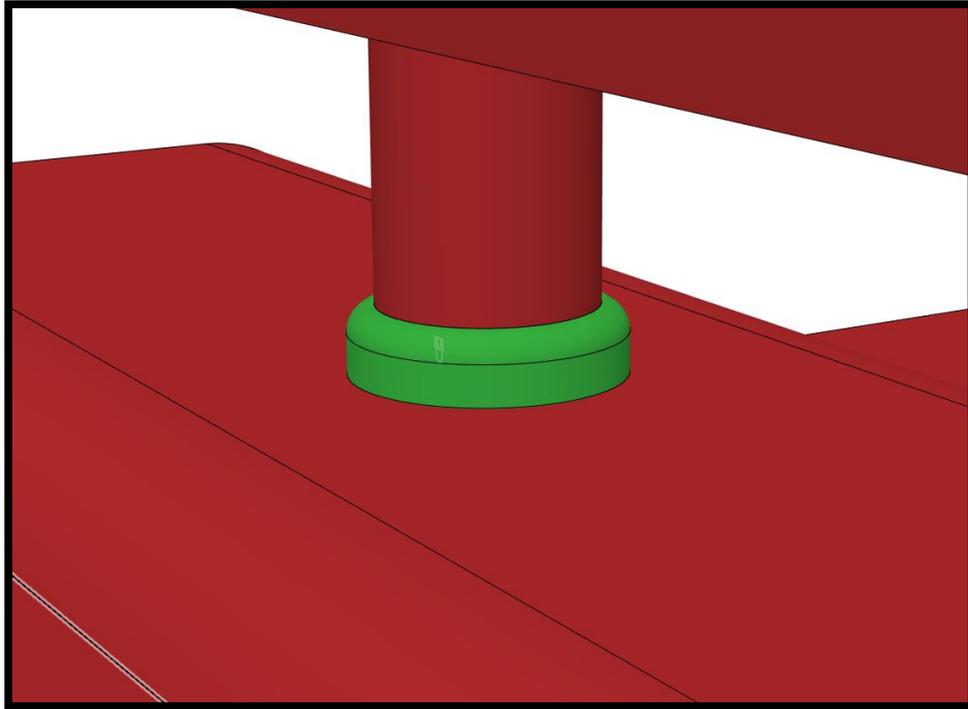
AFTER PRESERVE ROUNDING
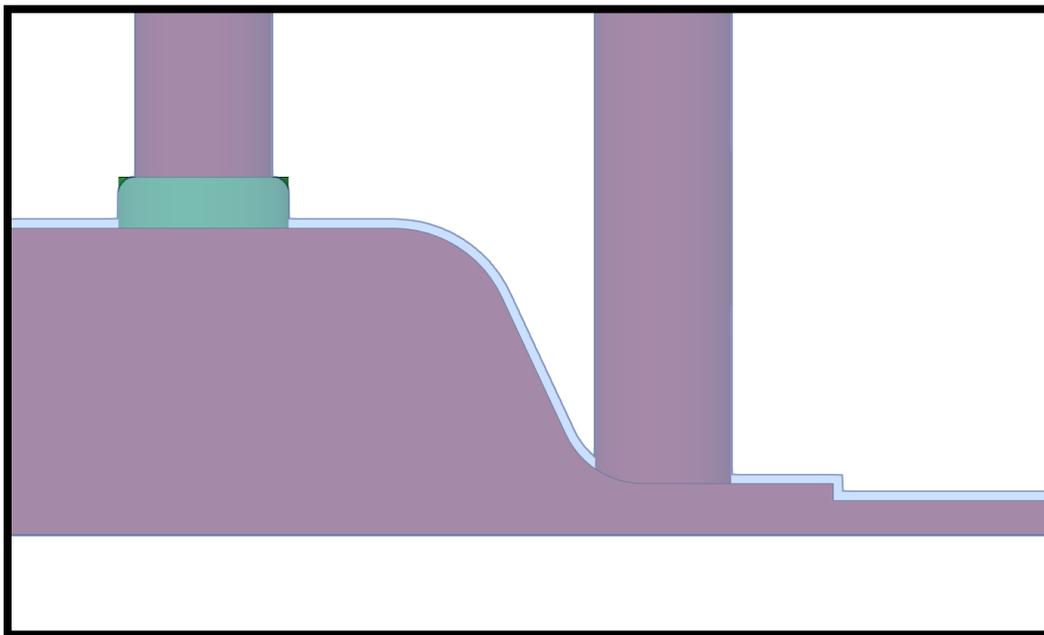

SIDE VIEW OF OBSTACLE OFFSETS.

Synthesis Resolution

Synthesis resolution controls the mesh size or level of detail of the generative solution. A low resolution will result in a faster solution at the expense of design space detail. A higher resulting will capture more geometric detail of both the preserves, obstacles, and resultant generative shape at the cost of increased solve time.

The synthesis resolution slider has 100 "clicks" from coarse to fine with the default resolution set to 40.
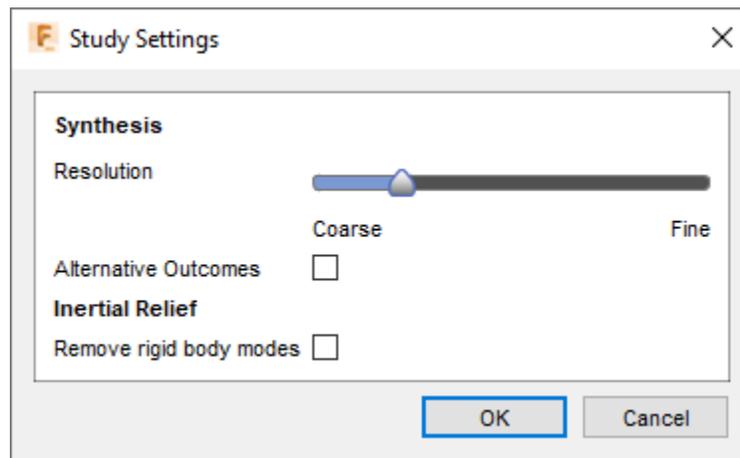


STUDY SETTINGS DIALOG
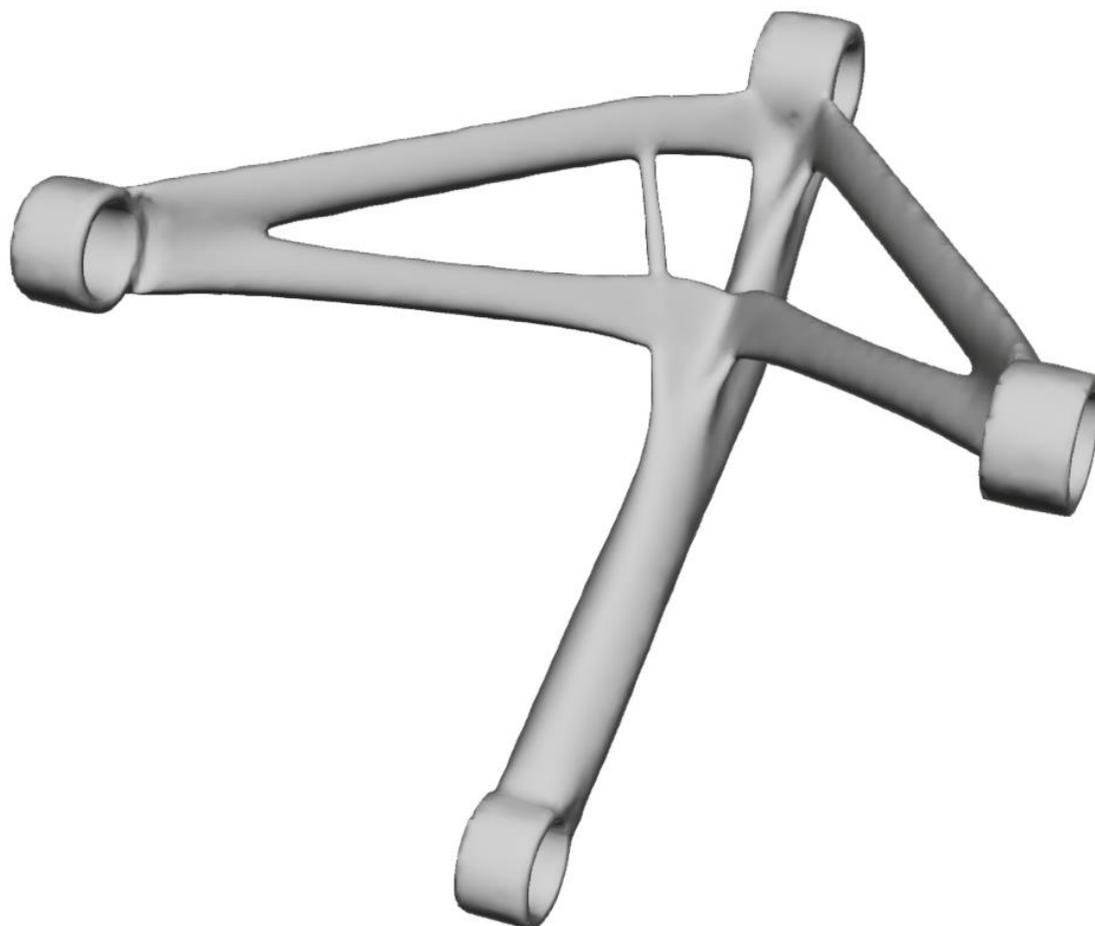
BRACKET - SYNTHESIS RESOLUTION 0

BRACKET - SYNTHESIS RESOLUTION 80

Starting Shapes

Starting shapes can help to "kick start" a solution to achieve an outcome faster. They will have an impact on the outcome compared to not using a starting shape at all. If no starting shape is assigned, generative design will simple build one that encompasses the preserves you have specified. In the event that a solution completes before a convergence, a final outcome can be used as a starting shape for another generative study
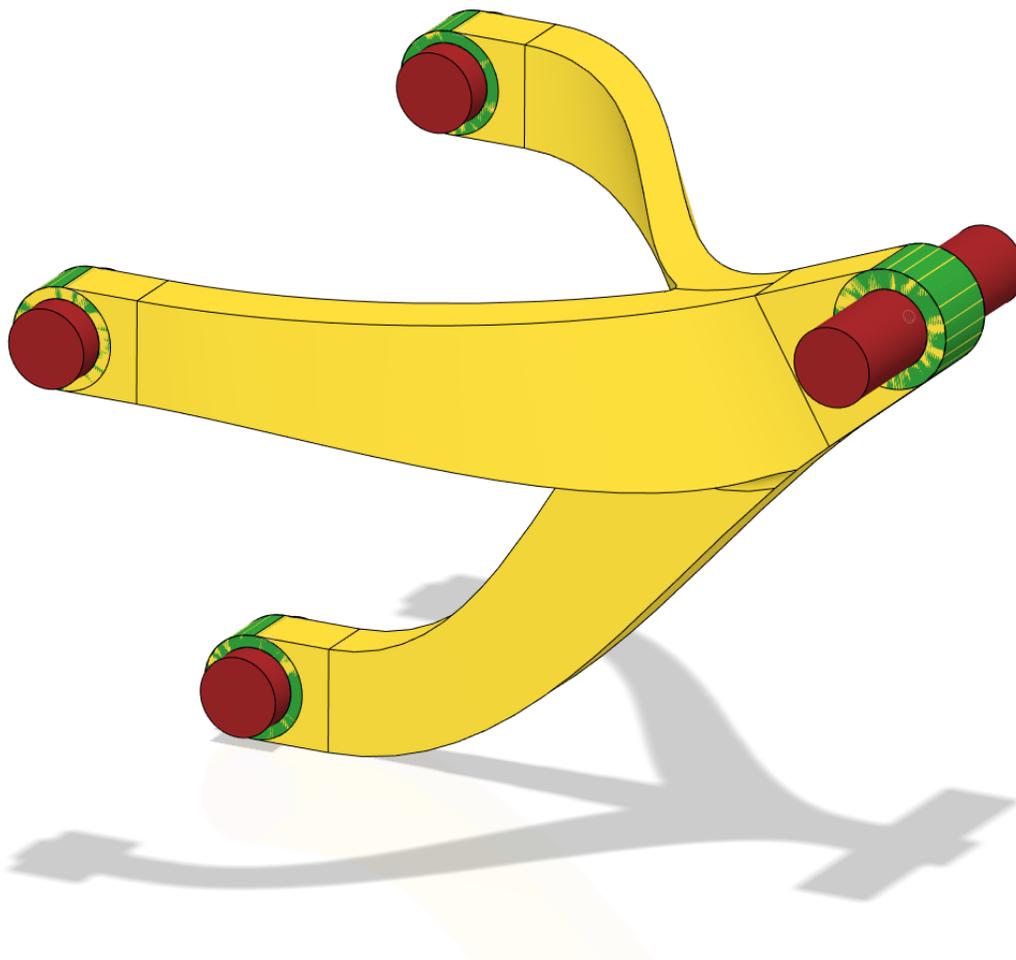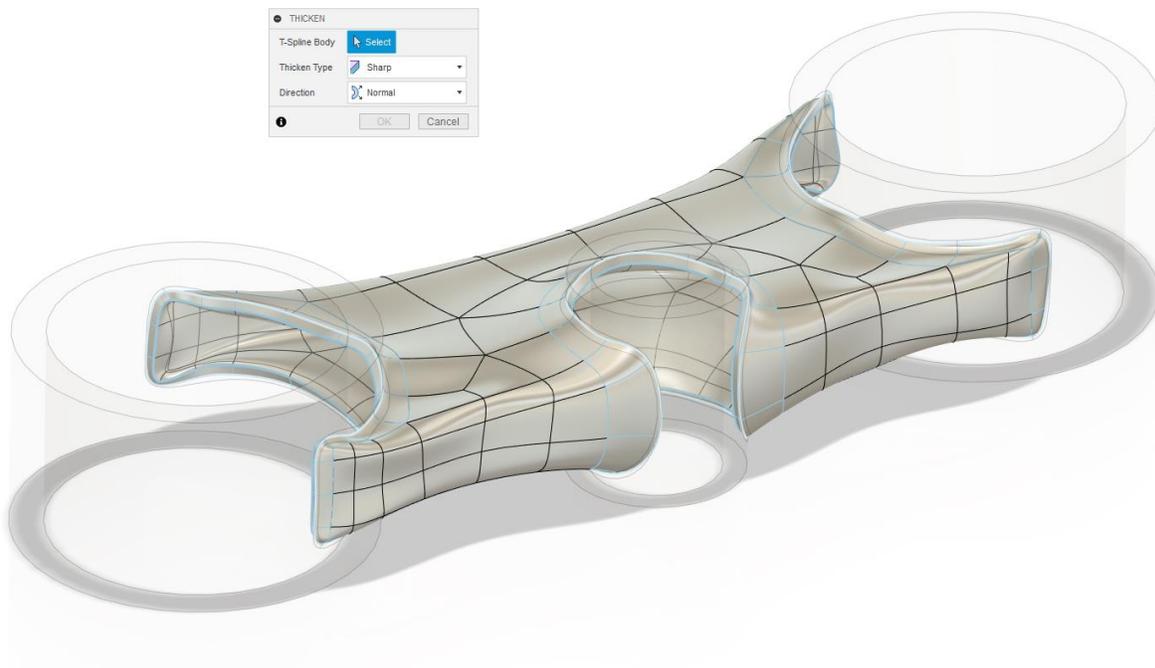
BRACKET WITH STARTING SHAPE
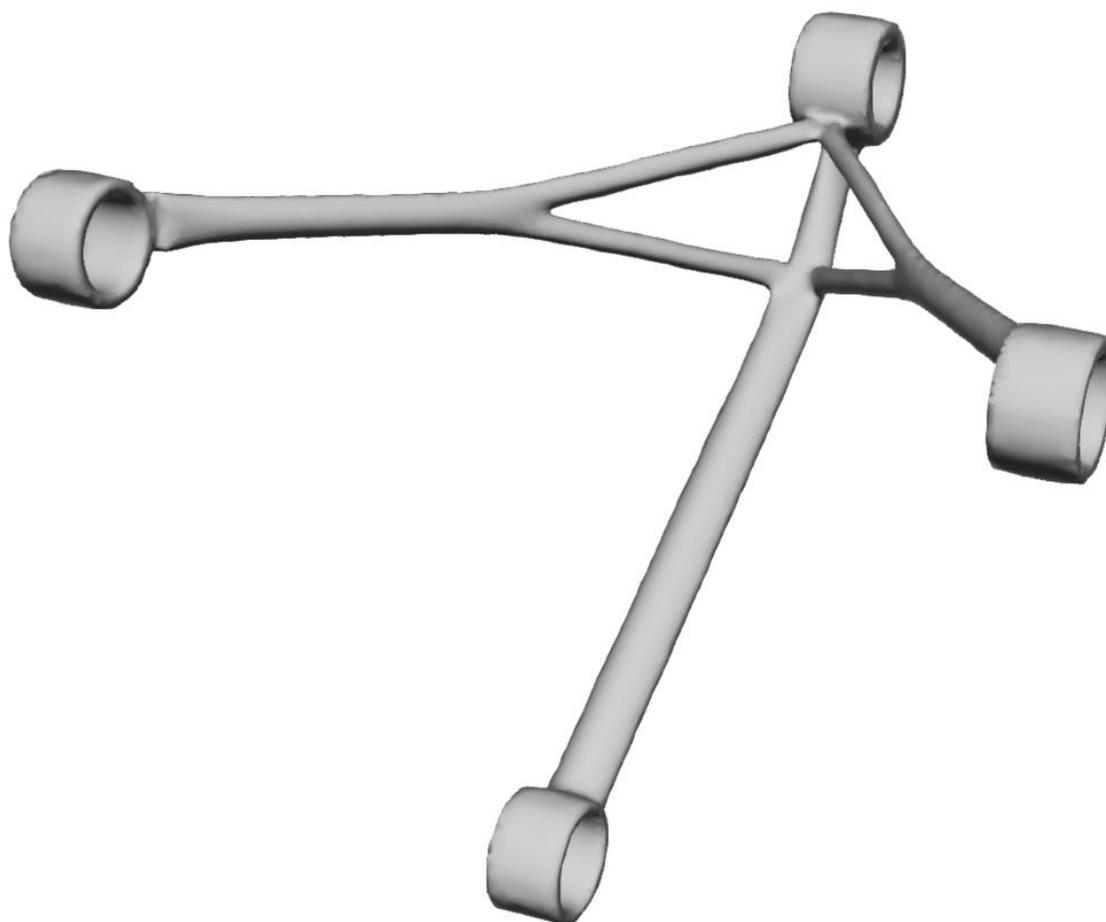
BRACKET OUTCOME FROM STARTING SHAPE

Outcome Hollowing

Hollowing or shelling a complex form body can be challenging. Hollowing at the form body level is a more reliable method and will result in a better final shape. The final BREP model is structurally based on the form body shape and may contain faces that are not conducive to a shelling operation. A form body is comprised of a group of relatively uniform quad faces and will hollow easily with a simple modify>thicken command. With the thicken type set to 'sharp', an additional organic part will be created. When the form body is completed, the additional part will create a thin-walled solid and the shelling operation will be complete.

FORM BODY THICKEN COMMAND