AUTODESK. UNIVERSITY

TR469255

Creating a Drone Chassis using Fusion 360 Generative Design

Cengiz Kurtoglu

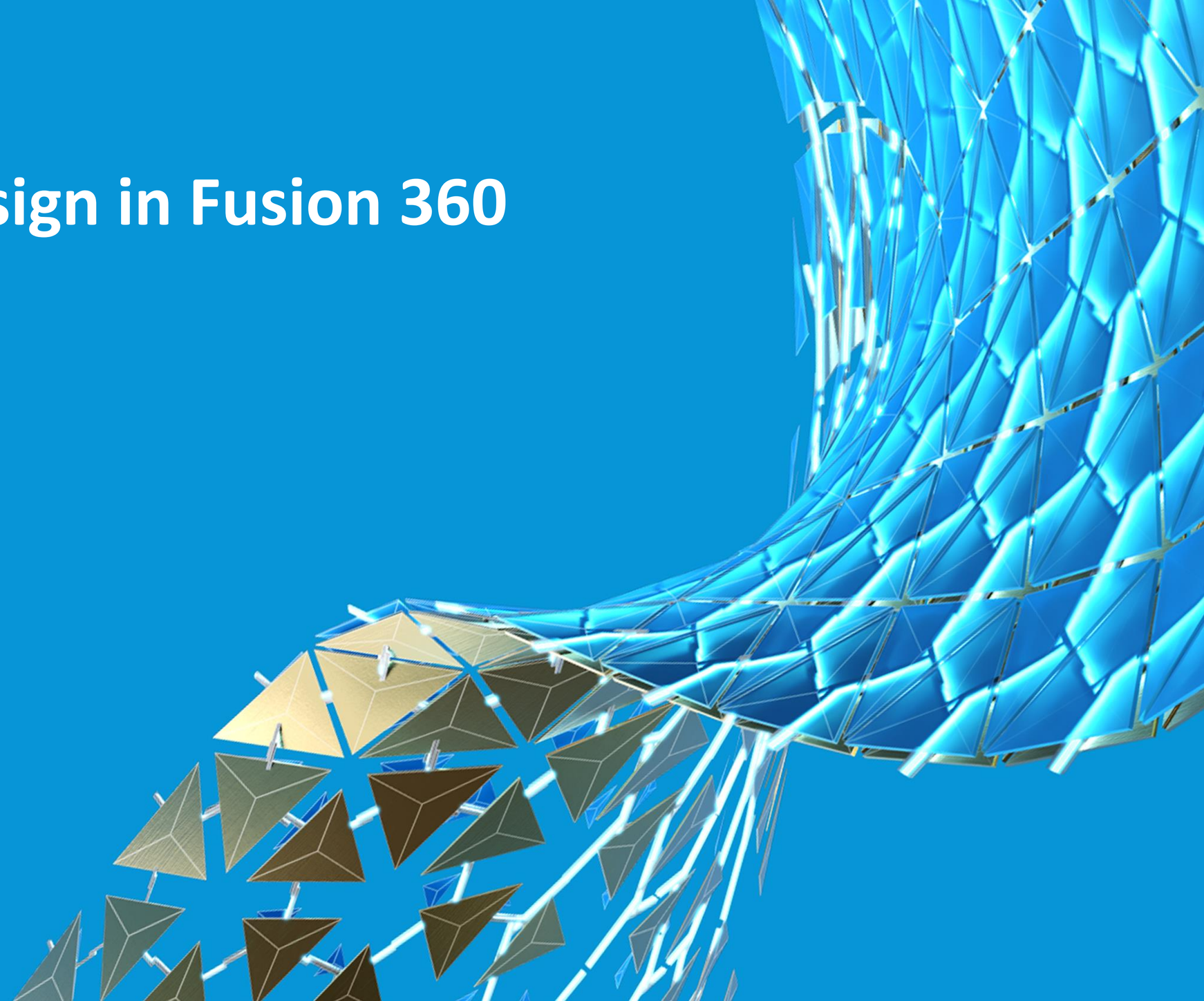
Mechanical Design Engineer | @designwagoon

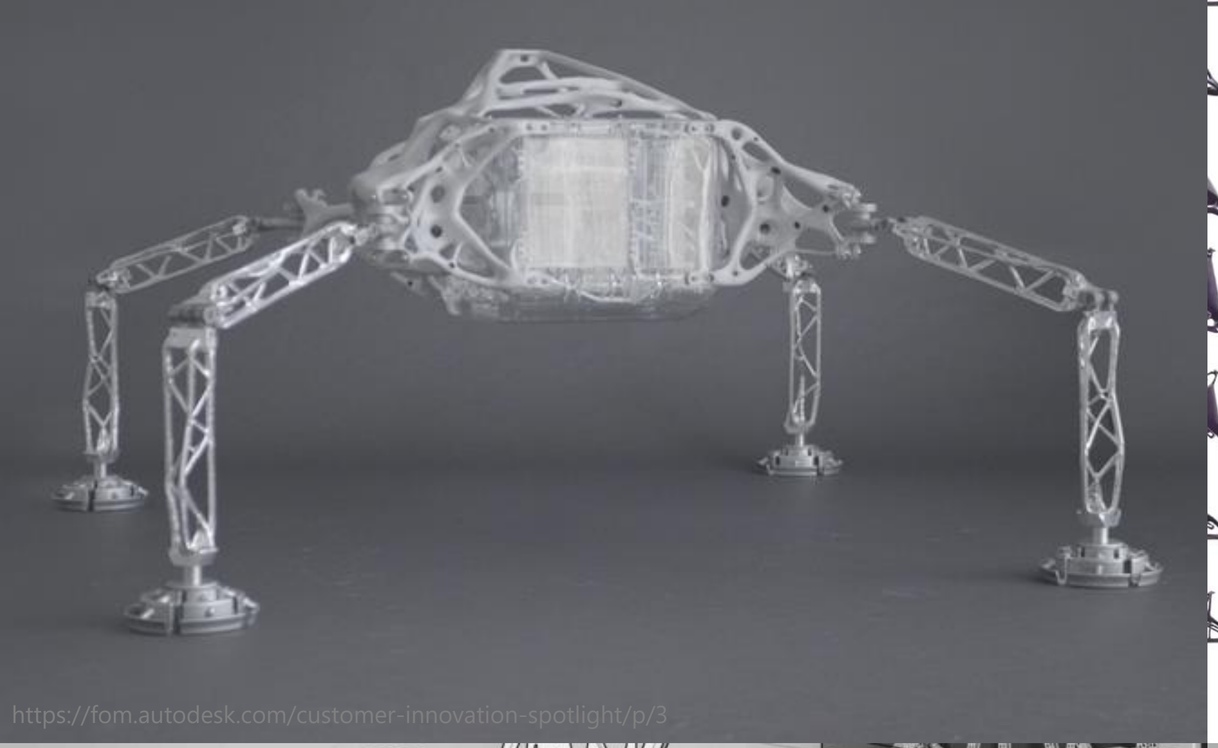
About the speaker

Cengiz Kurtoglu

Cengiz provides lectures and workshops to university students and academic staff in 3D designing as an Autodesk Registered Instructor for 5 years. He is a Mechanical Design Engineer in France. He has 3 years of experience supporting Start-Ups to develop new smart products in the field of medical technologies. He's currently working on a research project in the Soft Robotics field. Also he's the founder of *Designwagoon.com*

Generative Design in Fusion 360





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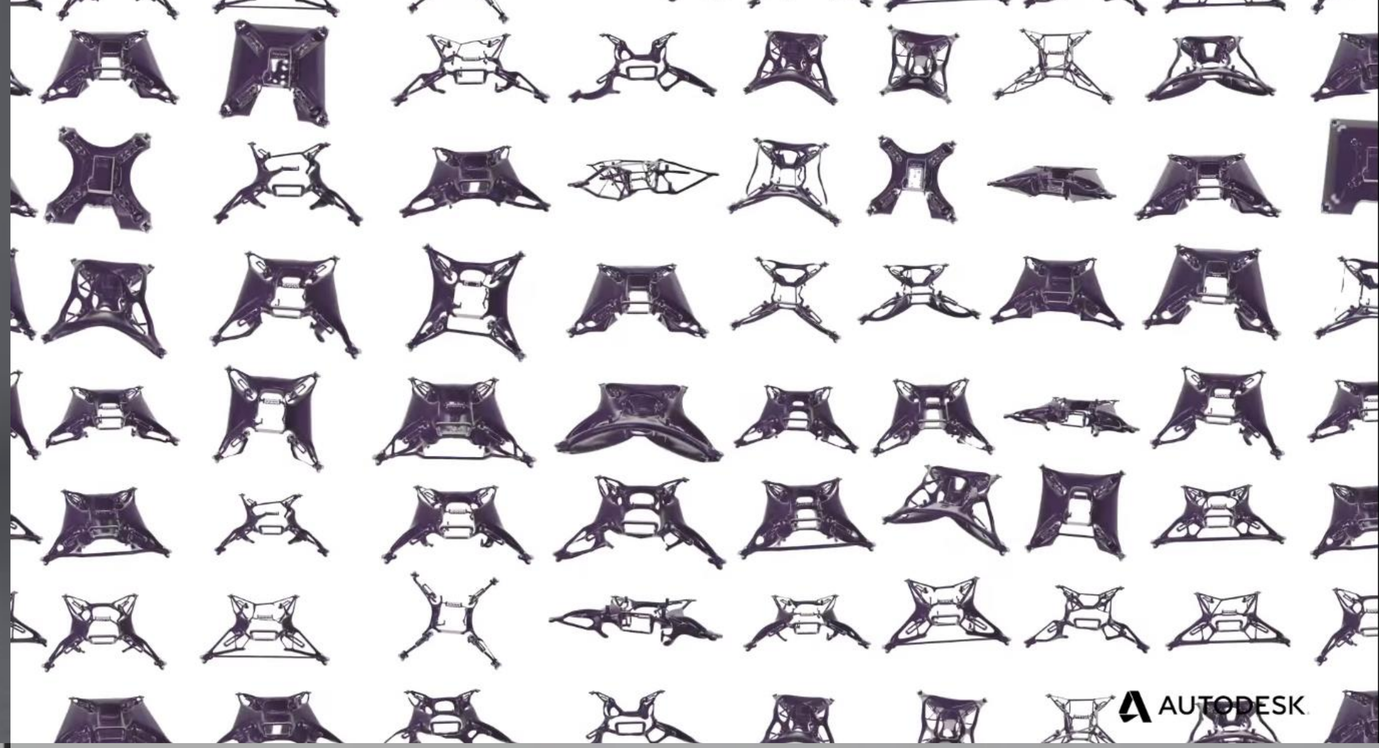

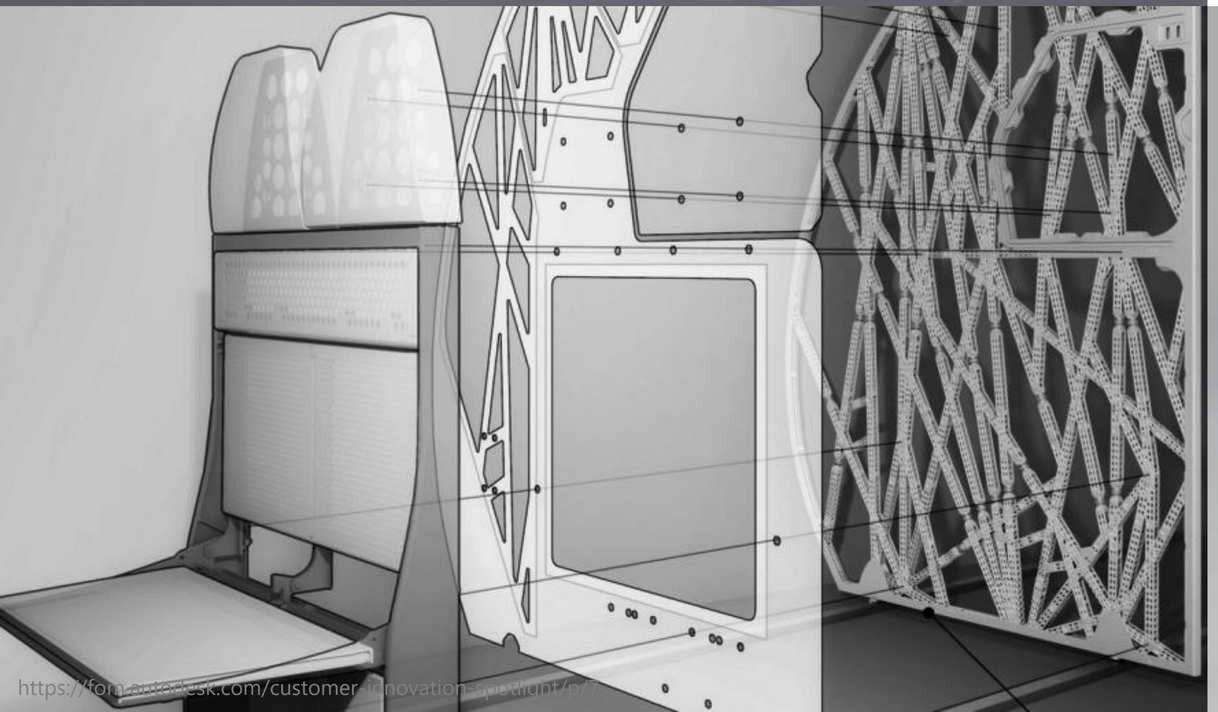

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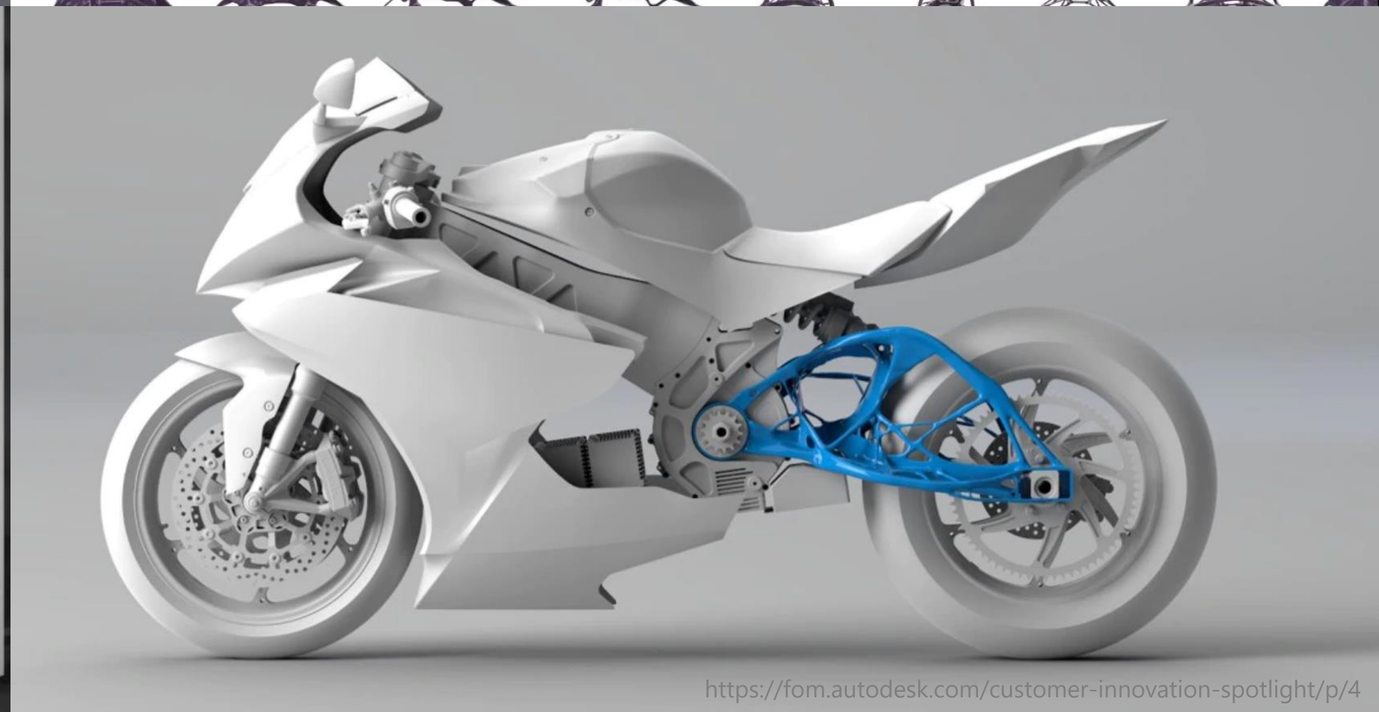

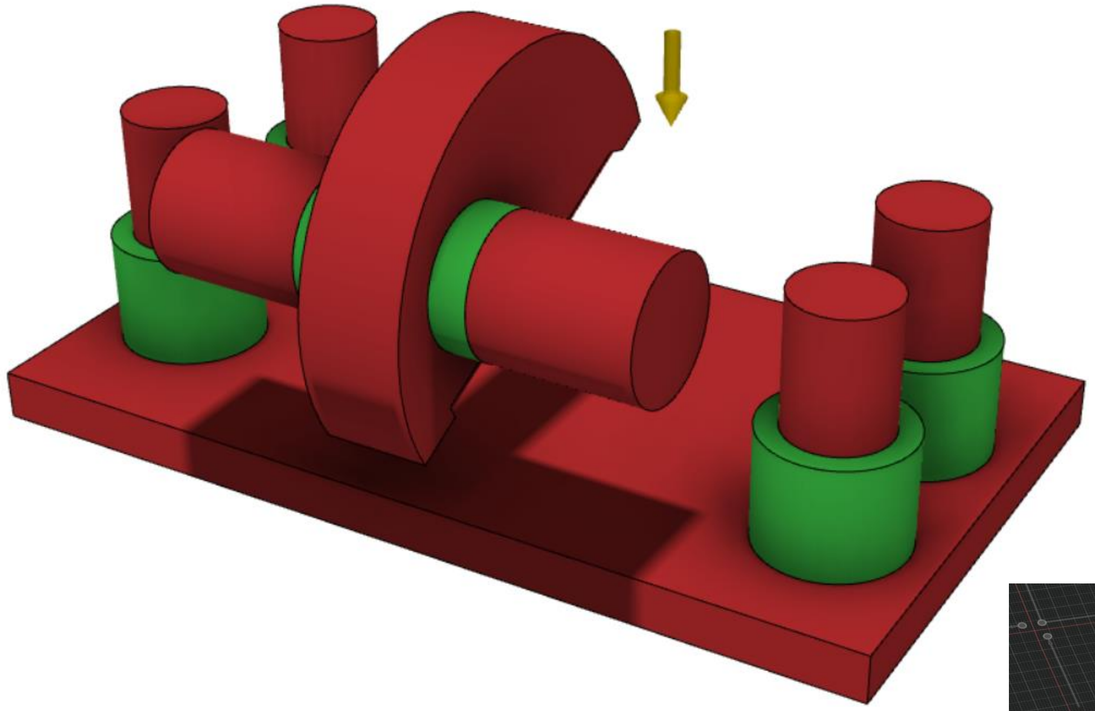

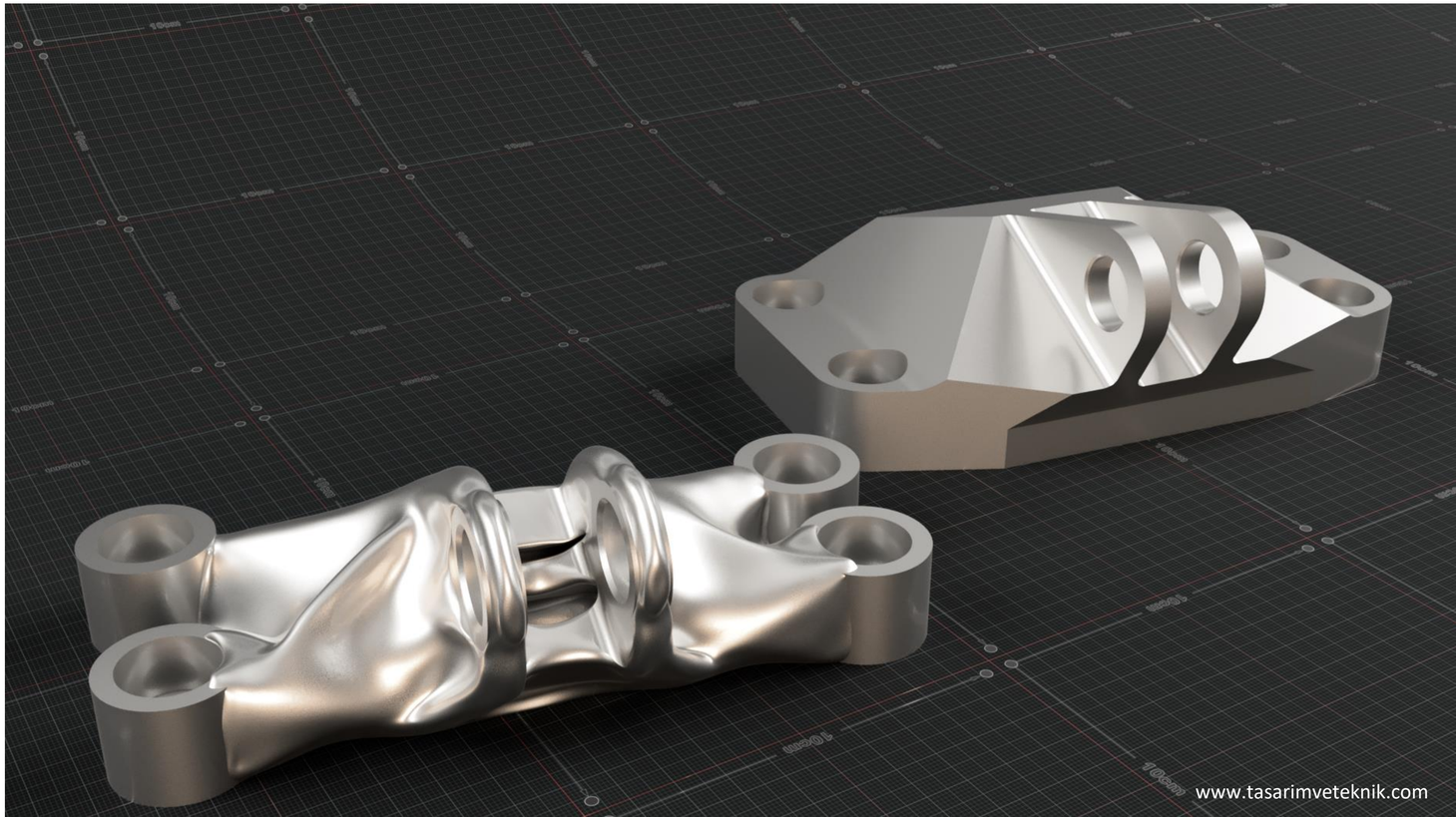
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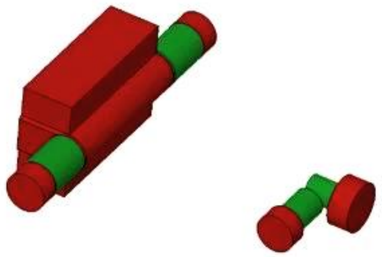
Generative Design Workflow



CAD → Related BODIES → DEFINE → GENERATE → EXPLORE

Creating a Drone Chassis using Fusion 360 Generative Design

MODELING

INITIAL BODIES

Designing the necessary regions for the part we need

PREPARATION

MODIFY THE BODIES

Modifying parts to prepare them as Preserve bodies, Obstacle bodies and Starting Shape for the Generative Design workspace

GENERATIVE DESIGN

ASSIGNATION OF PARAMETERS

Assignation of Structural Constraints,

Structural Loads,

Manufacturing Methods,

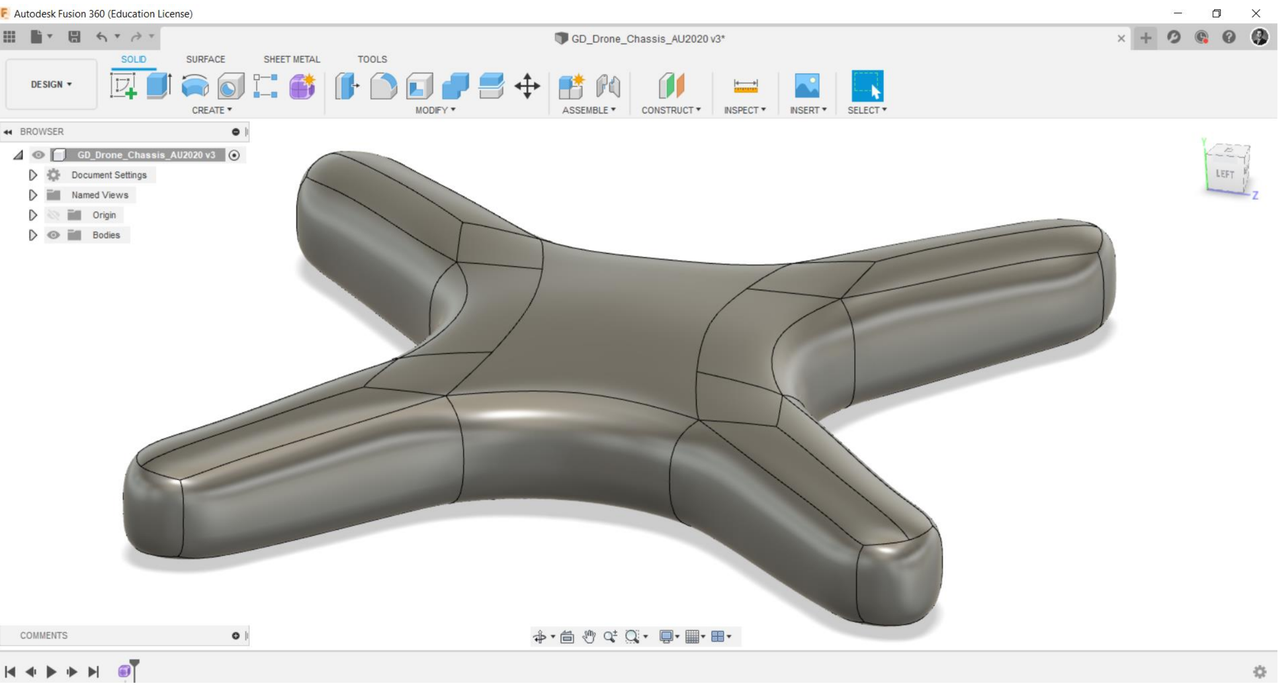
Materials,

Objective and Limits

RESULT

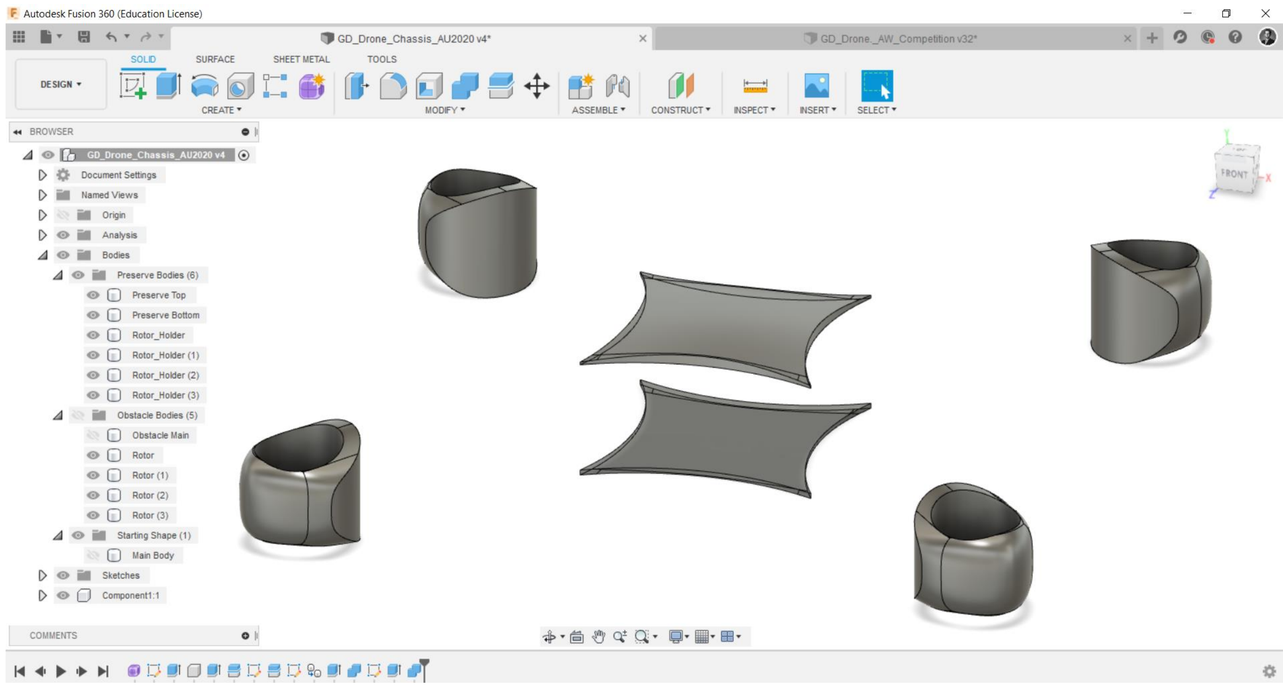
COMPERATION OF OUTCOMES

Making comparisons to determine the optimum outcome



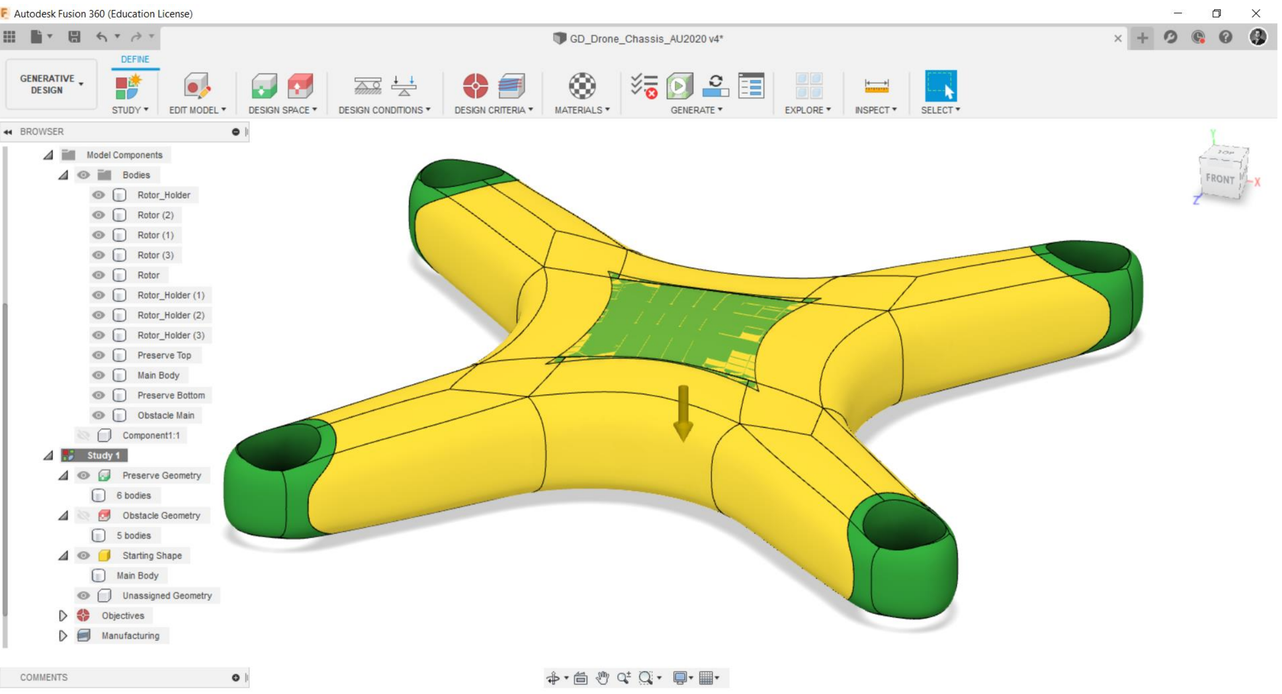
MODELING

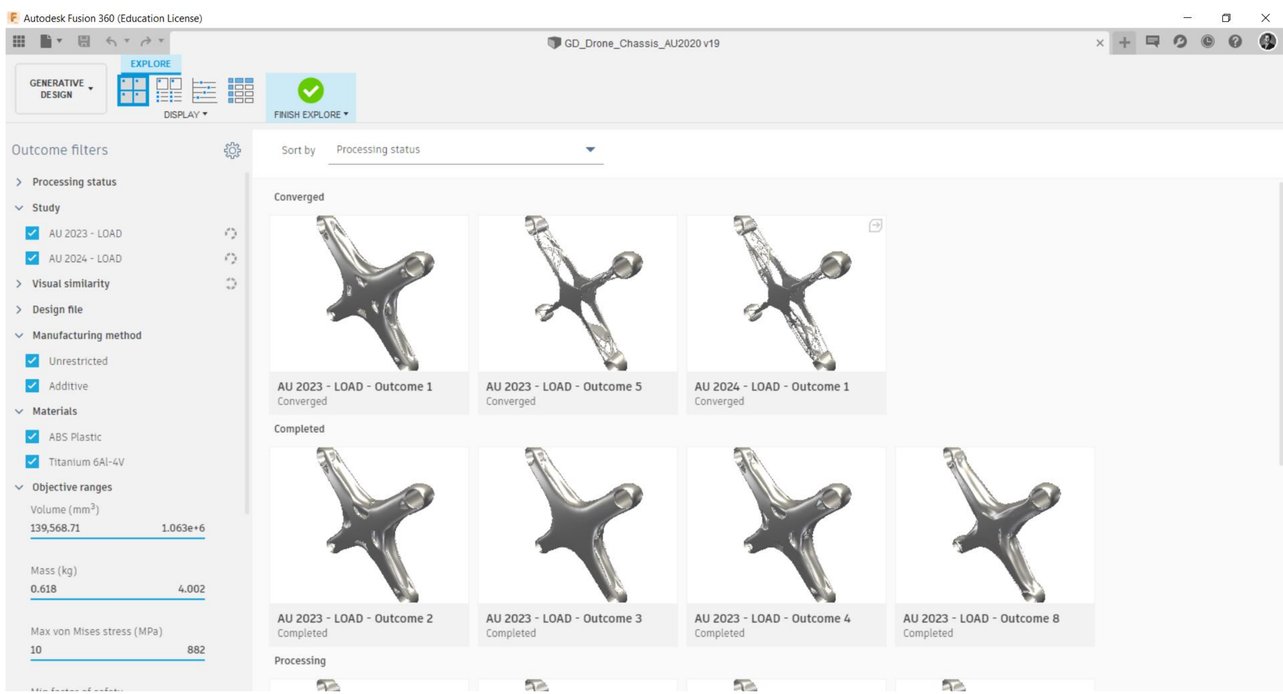
Designing the necessary regions for the part we need



PREPARATION

Modifying parts to prepare them as Preserve bodies, Obstacle bodies and Starting Shape for the Generative Design workspace





GENERATIVE DESIGN

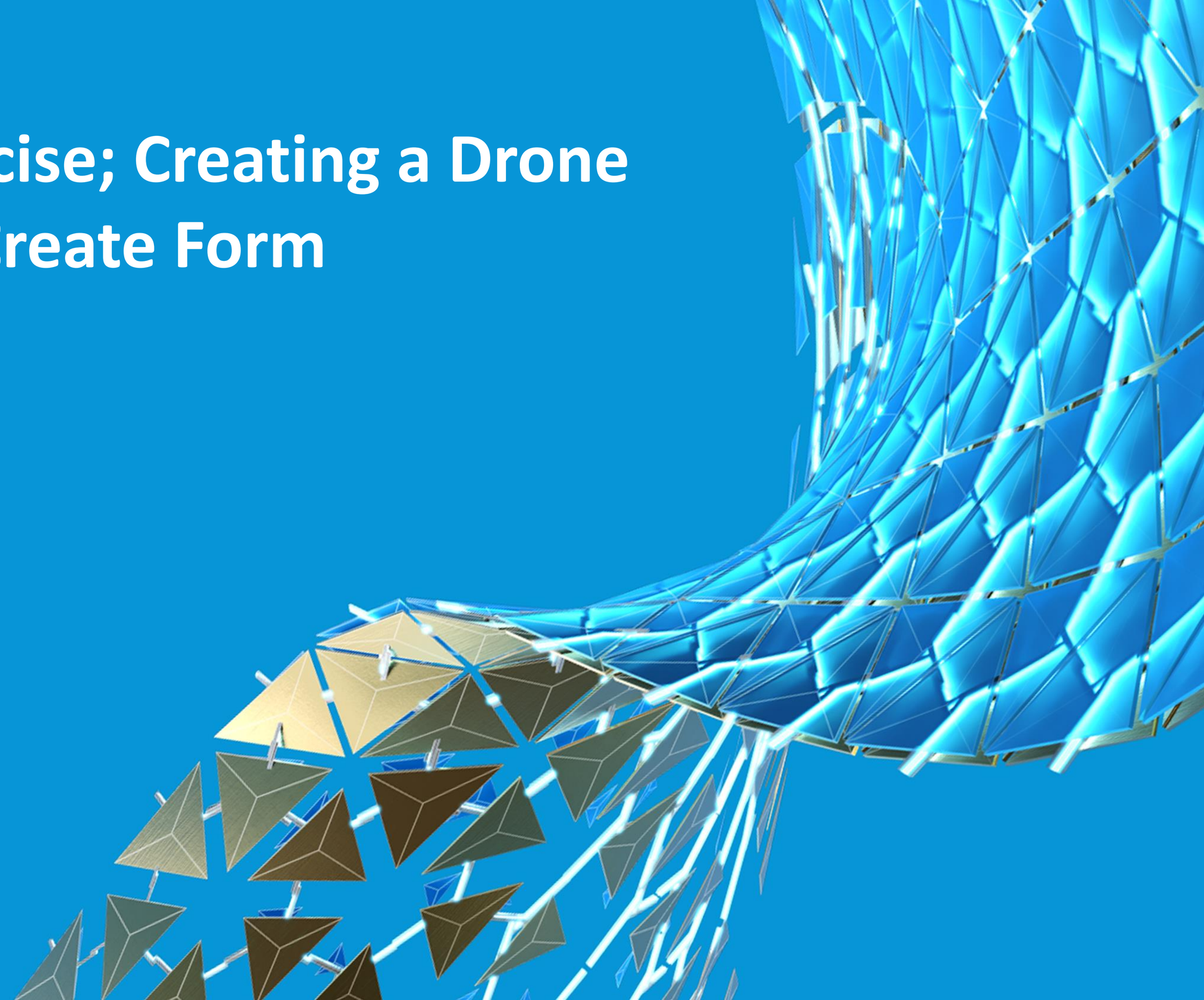
Assignation of Structural Constraints, Structural Loads,

Manufacturing Methods, Materials, Objective and Limits

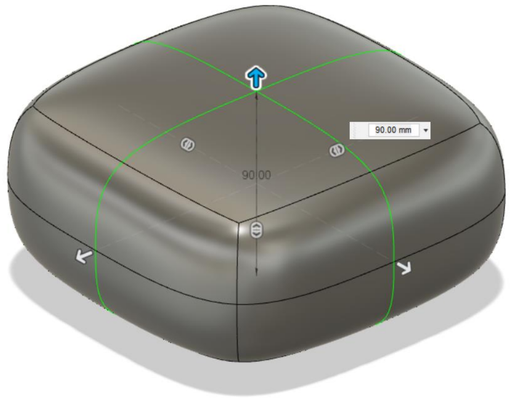
RESULT

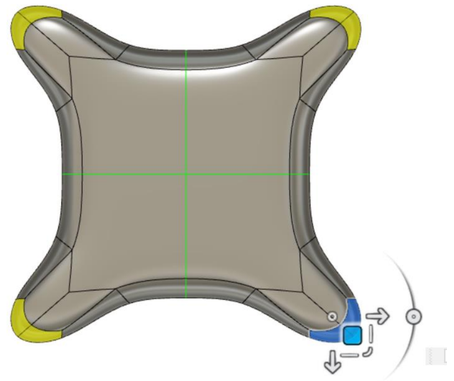
Making comparisons to determine the optimum outcome

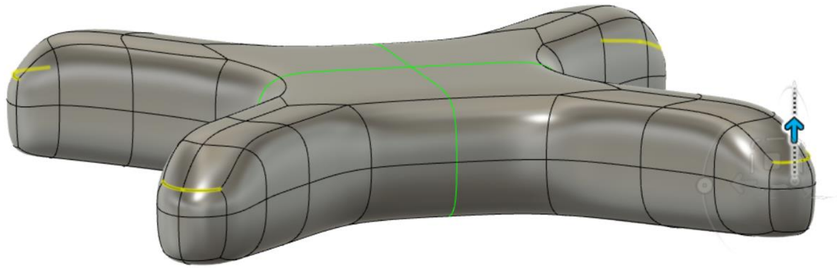
Modeling Exercise; Creating a Drone Chassis using Create Form

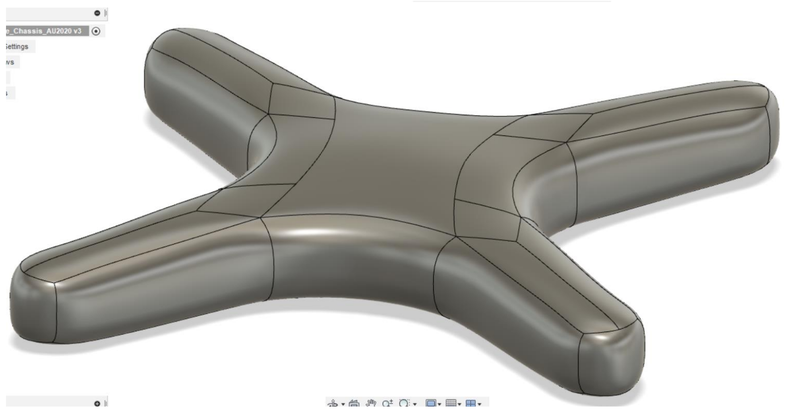


Modeling Exercise; Creating a Drone Chassis using Create Form



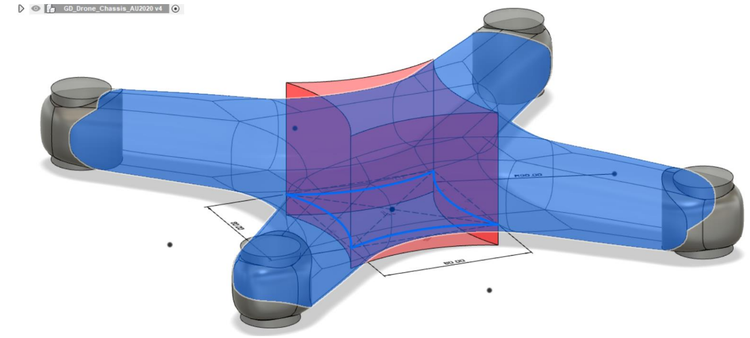


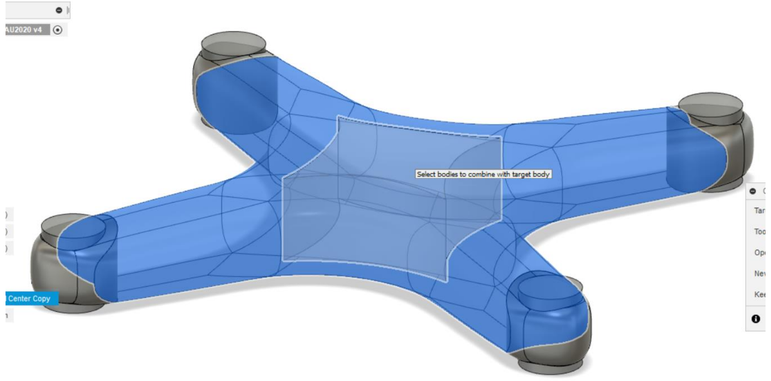


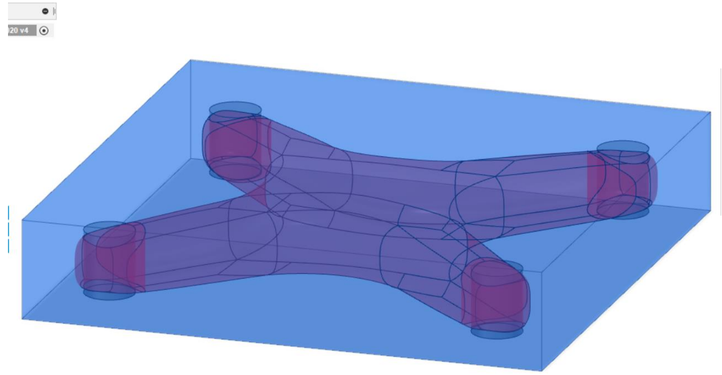


In this Hands-on Lab, we will design necessary part for Generative Design in Create Form Workspace.

Modeling Exercise; Creating a Drone Chassis using Create Form

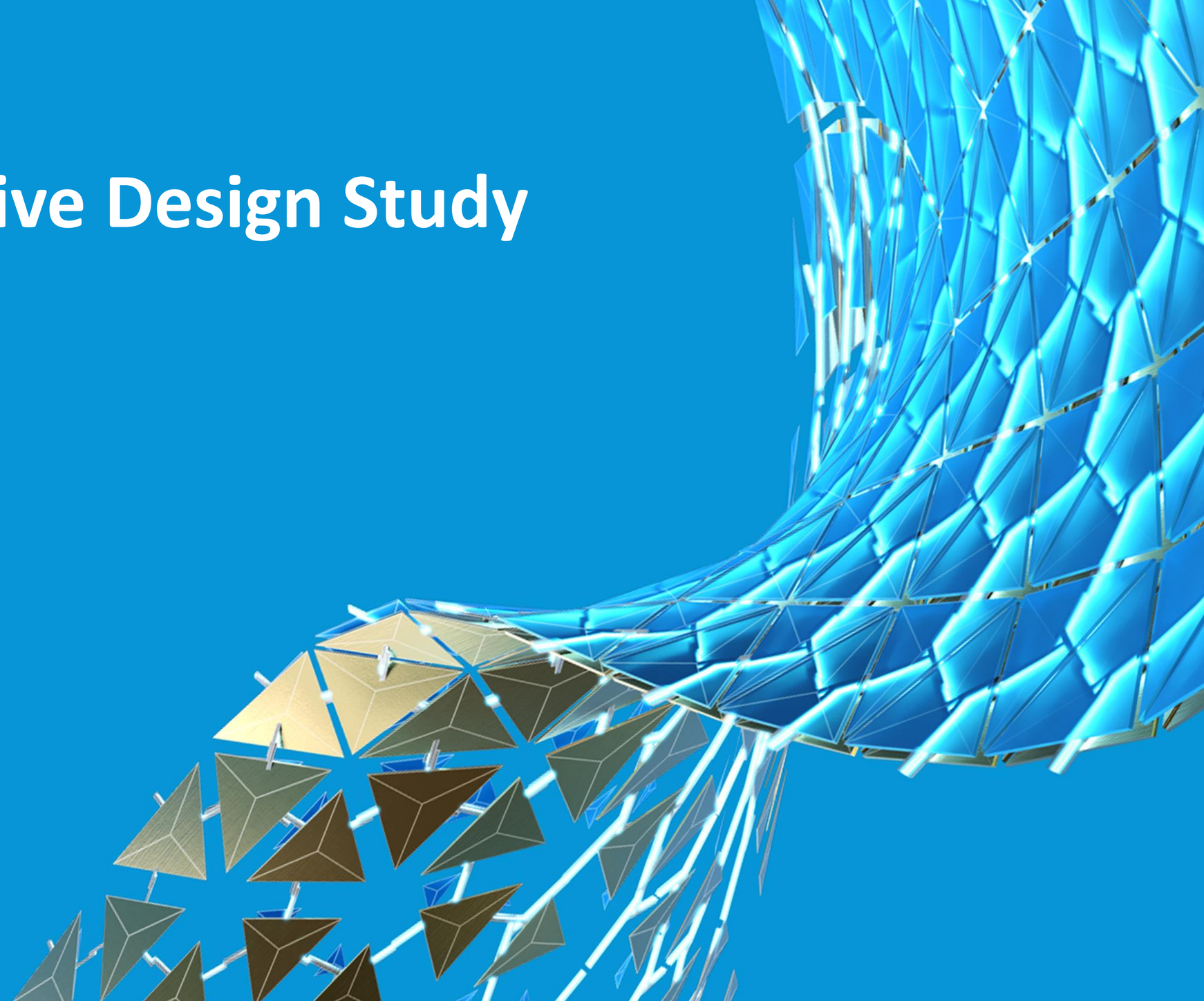




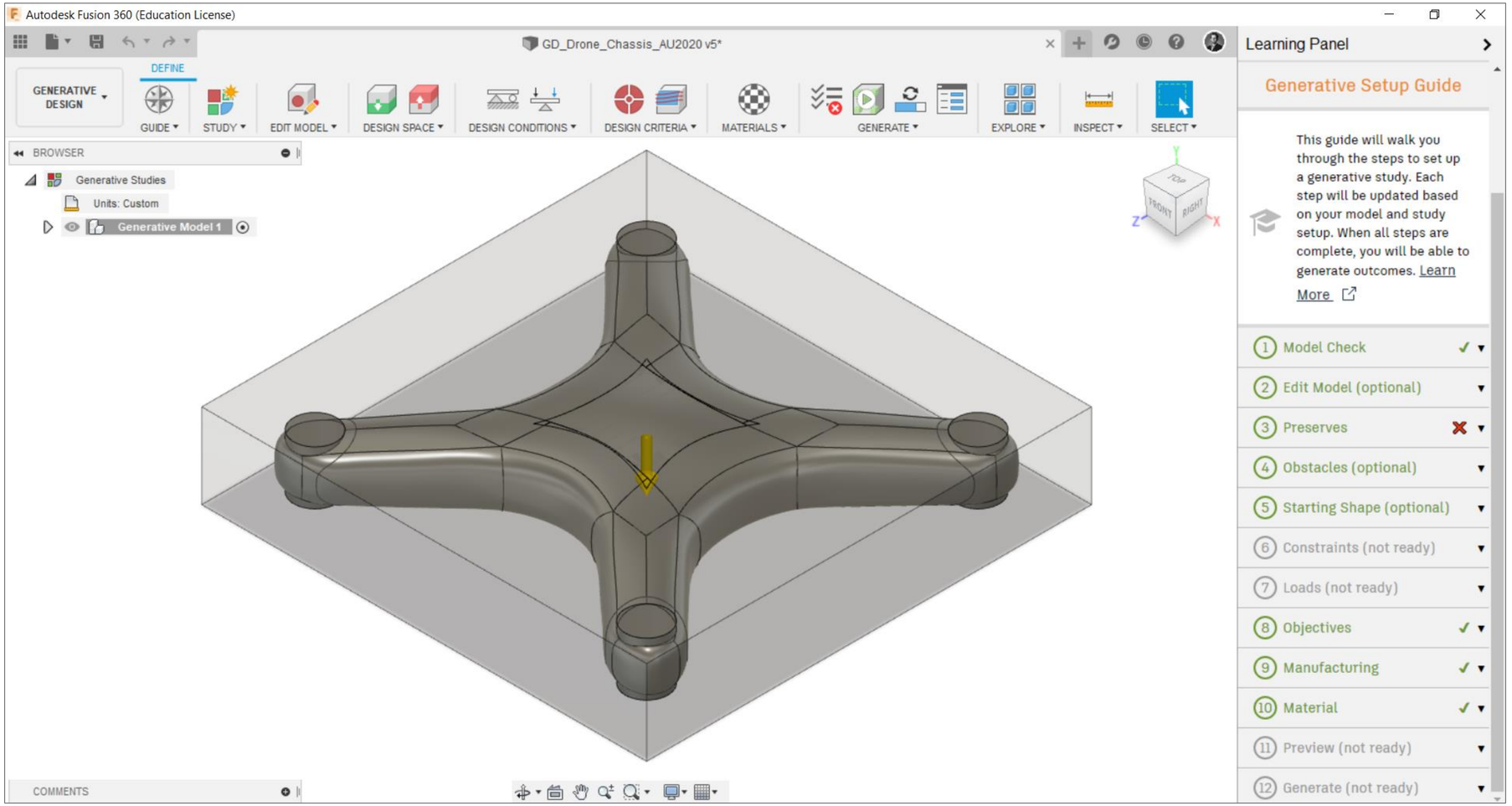


After we finished the modeling in Form workspace, we'll use the Model workspace to mofidy the bodies to prepare for Generative Design Studies.

New Generative Design Study

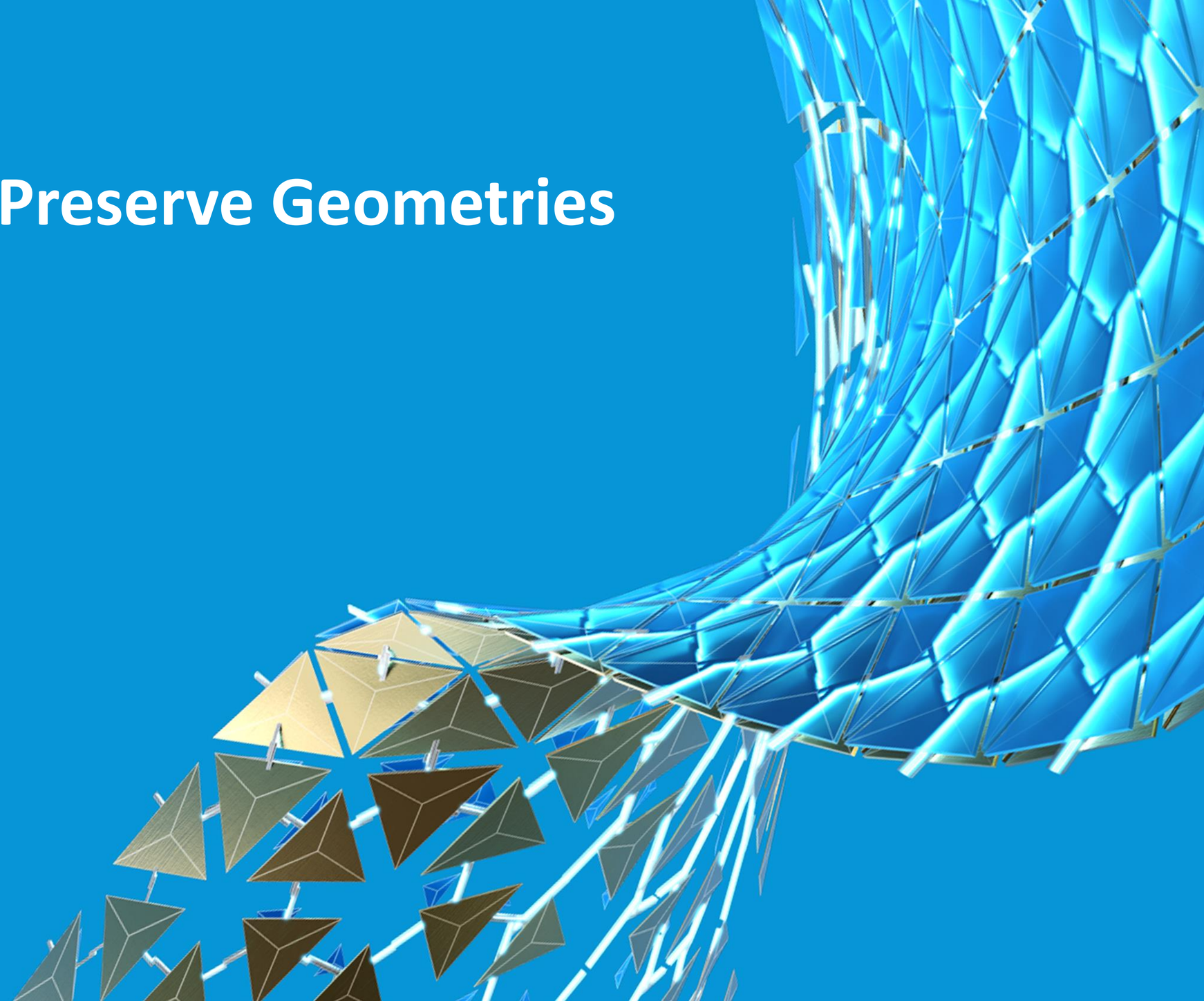


Generative Design Study

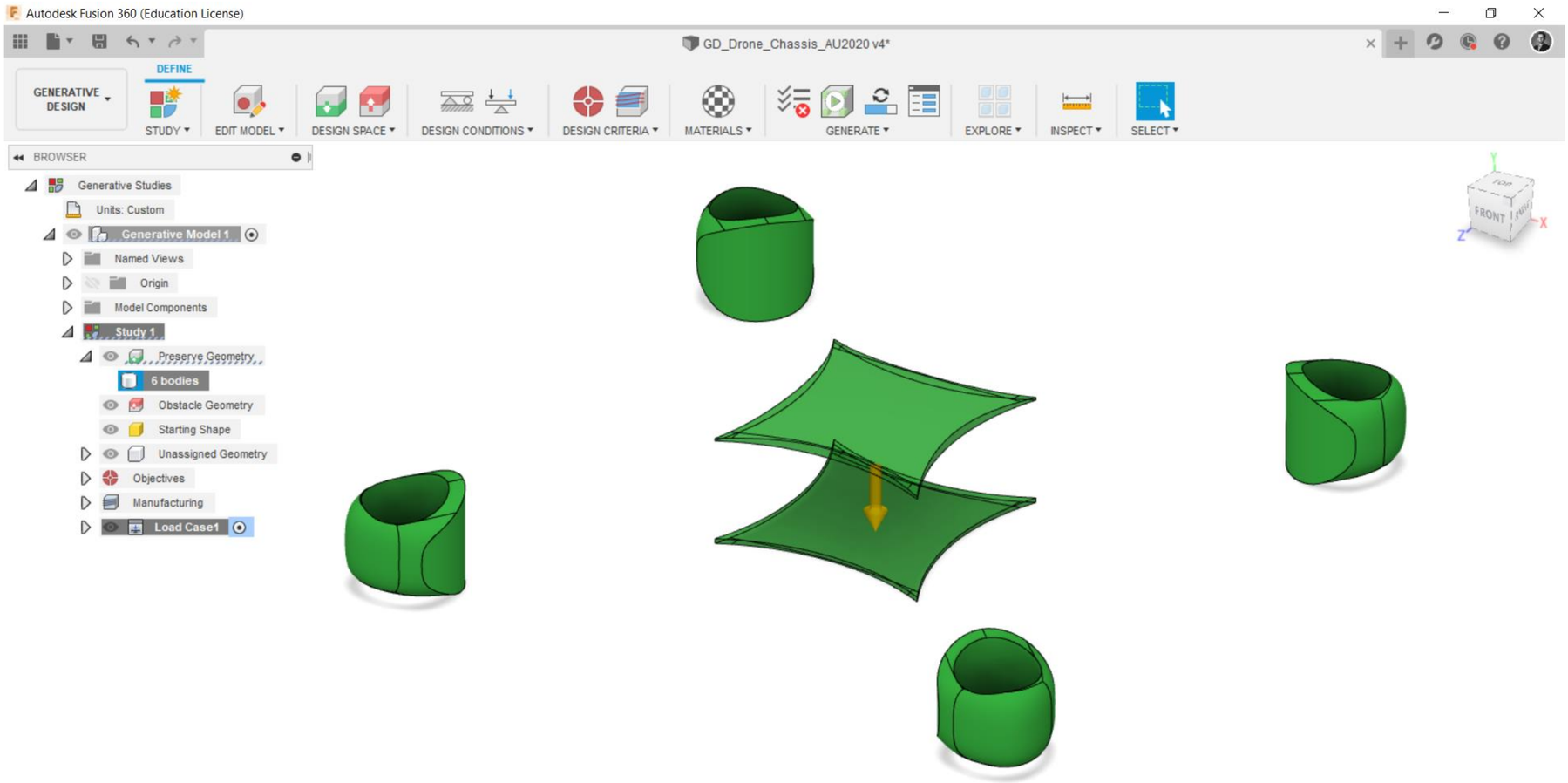


You can get information from GUIDE, there are detailed definitions of all steps for Generative Design.

Assignation of Preserve Geometries



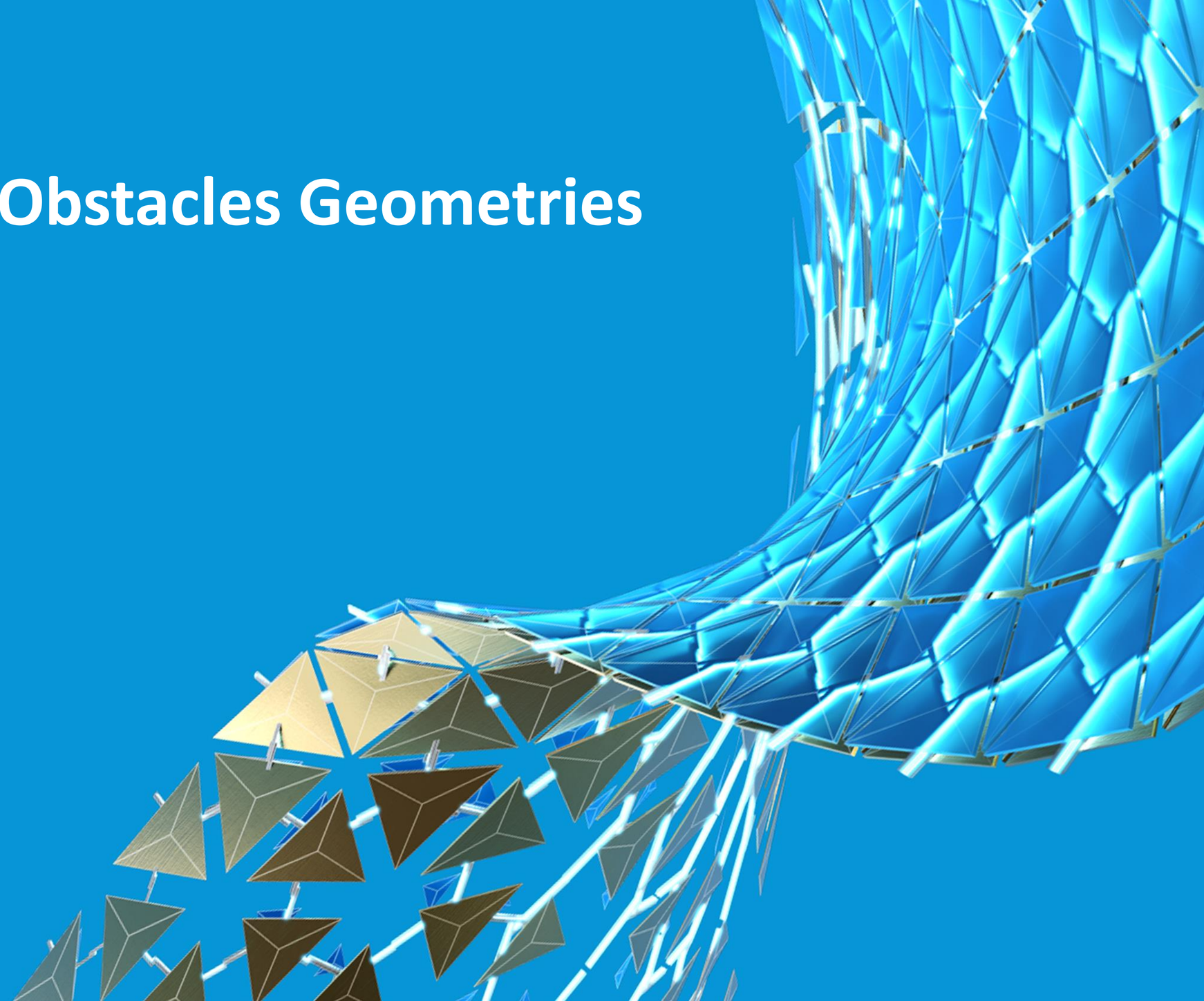
Assignation of Preserve Geometries



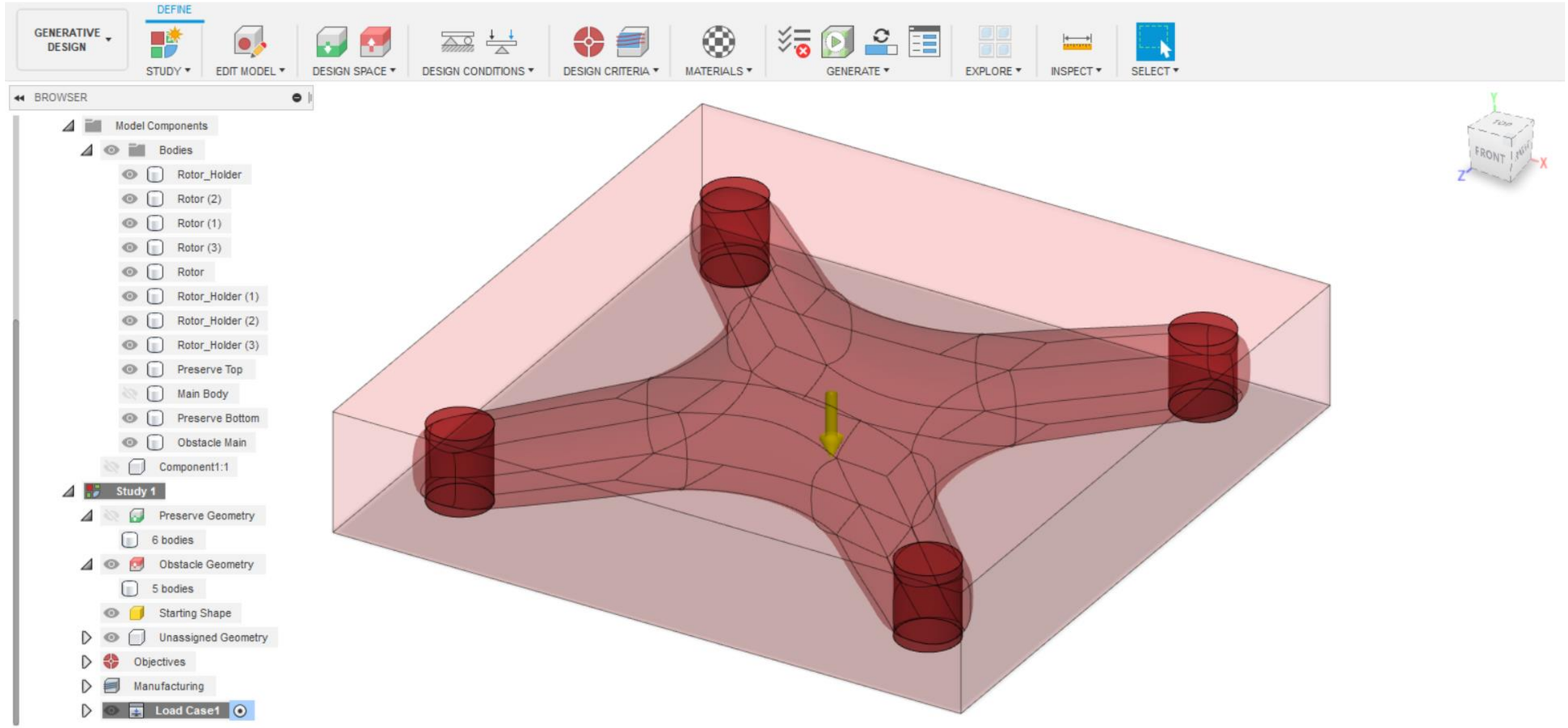
In Generative Design Study, it should be assigned Preserve Geometry that it allows adding Loads and Constraints.

Preserve Geometries also will appear in the final shape of the design.

Assignation of Obstacles Geometries

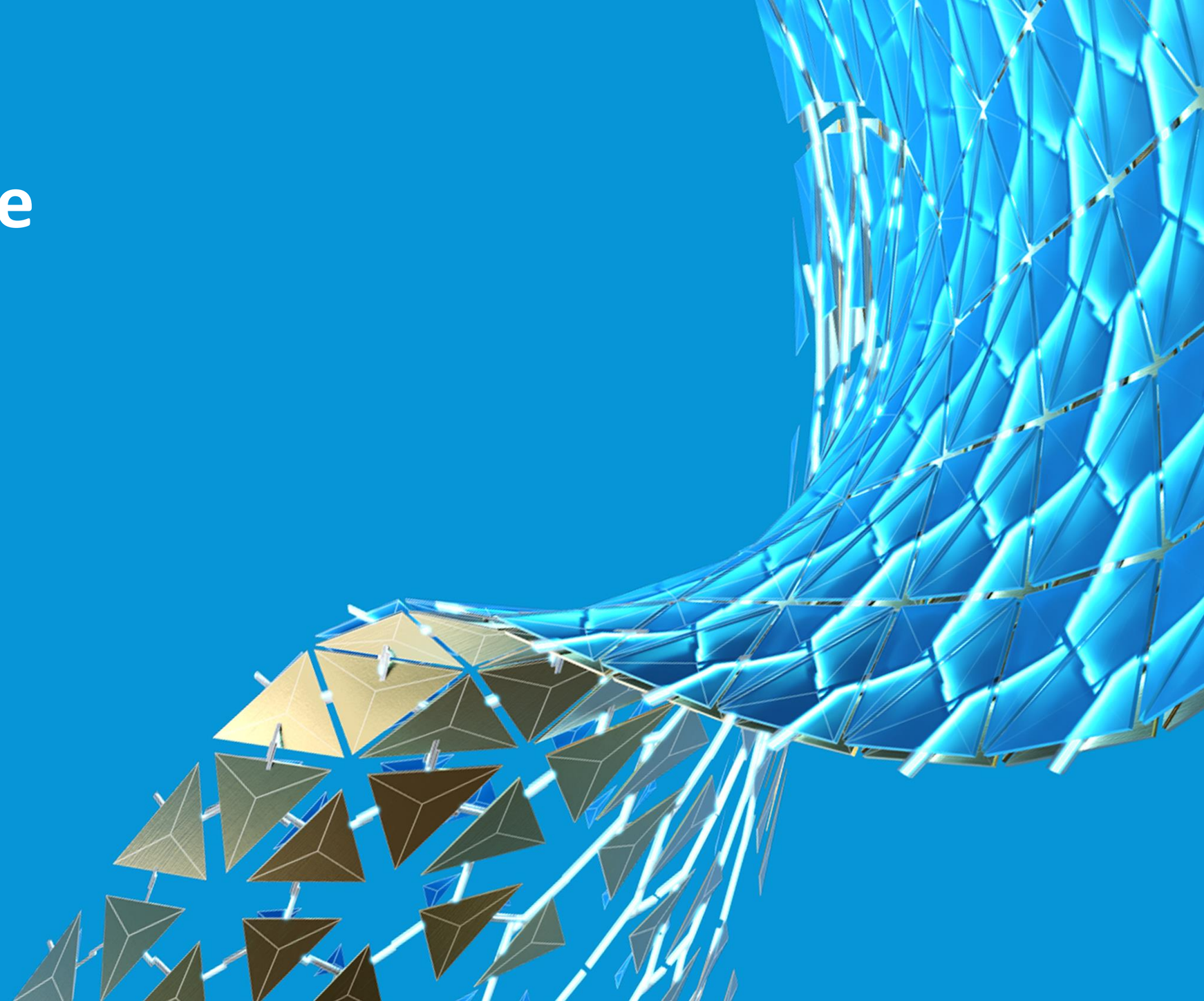


Assignation of Obstacles Geometries

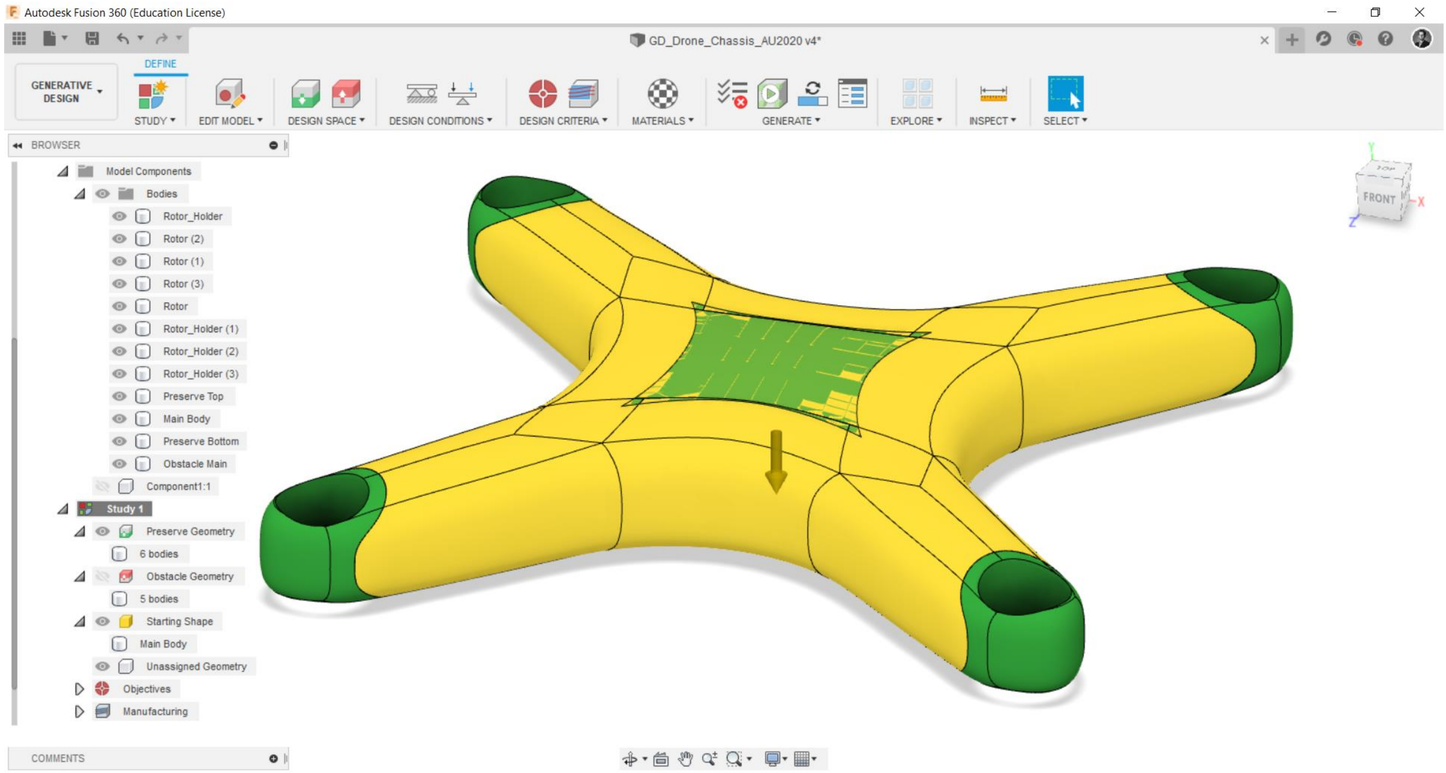


It’s not obligatory to add Obstacle Geometry in Generative Design Study. But in many cases, it will help you when you need to assign empty spaces where material placed during the generation of outcomes.

Starting Shape

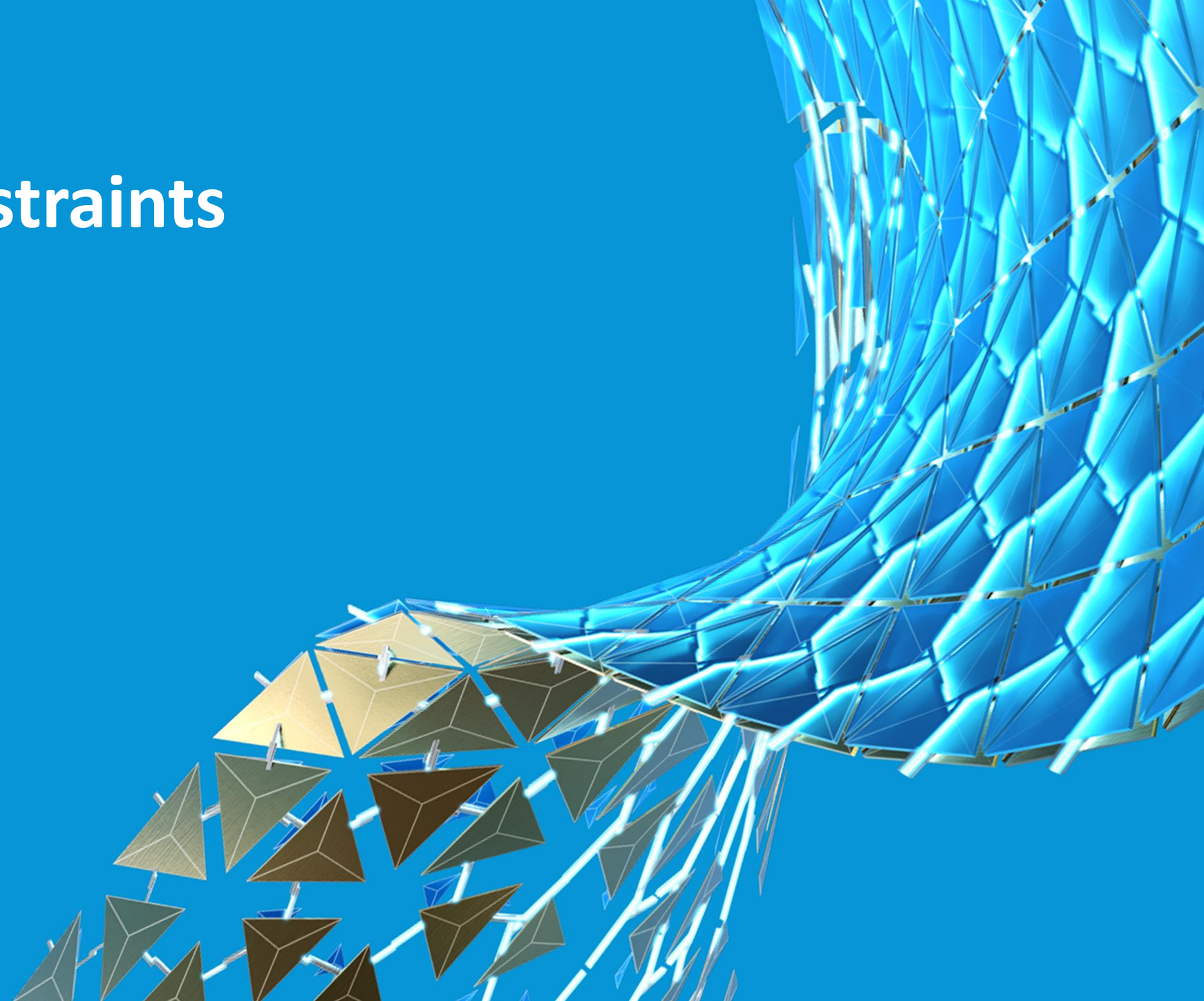


Starting Shape

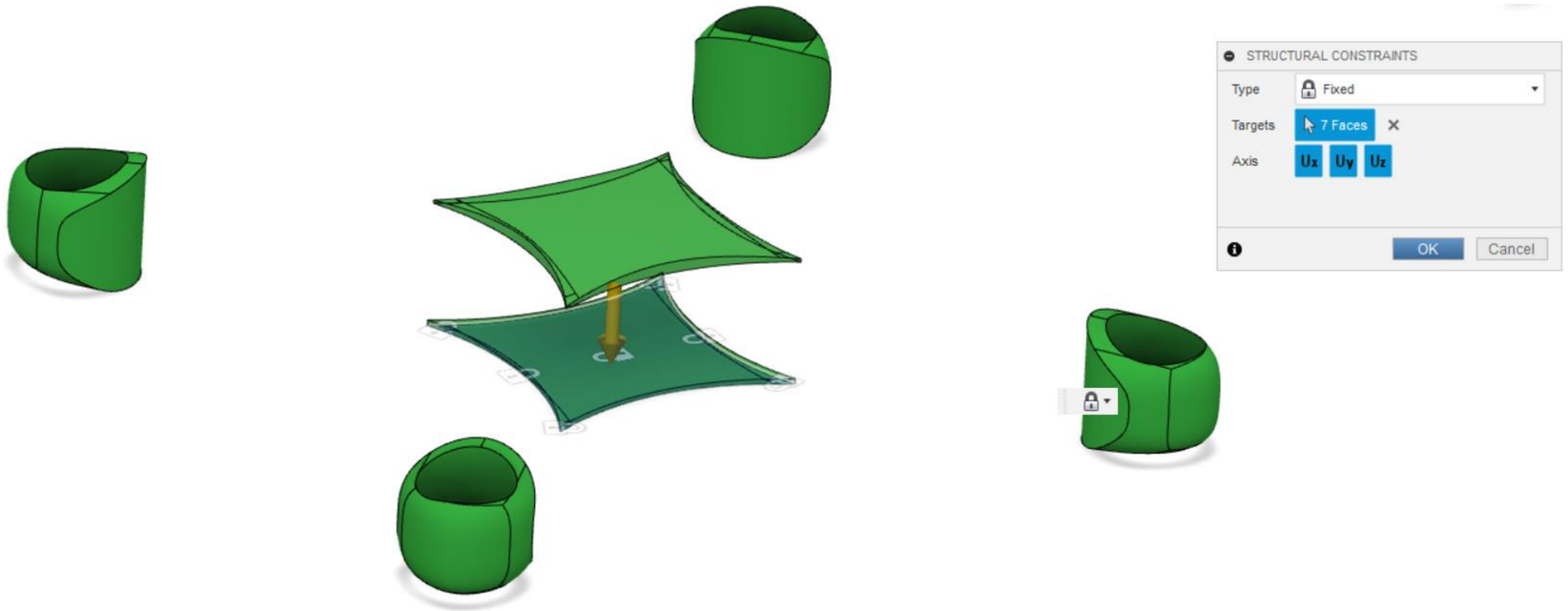


In Generative Design Study, Starting Shape is an optional tool. You can assign it as initial shape.

Structral Constraints

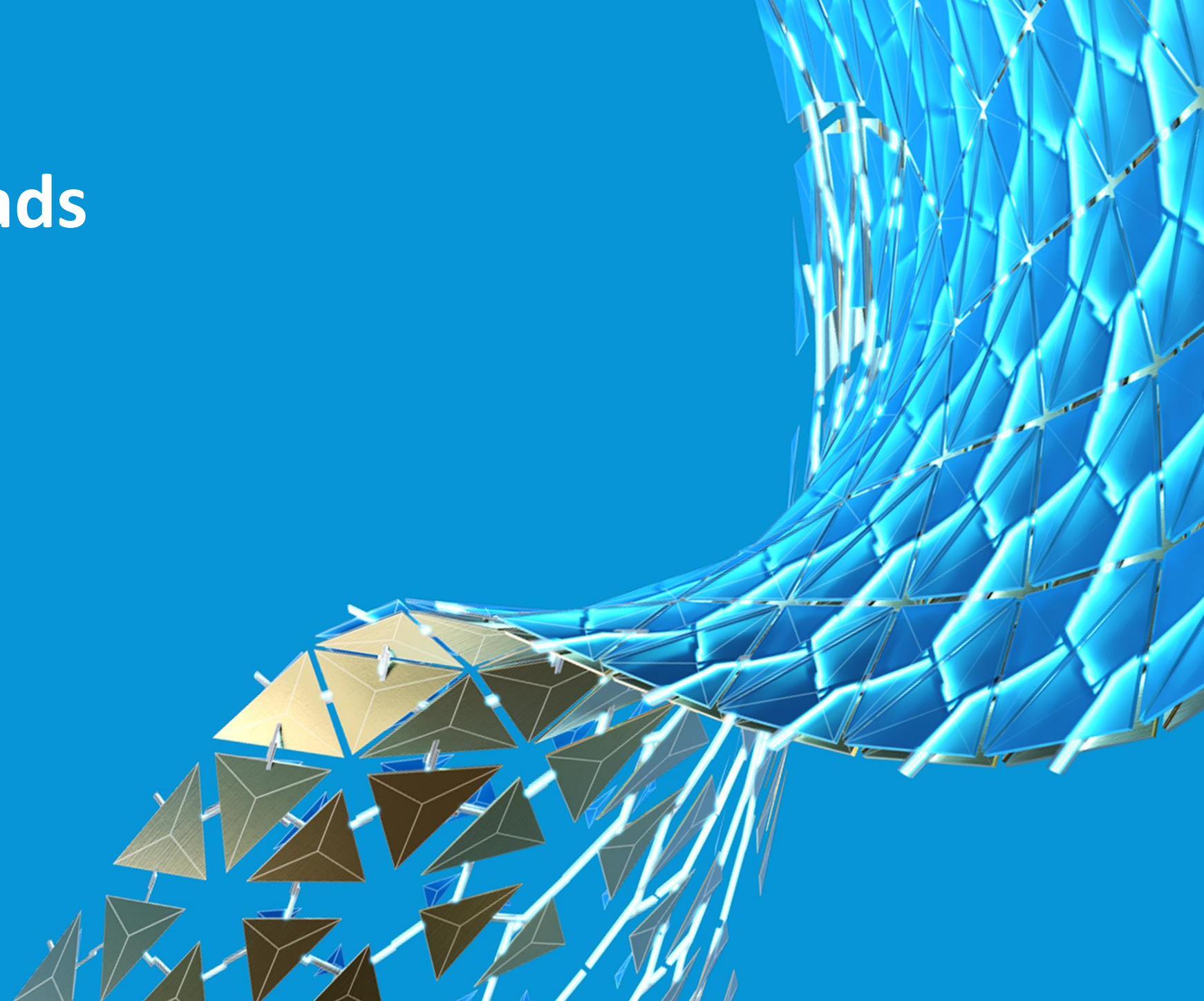


Structral Constraints

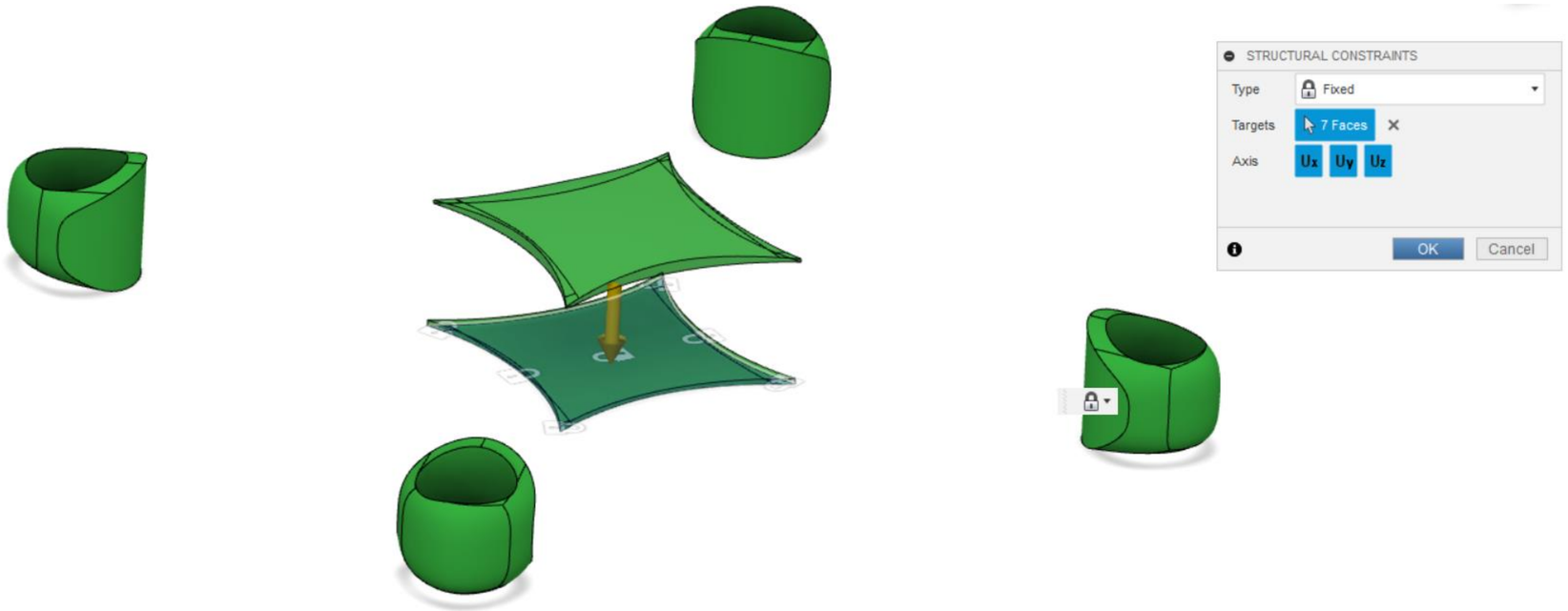


In the Generative Design Study, Structural Constraints restrict or limit the displacement of the model. In this hands-on lab, you can consider that Generative Design Study should create a Concept Drone Chassis in estimated conditions.

Structural Loads



Structral Constraints



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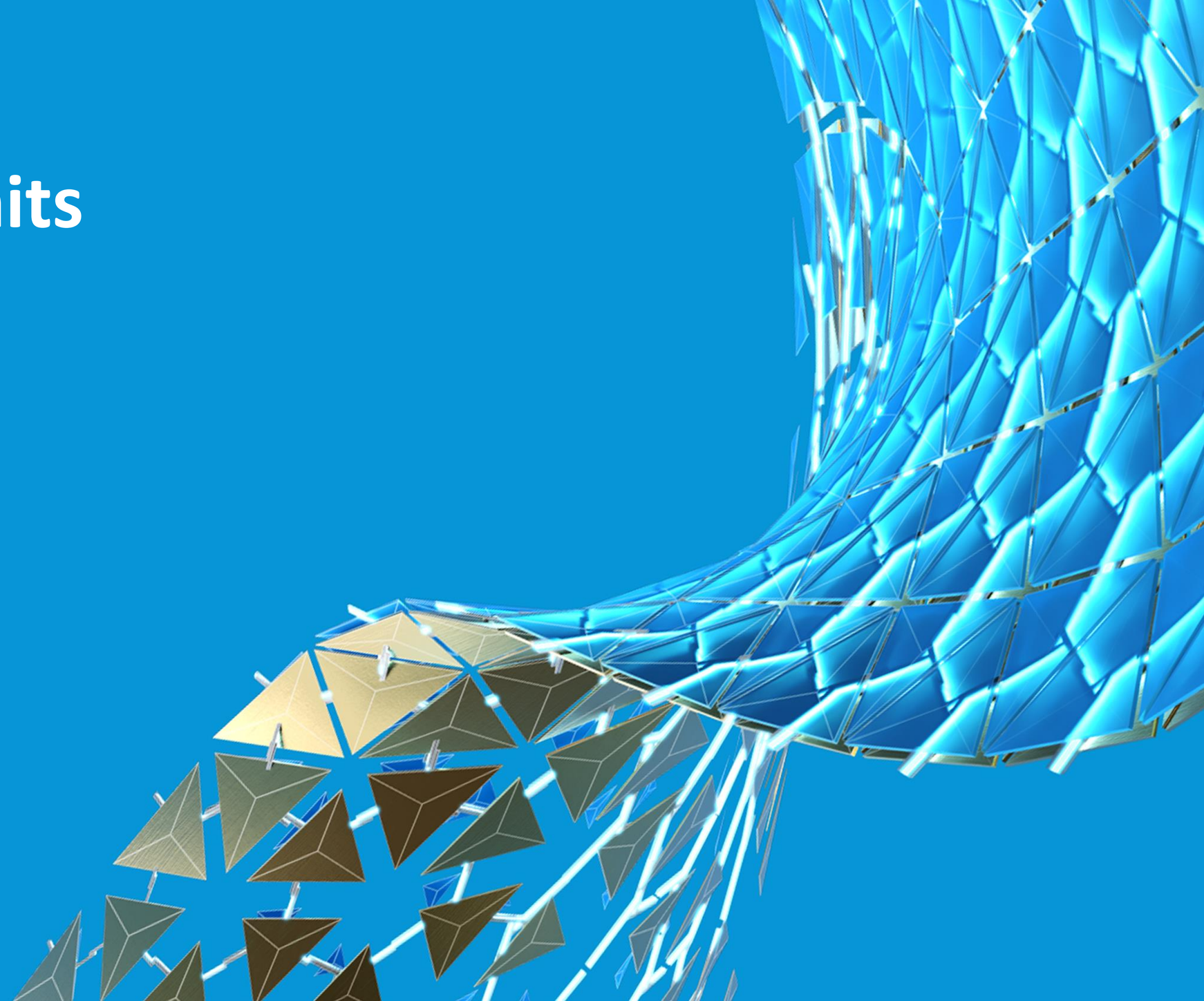
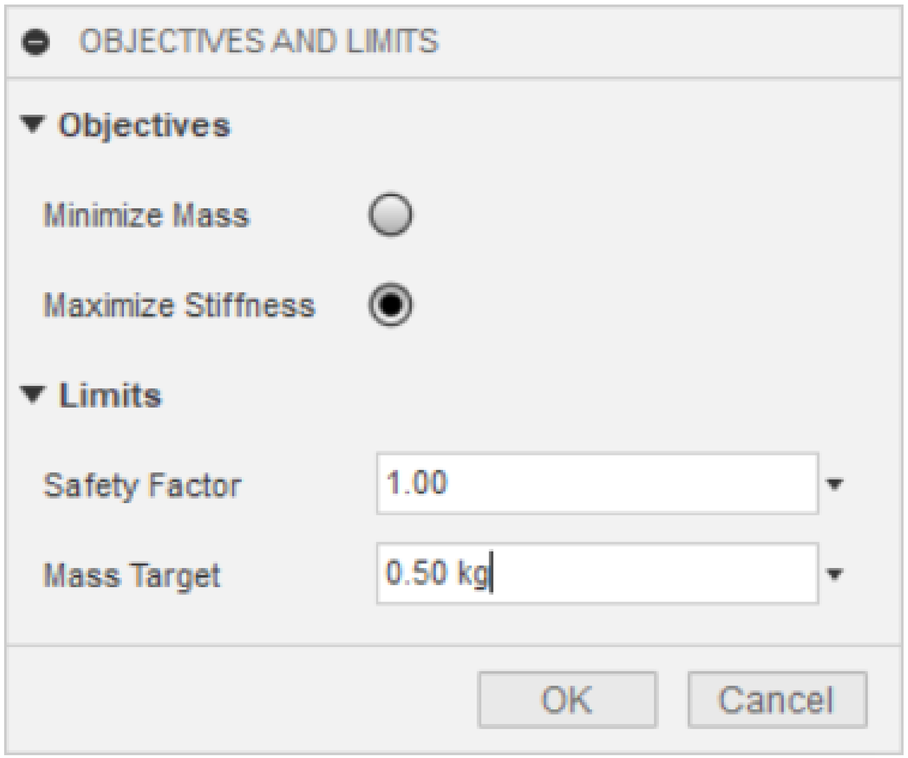
Objective Limits

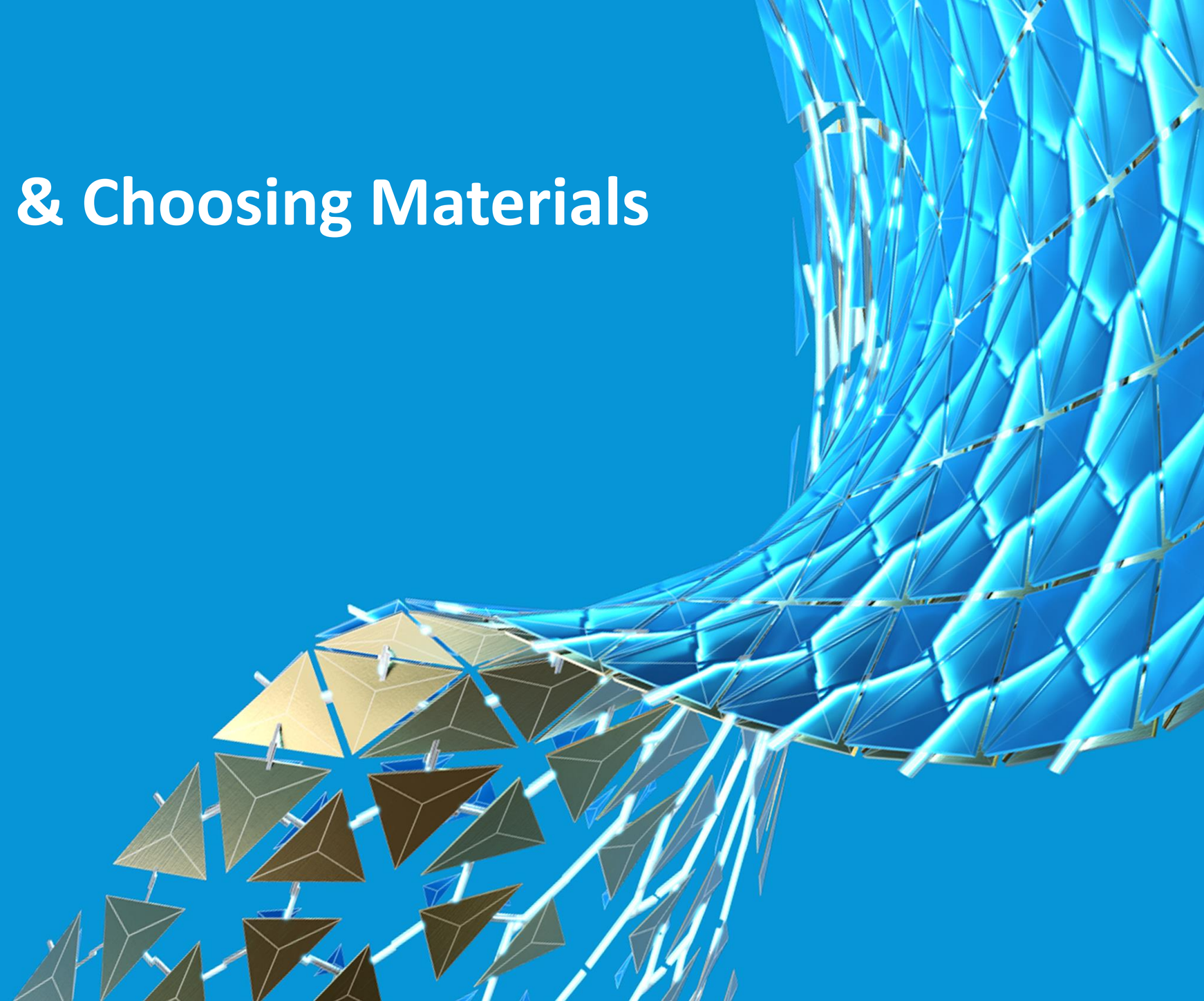


Structral Constraints



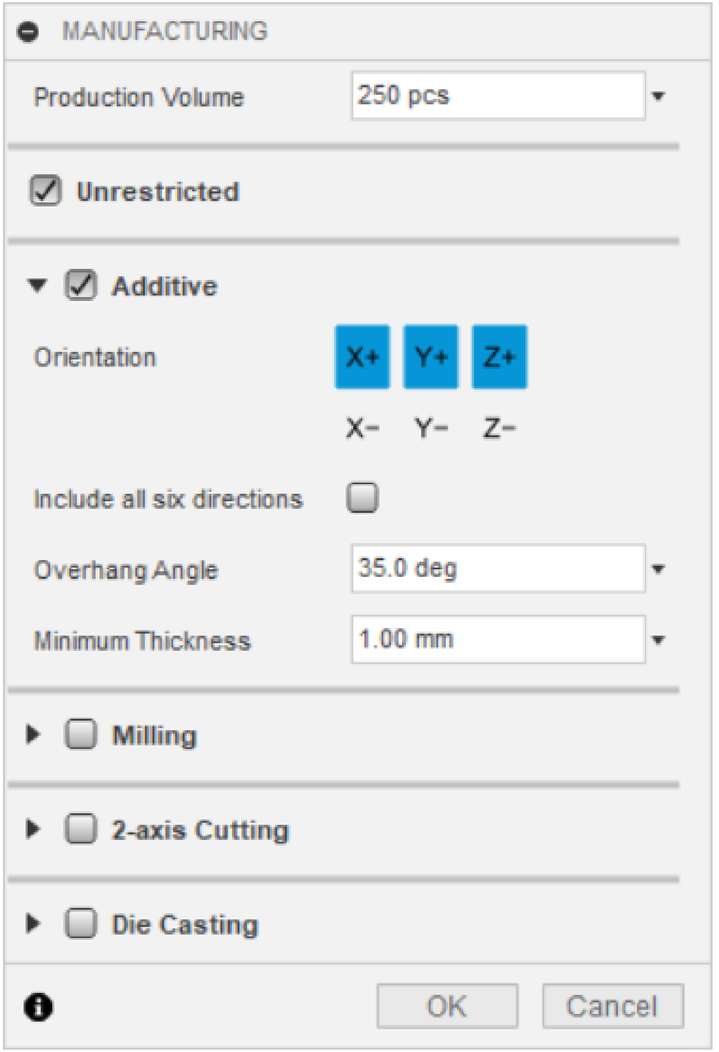
In this hands-on lab, we would like to reach the lightest solution for Concept Drone Chassis. For this aim, you can easily choose the Minimize Mass as Objectives. In general, it's proper to enter a value of 2 for Safety Factor on Limits.

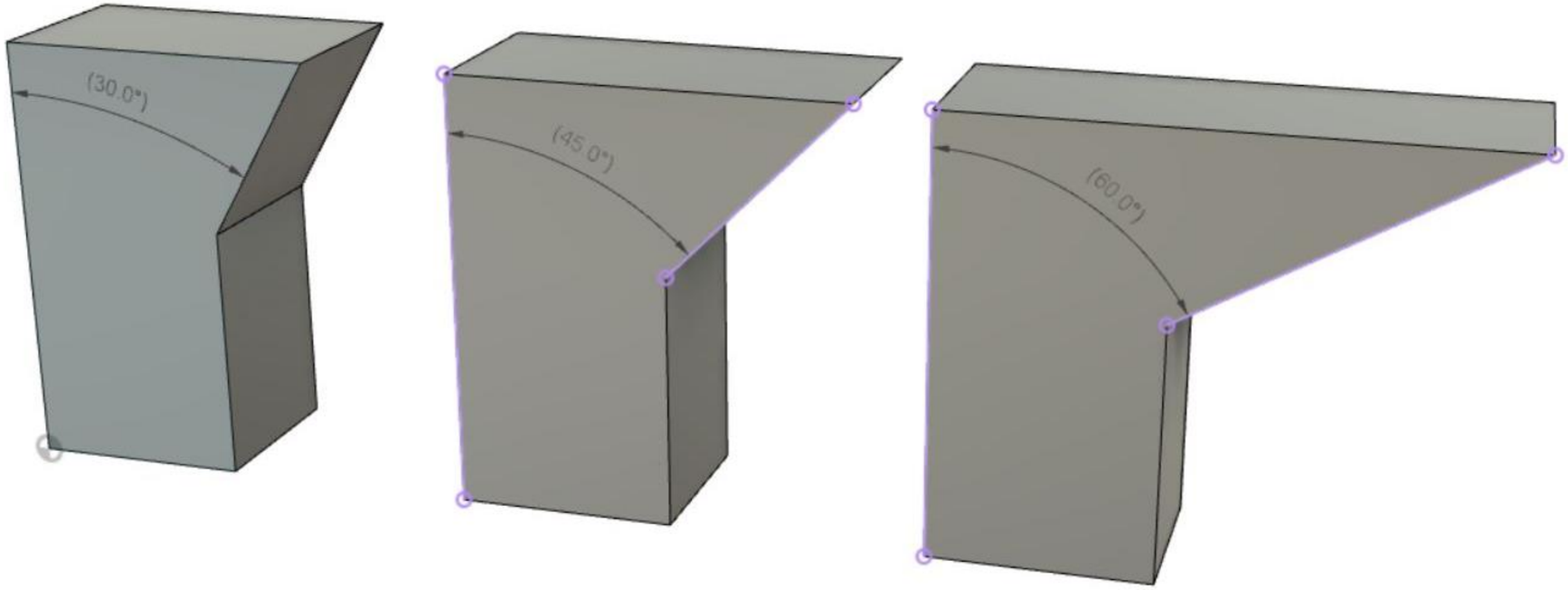
Manufacturing & Choosing Materials



Manufacturing & Choosing Materials

You can Select the Manufacturing Tool from Design Criteria. It specifies the manufacturing constraints for the design process. There are 5 different options available as Additive, Milling, 2-Axis Cutting, Die Casting and Unrestricted. In this hands-on lab, it will be chosen Additive manufacturing and unrestricted method, but, of course, you can try other methods for concept drone chassis.

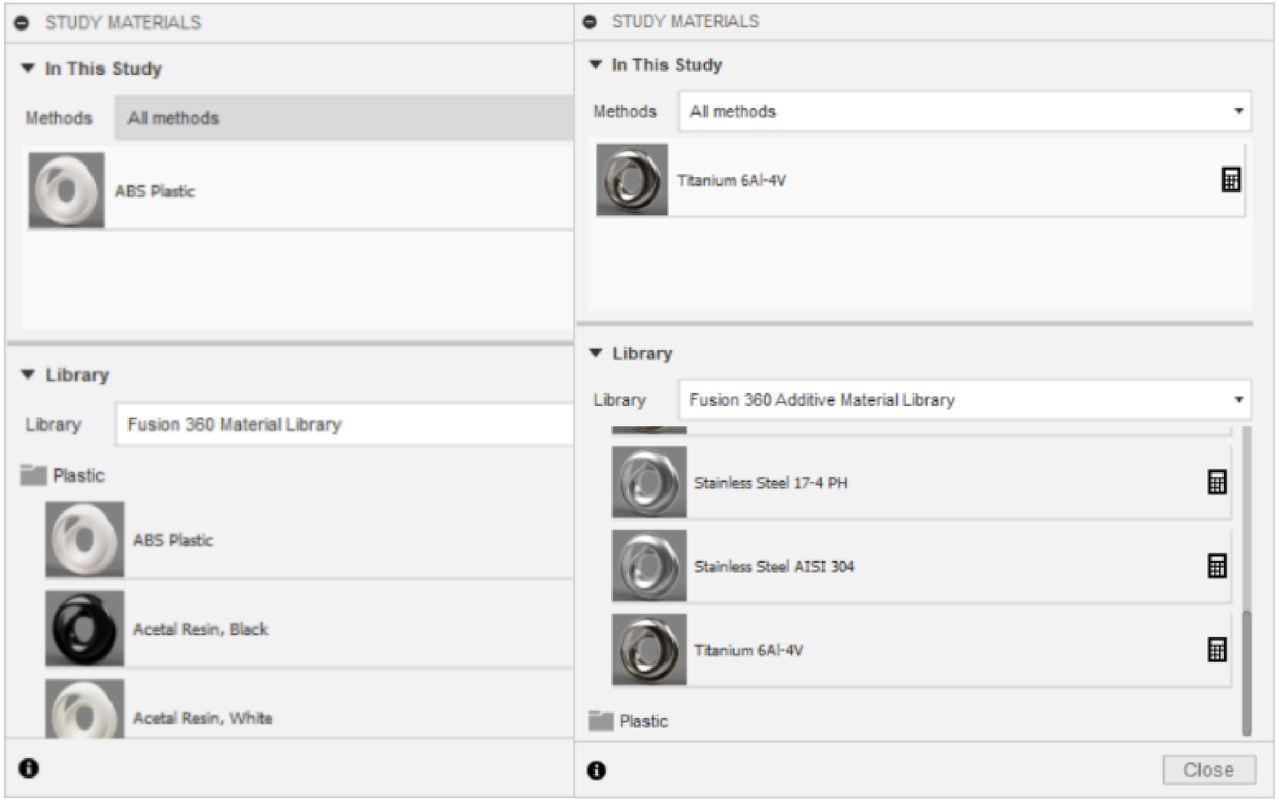




Overhang Angle

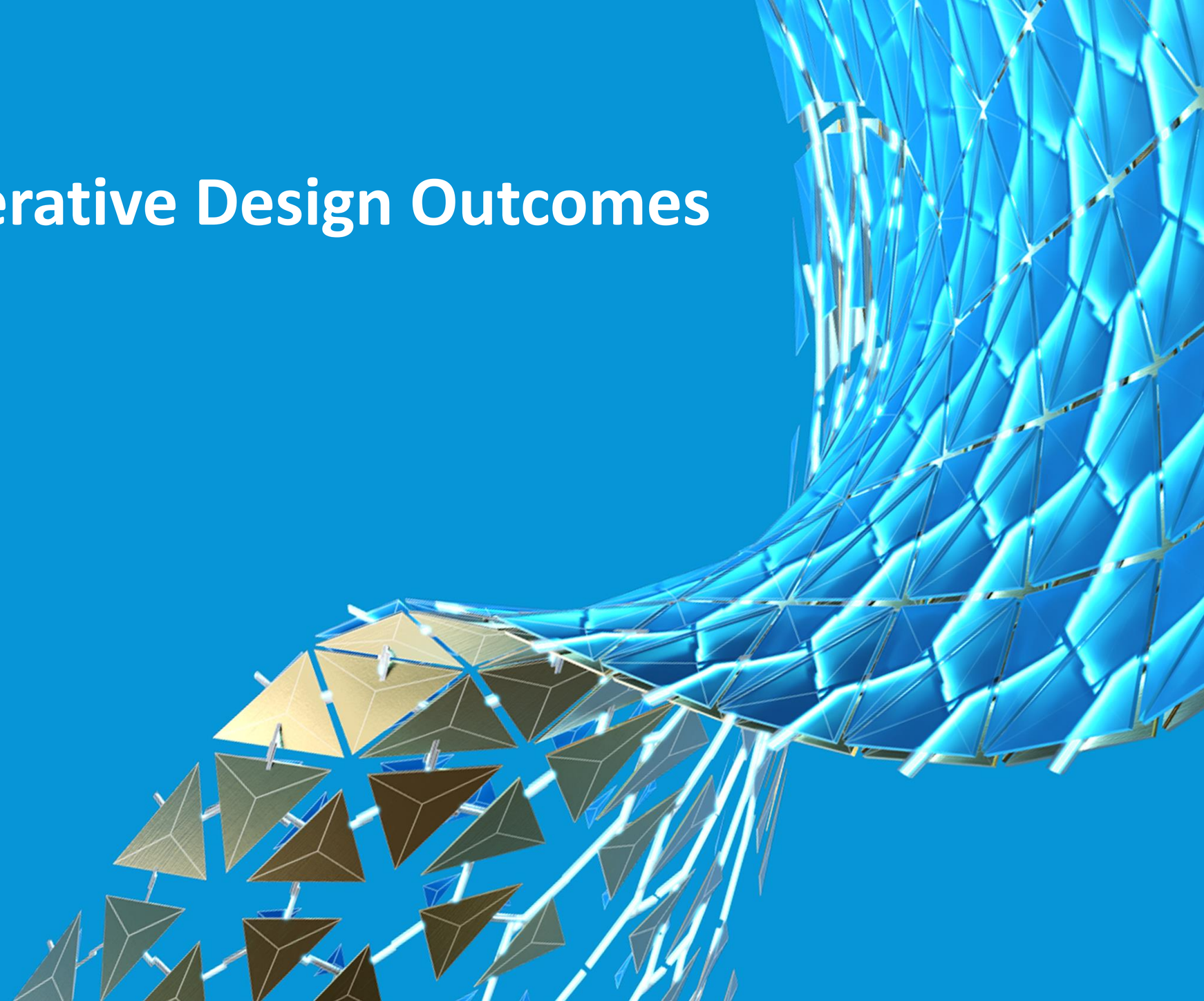
You can see the different overhang angles for additive manufacturing. If it’s over the 45 Degrees or more, it will be harder to manufacture without adding support, so you can think about your 3D printer properties and chose the best value for you.

Manufacturing & Choosing Materials

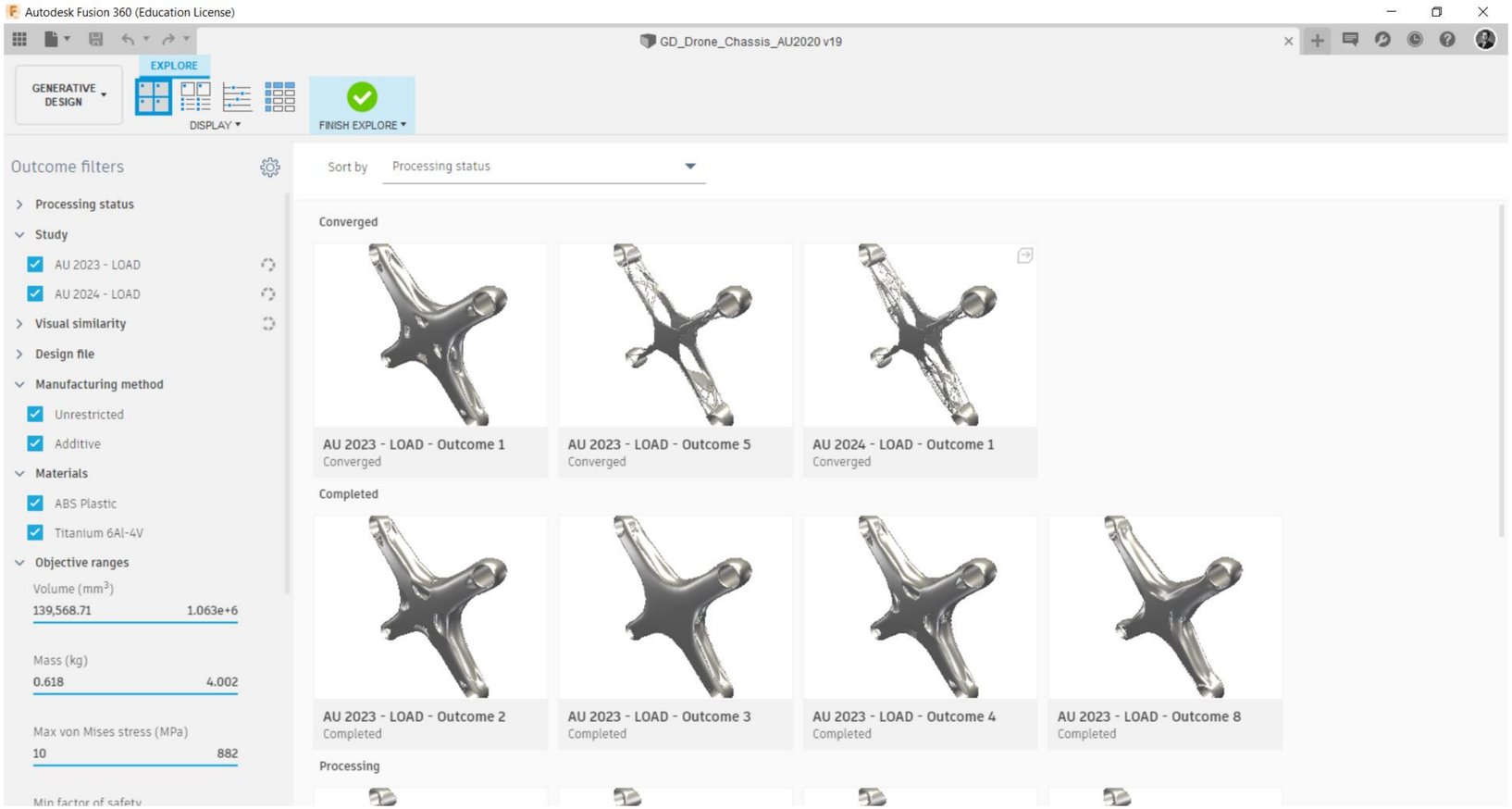


In this hands-on Lab, it will select two different materials as Plastic and Metal. But feel free to choose different materials for your cases.

Exploring Generative Design Outcomes

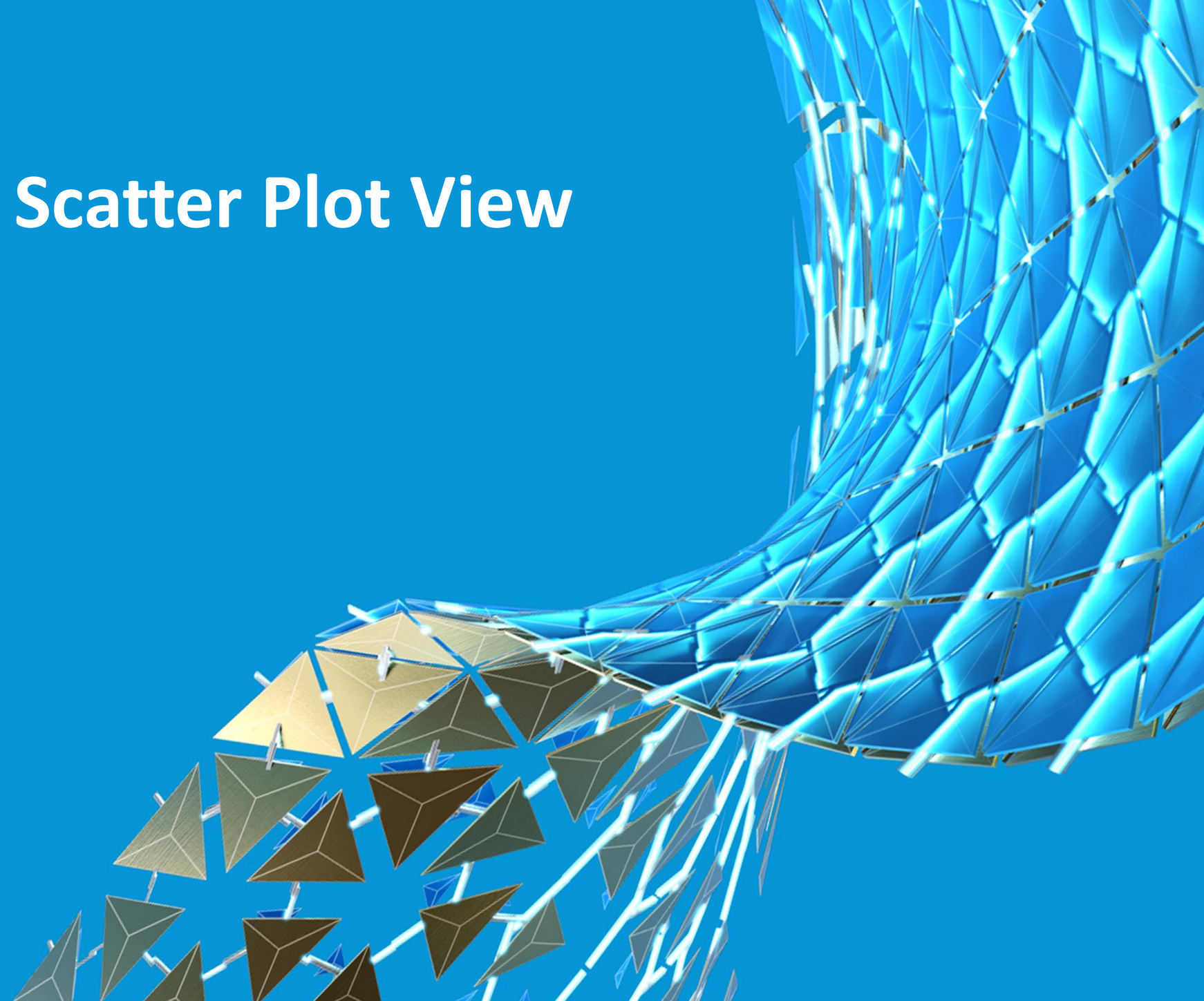


Exploring Generative Design Outcomes

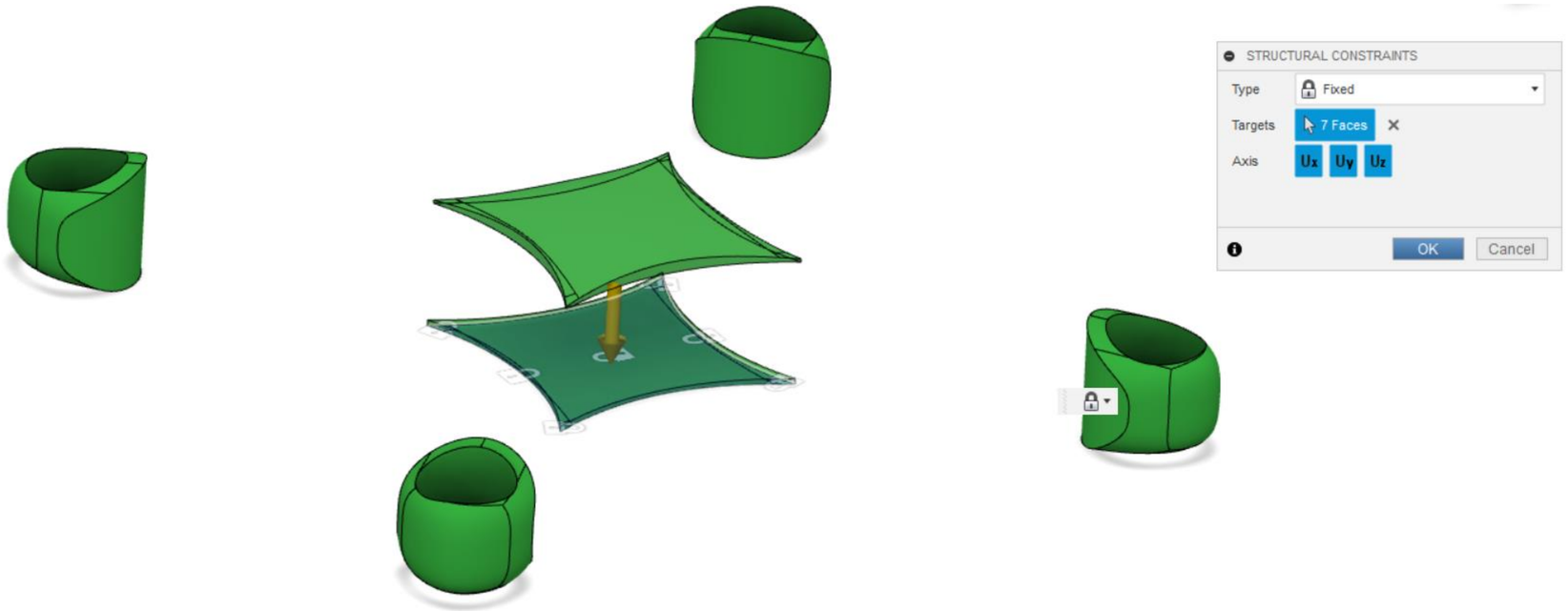


Fusion 360 offers us a detailed Explore page which contains many outcomes. You can easily change the objective ranges from Outcome Filters and you will see only outcome thumbnails that you need for your necessary.

Details of the Scatter Plot View



Structral Constraints



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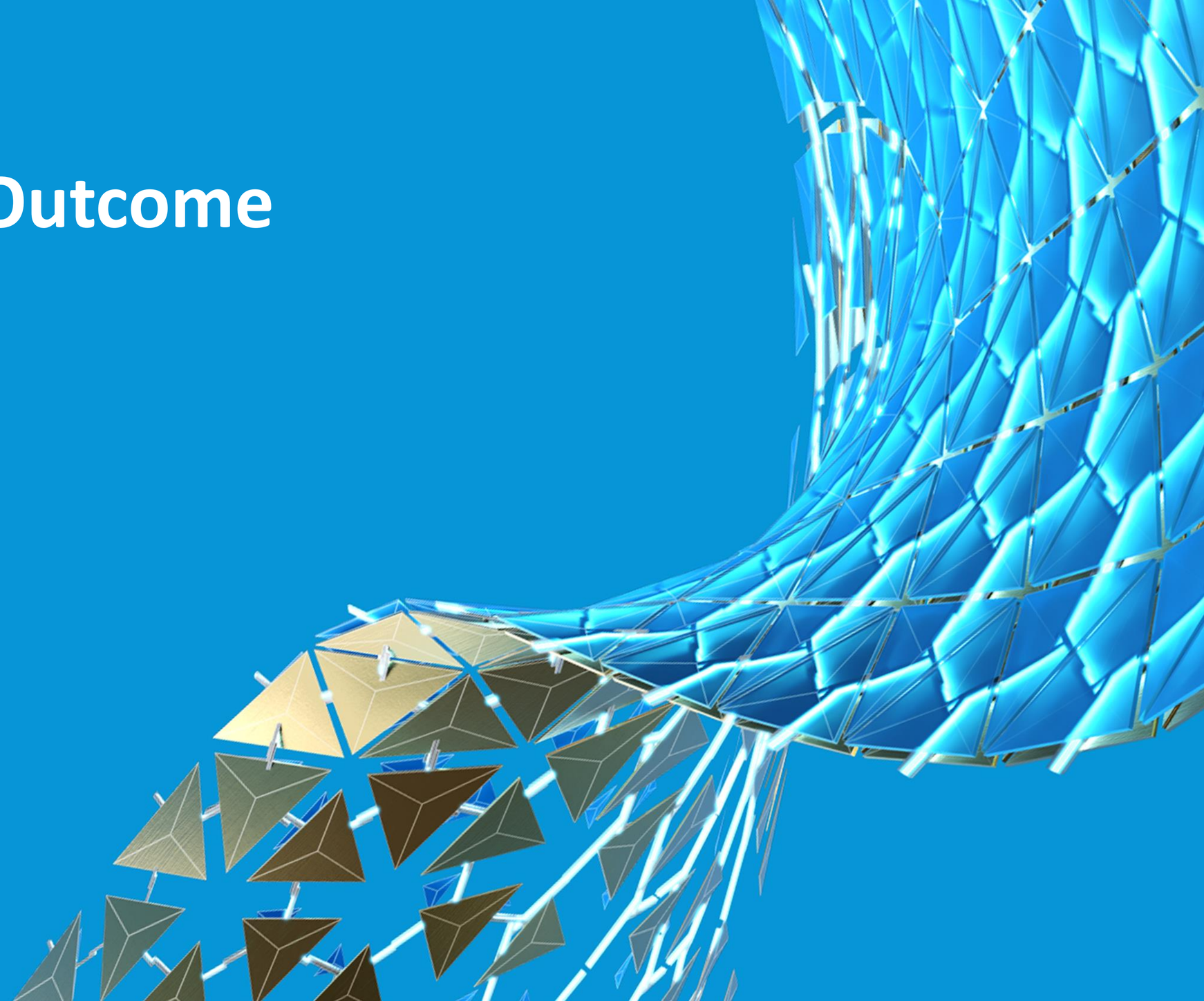
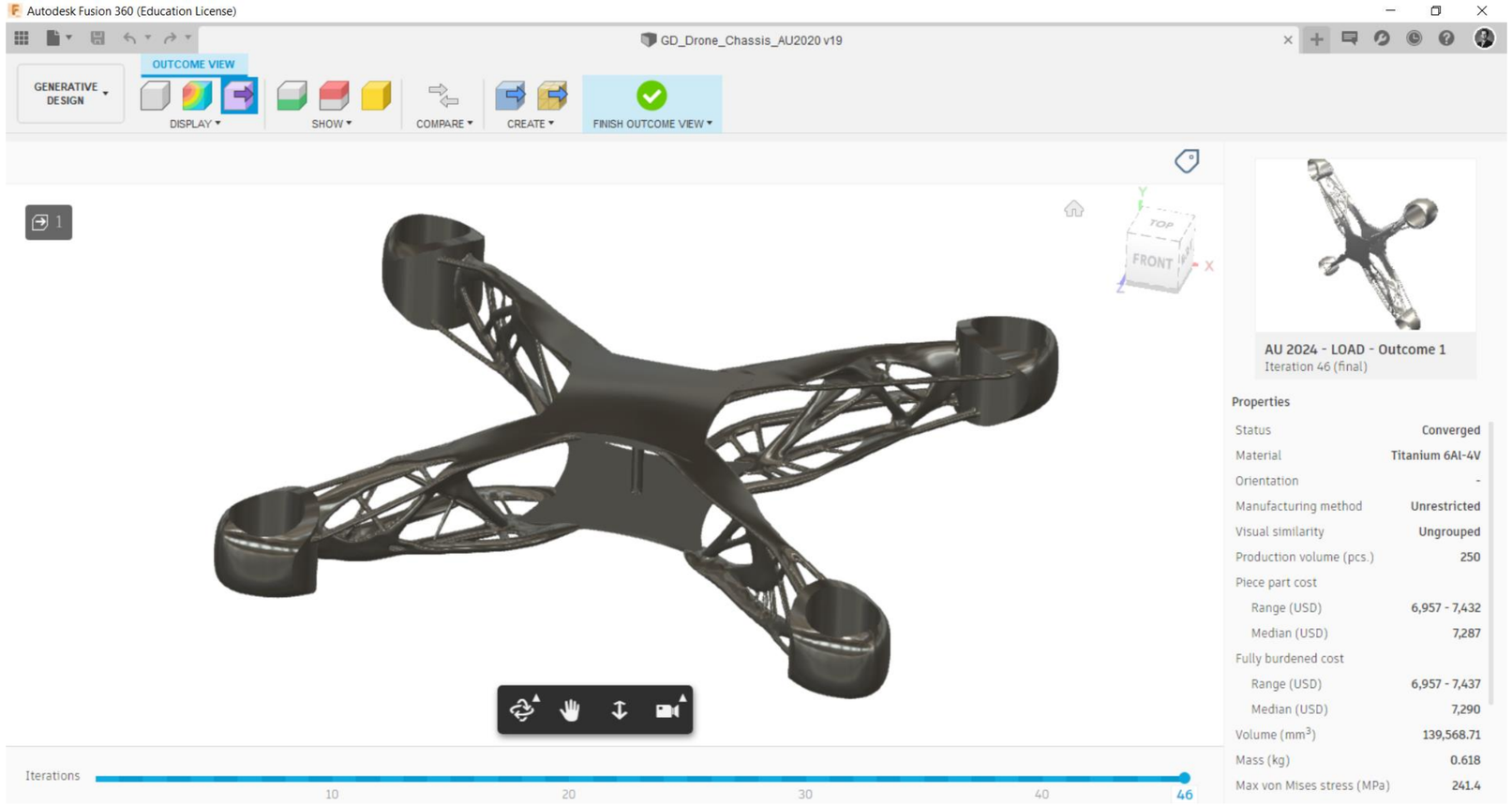
Design from Outcome

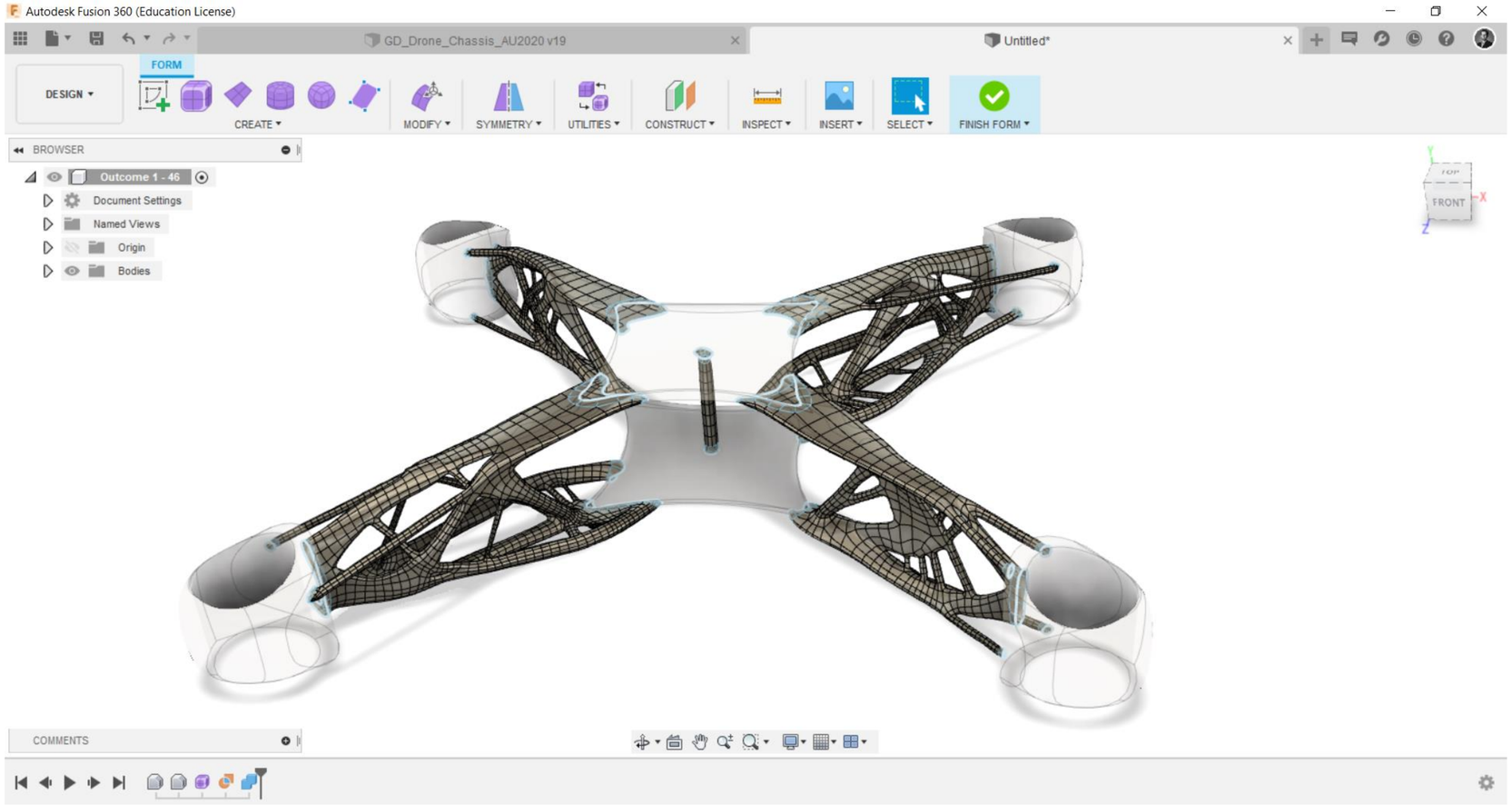


Design from Outcome



You can easily create 3D Design from your selected outcome iteration using CREATE > Design from Outcome

Design from Outcome



You can easily modify your selected outcome design from your Generative Design Study. At the beginning of the hand-out, we started creating a box, and now, that's the result of the Hands-on Lab.