SOLIDWORKS

DESIGN PROJECTS

STUDENT GUIDE

3DEXPERIENCE



FLYING GLIDER

DASSAULT SYSTEMES

DESCRIPTION

Welcome to the Design Projects Student Guide for the Flying Glider project! Your project goal is to create a flying glider inspired by your imagination. Take inspiration from nature, feats of flying, and science fiction to come up with a design that can be turned into a glider that can fly!

This guide contains information regarding design intent, design for manufacturing (DFM), and design tips for building your very own flying glider.

You will use CAD to design each part of the glider before laser cutting all the pieces and assembling them together.

For a video demonstrating the design approach, detailed dimensions, and step-by-step instructions, see the links in the **Additional Resources** section below.

PROJECT TASKS

Your tasks are to:

1. Create all of the components of the glider.
    a) Wing
    b) Stabilizer
    c) Fuselage
    d) Ballasts
2. Create an assembly of the plane in CAD for design analysis
3. Manufacture the components from your design.
4. Assemble and test fly the glider.

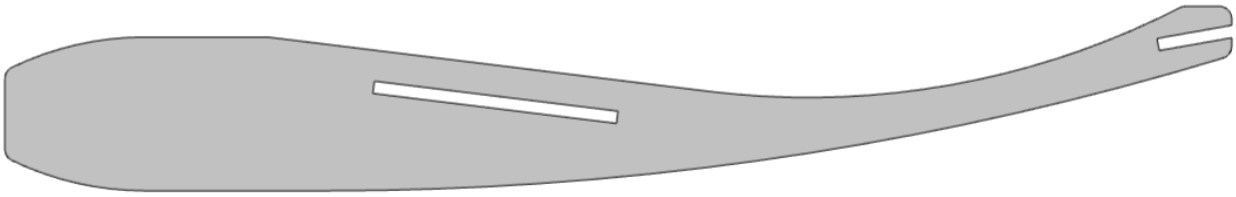
ADDITIONAL RESOURCES

LINK TO DOCUMENTS

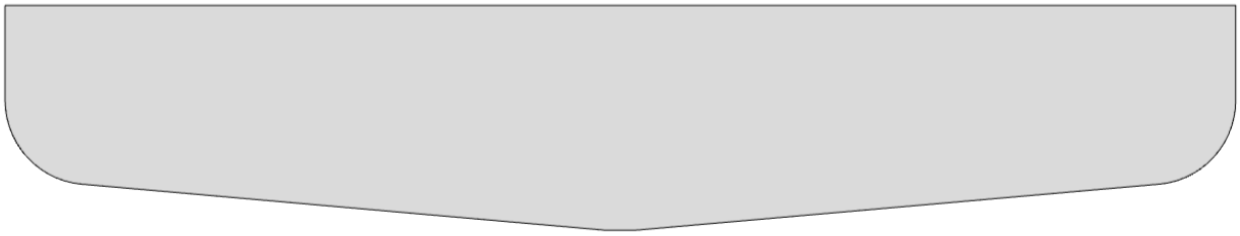
LINK TO YOUTUBE

LINK TO STEP-BY-STEP

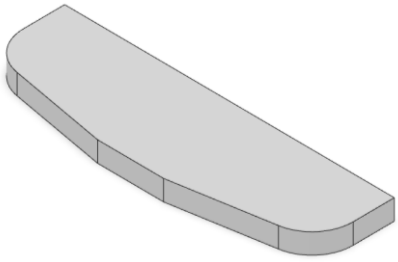
FLYING GLIDER COMPONENTS



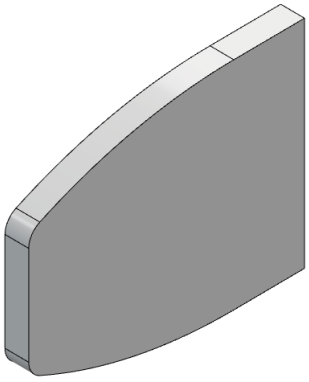
Fuselage – 1 Piece



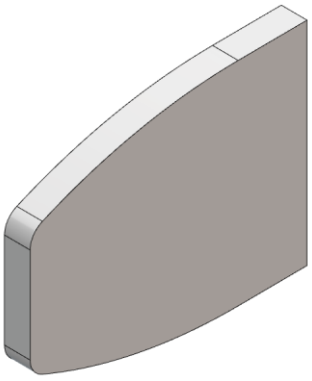
Wing – 1 Piece



Stabilizer – 1 Piece



Inner Ballast – 2 Pieces



Outer Ballast – 2 Pieces

FUSELAGE

DESIGN INTENT:

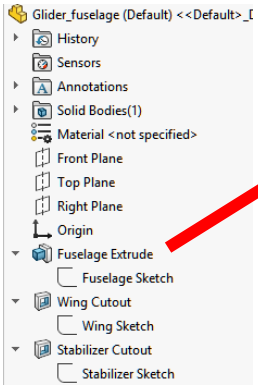
- Securely holds all parts of the plane together—doesn't break when flying or landing.

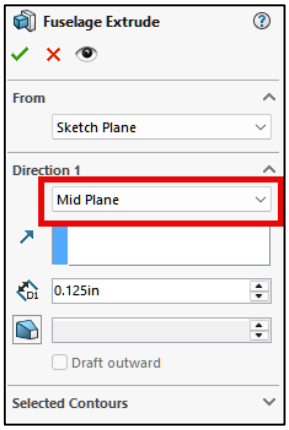
DESIGN FOR MANUFACTURING:

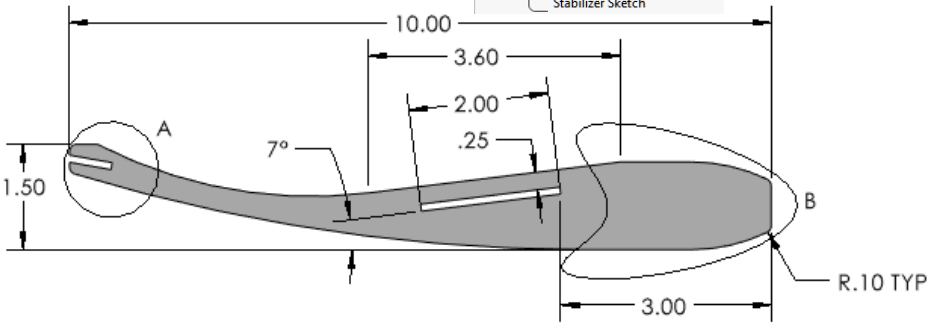
- Cutouts should be the exact dimension of the wing and stabilizer with no tolerance.

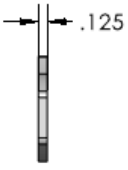
DESIGN TIPS:

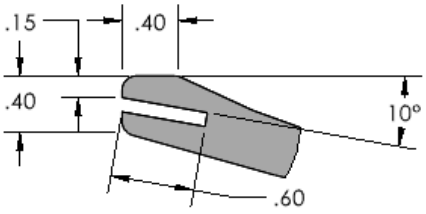
- Use a midplane extrude with a distance of your material thickness for the fuselage extrude. This will aid in creating the assembly.
- Use the same material thickness dimension for the height of the wing cutout and stabilizer cutout.



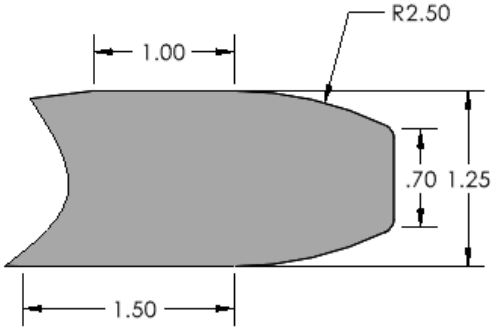








DETAIL A



DETAIL B

WING

DESIGN INTENT:

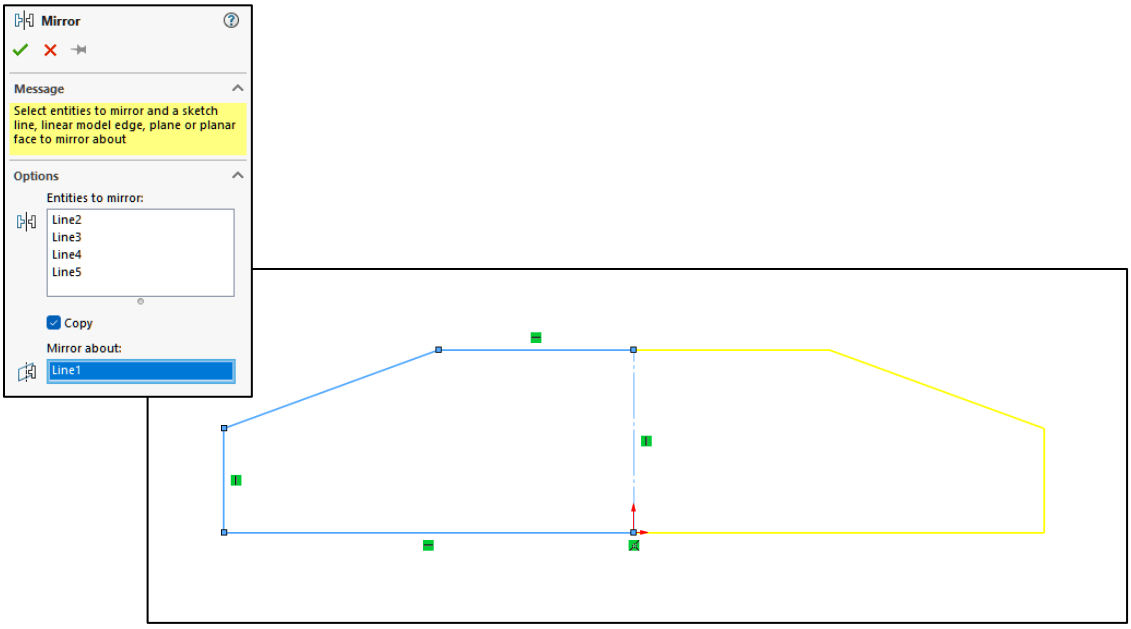
- A large, thin wing that generates **lift** and allows for smooth flight.
- The wing is angled upward where it attaches to the fuselage.

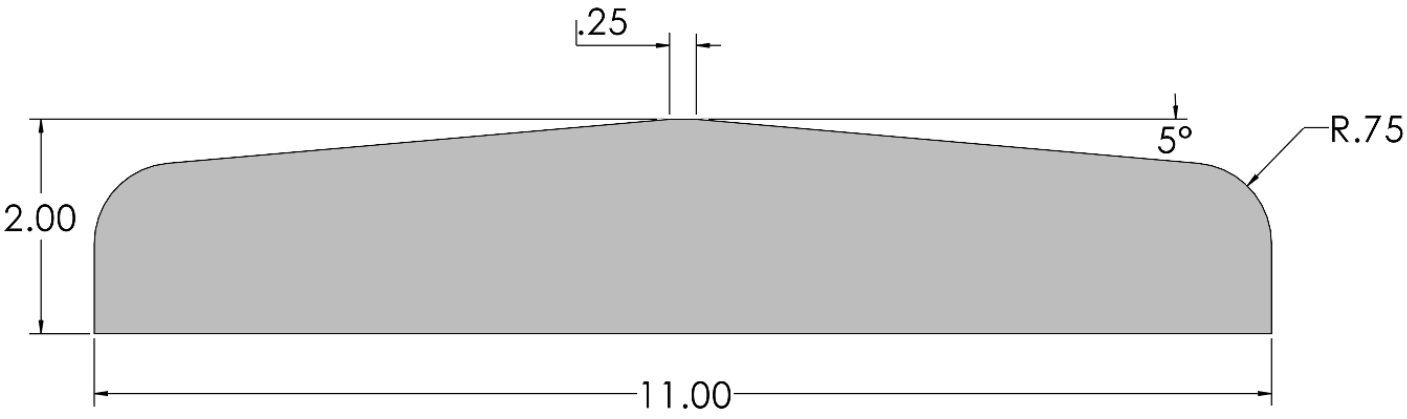
DESIGN FOR MANUFACTURING:

- Make the wing widest where it slots into the fuselage. This will make it easier to assemble the pieces of the plane once laser cut.

DESIGN TIPS:

- This part is horizontally symmetrical. Create half of the geometry, then mirror it using the Sketch Mirror tool found in the Sketch toolbar.





STABILIZER

DESIGN INTENT:

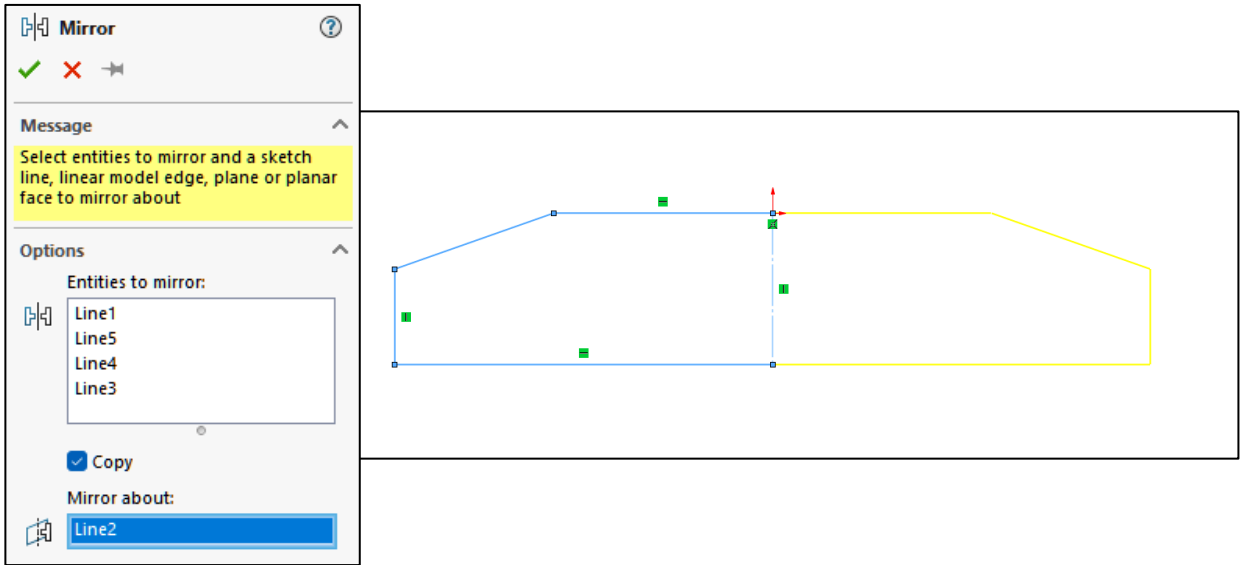
- This small horizontal stabilizer is meant to keep the glider stable in flight.
- The stabilizer is tilted slightly downwards where it attaches to the fuselage.

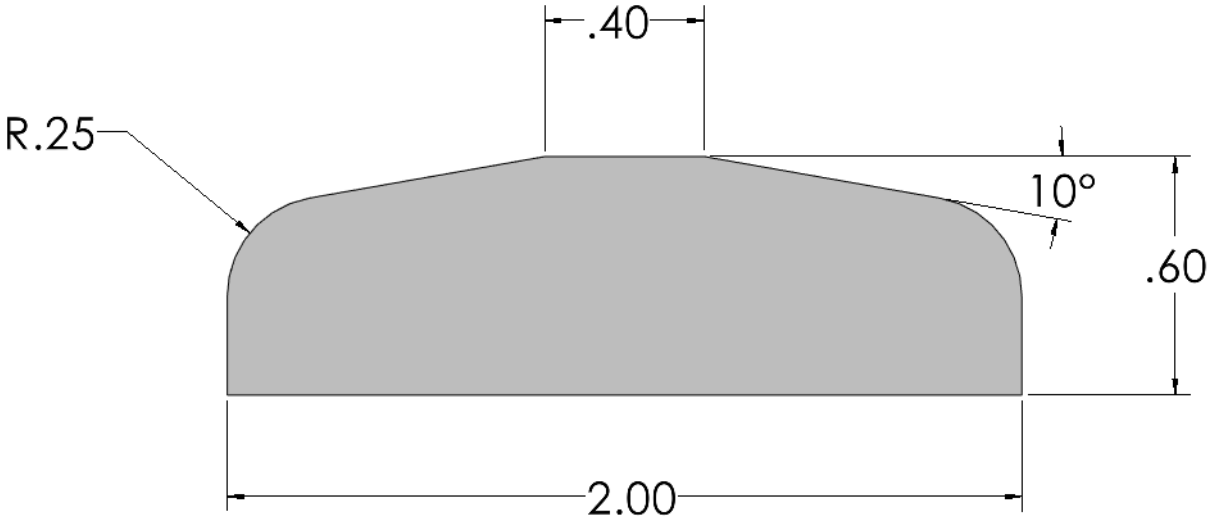
DESIGN FOR MANUFACTURING:

- Like the wing, make the stabilizer widest where it slots into the fuselage.

DESIGN TIPS:

- The stabilizer is also horizontally symmetrical. Create half of the geometry, then mirror it using the Sketch Mirror tool found in the Sketch toolbar.





BALLASTS

DESIGN INTENT:

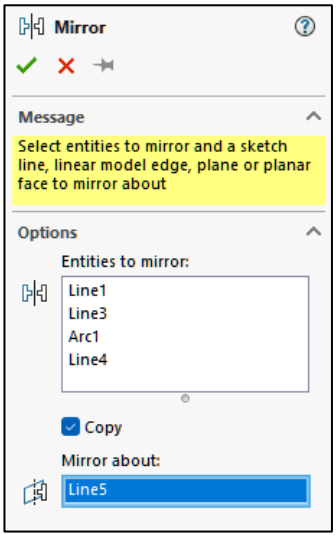
- These ballasts bring the center of mass (CoM) of the glider to the correct position underneath the large wing

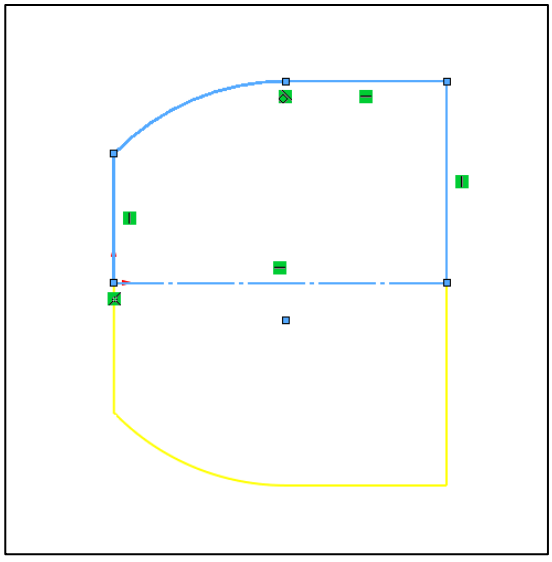
DESIGN FOR MANUFACTURING:

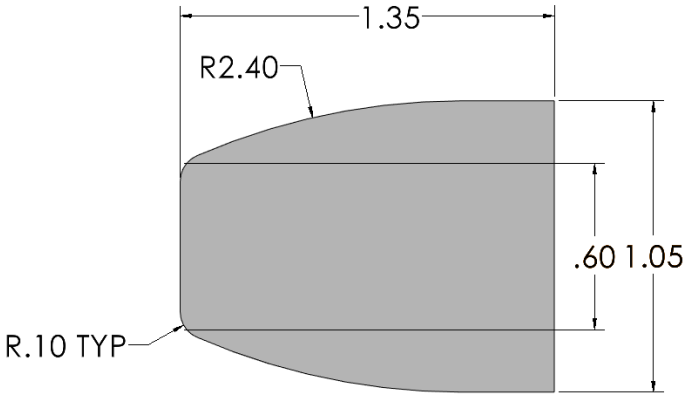
- Create a large enough face for the ballasts to be securely glued to each other and the fuselage.

DESIGN TIPS:

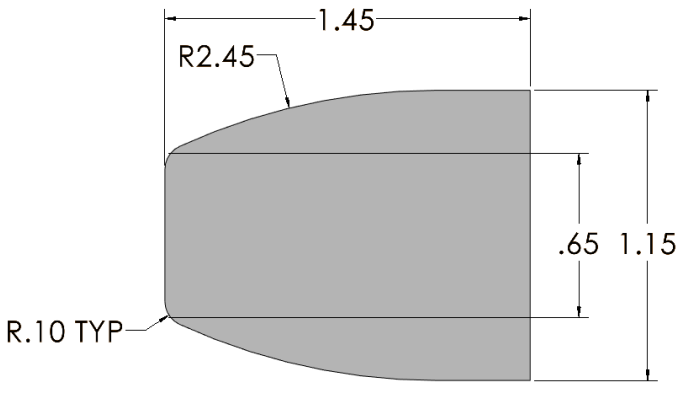
- Each ballast part is vertically symmetrical. Create half of the geometry, then mirror it using the Sketch Mirror tool found in the Sketch toolbar.







Outer Ballast



Inner Ballast

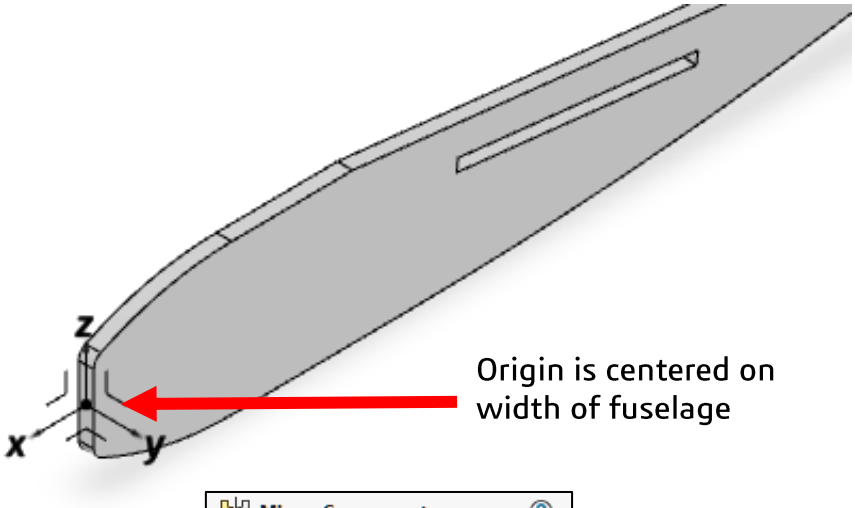
CAD ASSEMBLY

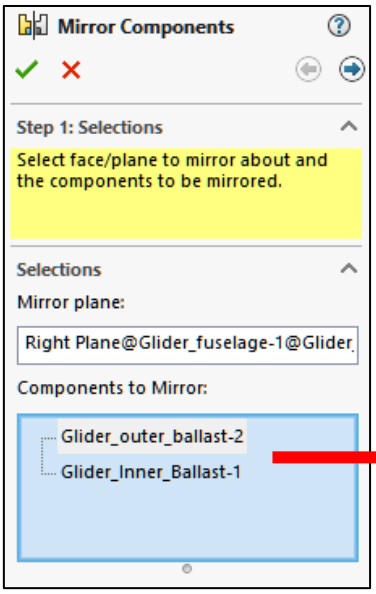
DESIGN INTENT:

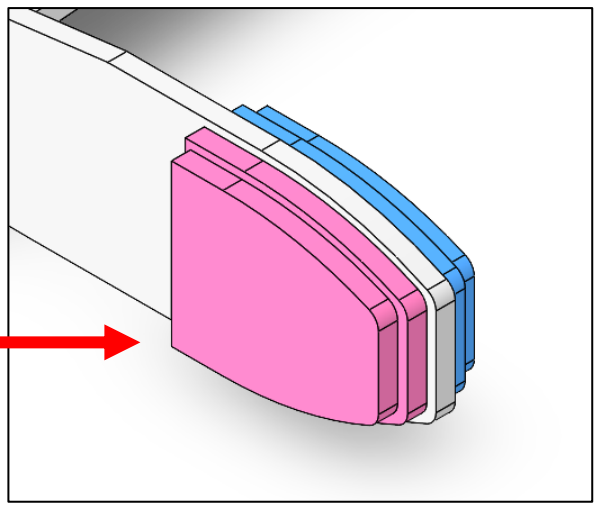
- Insert all components into an assembly to visualize and analyze your design.

DESIGN TIPS:

- Insert the fuselage **first**, fixed at the origin. As it was built with a midplane extrude, it will have its nose centered width-wise in the assembly.
- Create the mates for the ballasts on one side of the glider, then use the Mirror tool found in the Assembly toolbar to mirror the components to the other side.



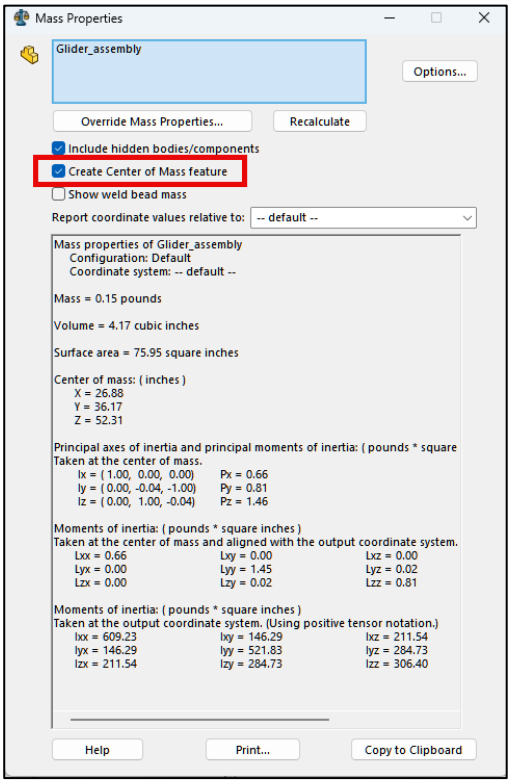


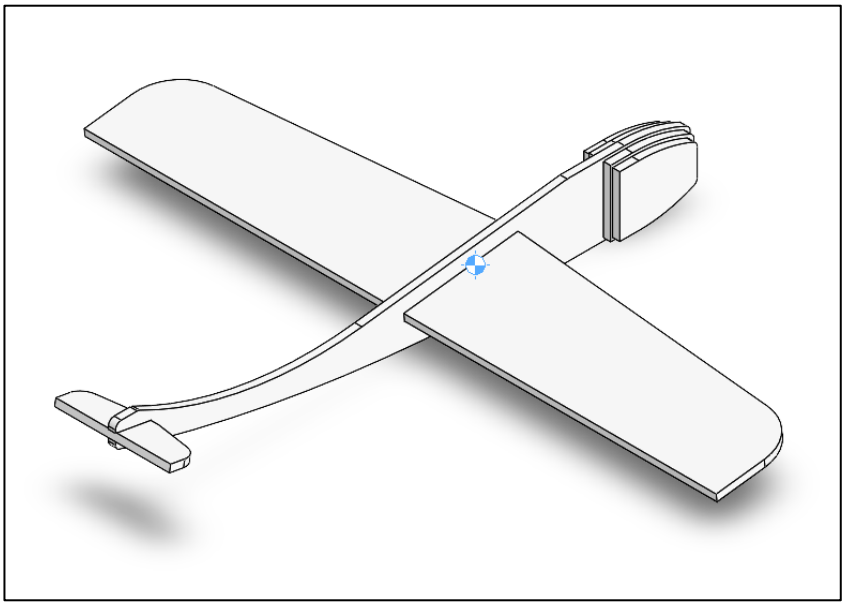


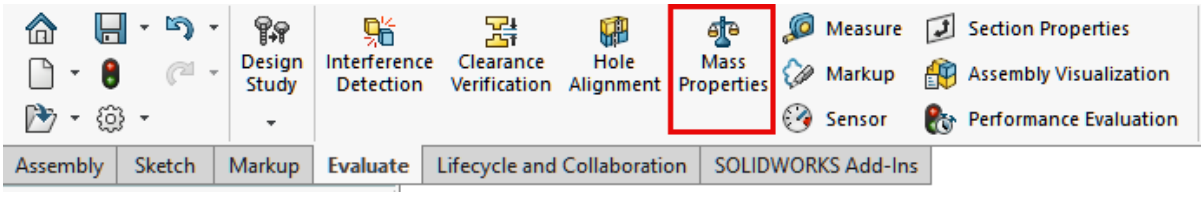
DESIGN ANALYSIS—CENTER OF MASS

DESIGN INTENT:

- Using the completed assembly, calculate the **center of mass** (CoM) of the glider.
- For smooth flight, the Co< should be about 1/3rd of the way from the front of the wing







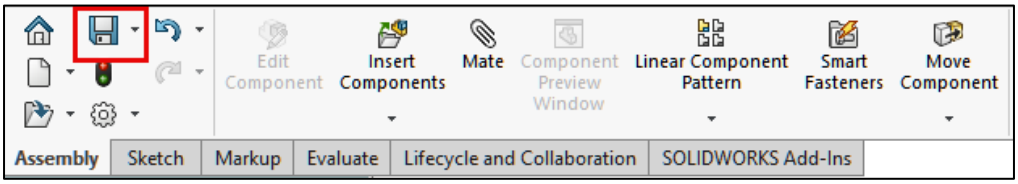
LASER CUTTING—EXPORTING DXF FILES

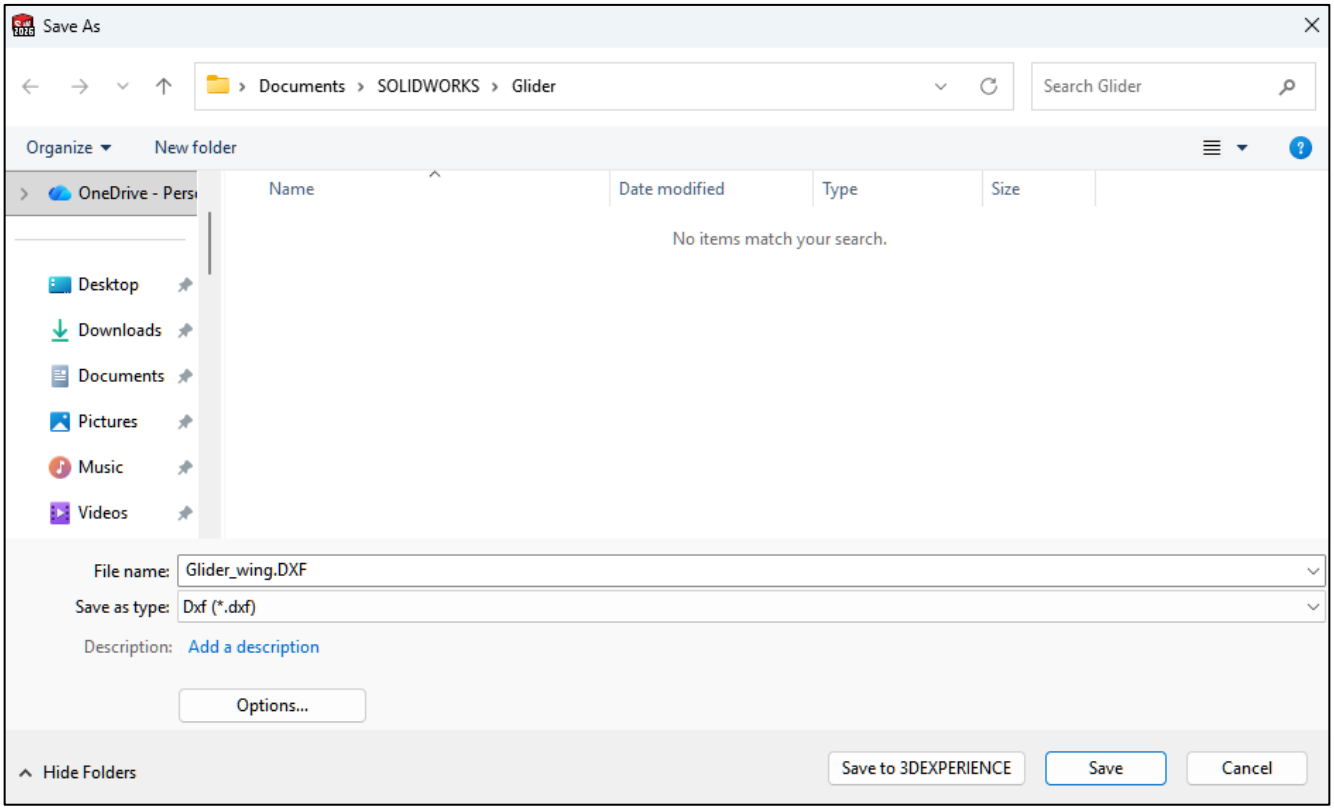
DESIGN INTENT:

- Export each face of each unique part for laser cutting.
- This means that you will export a separate DXF file for each part: the **wing,** the **fuselage**, the **stabilizer**, the **outer ballast**, and the **inner ballast**.

DESIGN TIPS:

- Click Save as New and save the Part as a DXF file.
- Give the file a descriptive name to help organize your files!





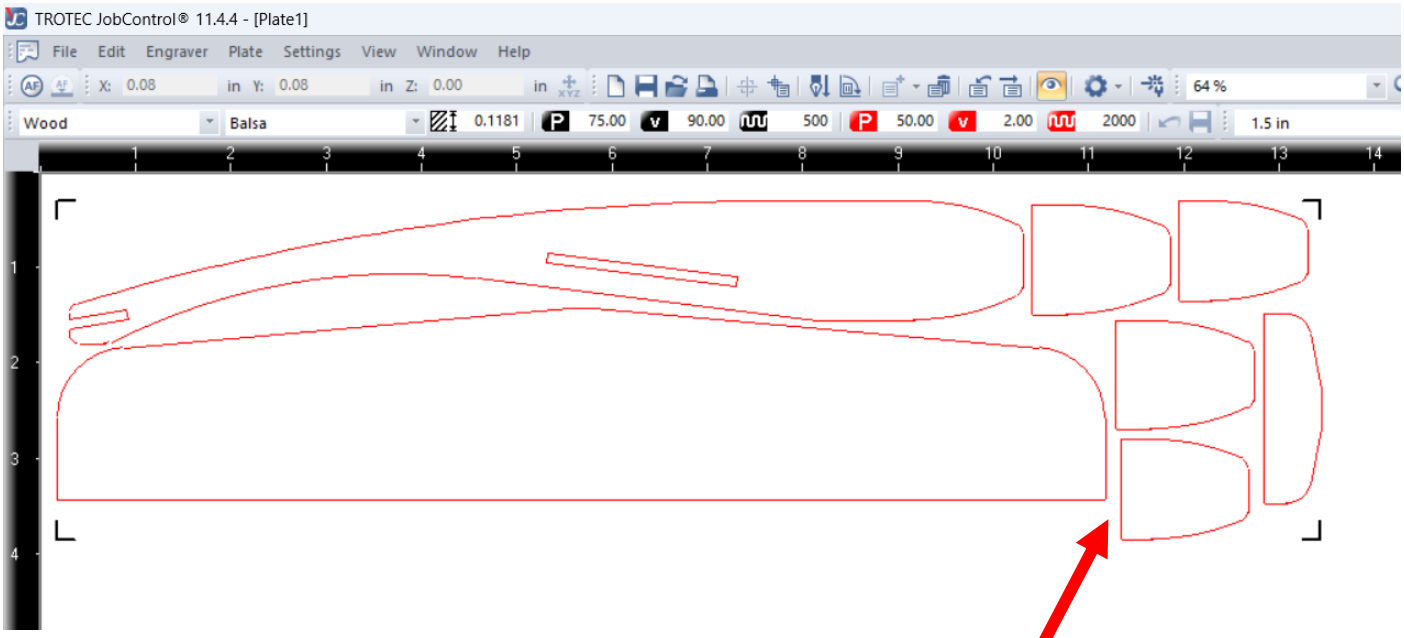
LASER CUTTING—NESTING PIECES

DESIGN INTENT:

- Use nesting to minimize waste during manufacturing

DESIGN TIPS:

- In your laser cutting software, place the outlines of each piece next to each other with around 1/16th of an inch of space. This minimizes waste while making sure that the laser cuts don't overlap.



Parts are nested close together