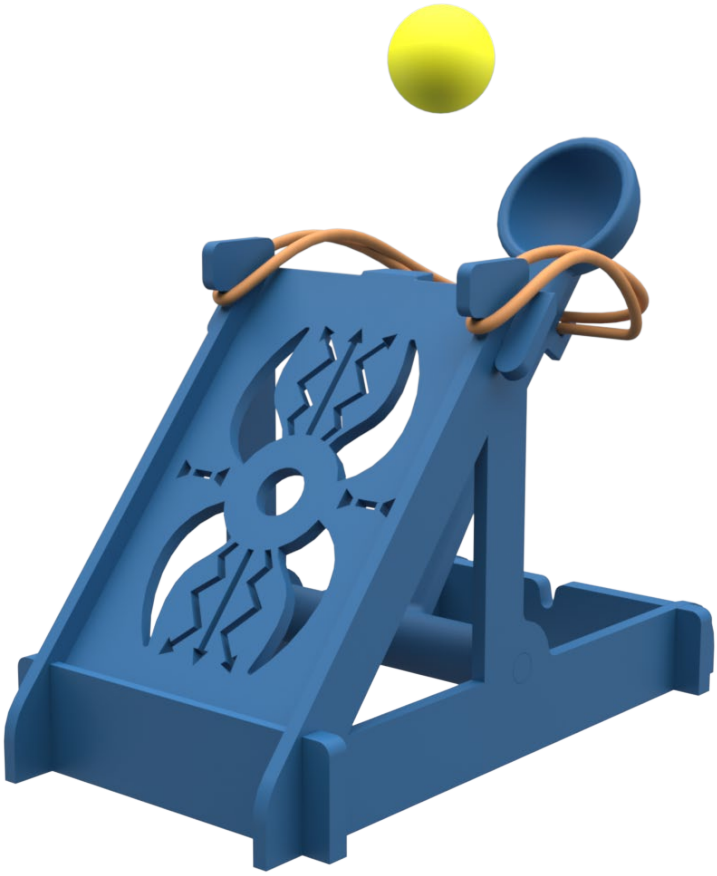
SOLIDWORKS

DESIGN PROJECTS

STUDENT GUIDE

3DEXPERIENCE



CATAPULT

DASSAULT SYSTEMES

DESCRIPTION

Welcome to the Design Projects Student Guide for Catapult! The focus of this project is a Roman onager style catapult design.

This guide contains information regarding Design Intent, DFAM (Design for Additive Manufacturing) and Design Tips to keep in mind for each part.

You will use CAD to design each part, print the parts on a 3D printer and assemble them to complete the bridge.

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

- Create the following bridge components in CAD:
    - Side Plate
    - Front Support
    - Back Support
    - Faceplate
    - Basket Arm
- Create an assembly of the catapult in CAD.
- Print the physical components on a 3D printer.
- Assemble the catapult.

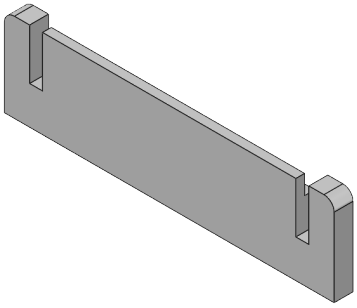
ADDITIONAL RESOURCES

LINK TO DOCUMENTS

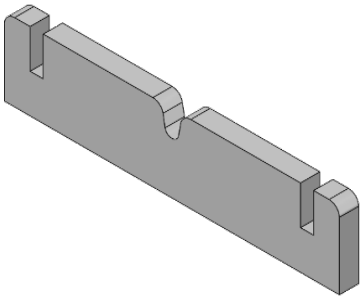
LINK TO YOUTUBE VIDEO

LINK TO STEP-BY-STEP

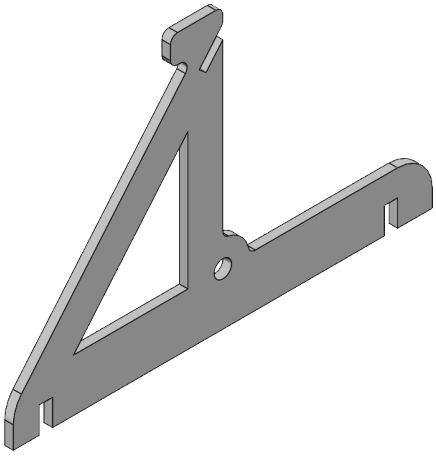
CATAPULT COMPONENTS



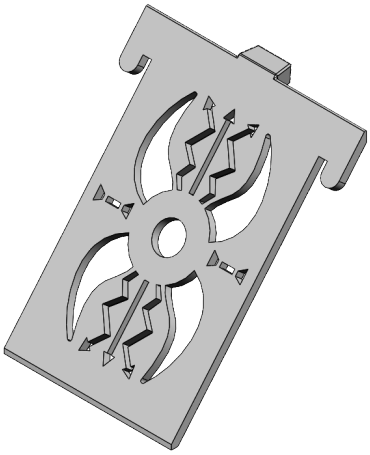
FRONT SUPPORT
QTY = 1



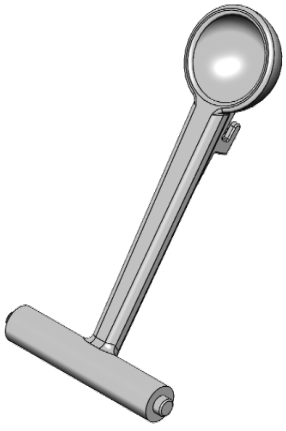
BACK SUPPORT
QTY = 1



SIDE PLATE
QTY = 2



FACE PLATE
QTY = 1



BASKET ARM
QTY = 2

SIDE PLATE

DESIGN INTENT

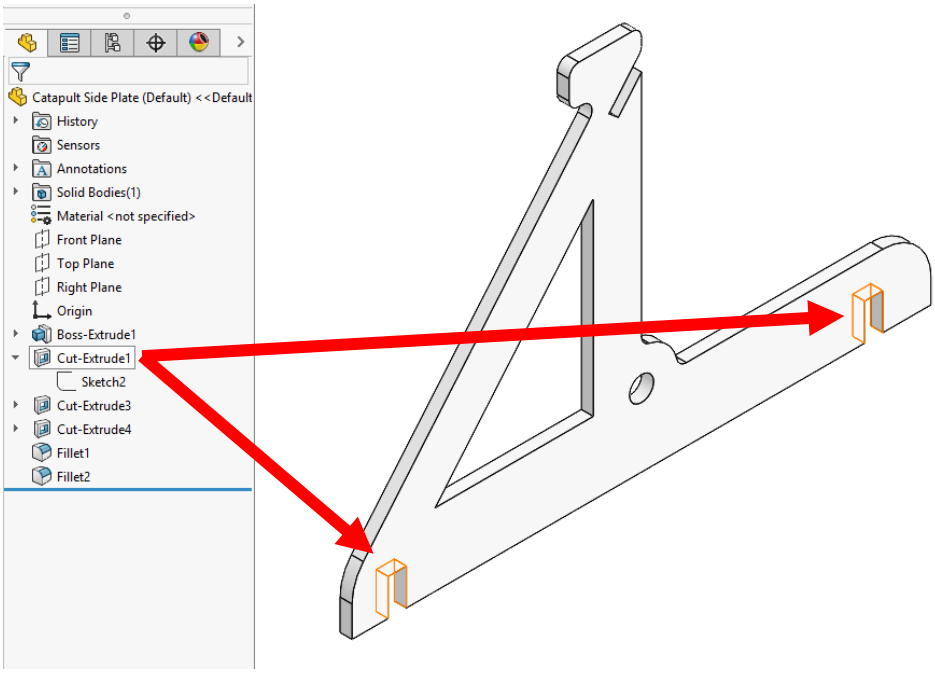
- Side Plates are identical.
- Slots are used to connect the side plates to the Front and Back Supports, and the Face Plate.
- Pivot hole for Basket Arm is centered on part.

DFAM

- Uses Flat-Pack Design, no support material necessary.
- Components can be nested to print several at one time.

DESIGN TIPS:

- Create separate features for the slots and other cuts. This makes it easier to manage the different features.



FRONT SUPPORT

DESIGN INTENT

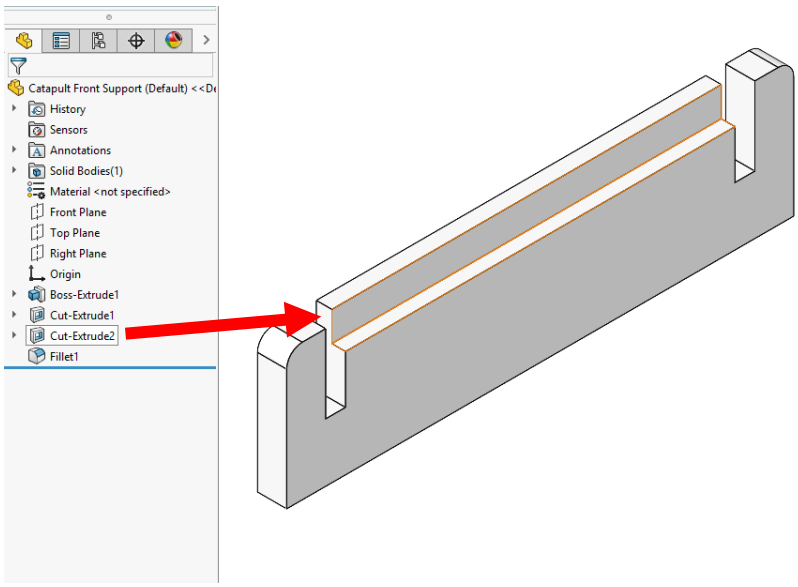
- Same thickness as Back Support.
- Slots are used to connect to Side Plates.
- Groove on back side for Face Plate to rest on.

DFAM

- Uses Flat-Pack Design, no support material necessary.
- Components can be nested to print several at one time.

DESIGN TIPS:

- Use a cut to create the groove that the Face Plate will rest on.



BACK SUPPORT

DESIGN INTENT

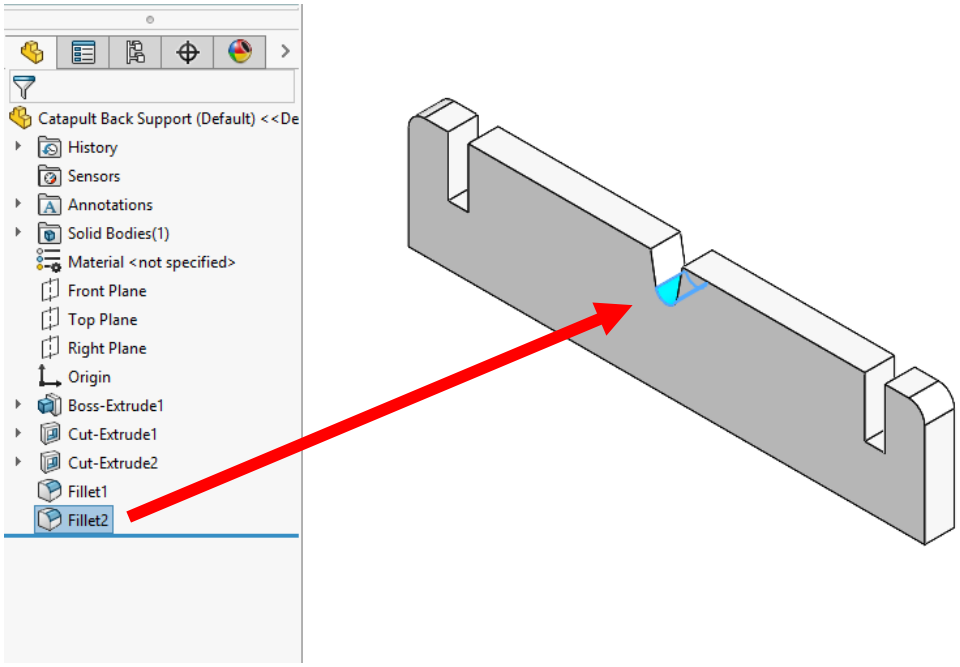
- Same thickness as Front Support.
- Slots are used to connect to Side Plates.
- Notch allows Basket Arm to rotate fully.

DFAM

- Uses Flat-Pack Design, no support material necessary.
- Components can be nested to print several at one time.

DESIGN TIPS:

- Use a Full Round fillet for the bottom of the notch.



FACE PLATE

DESIGN INTENT

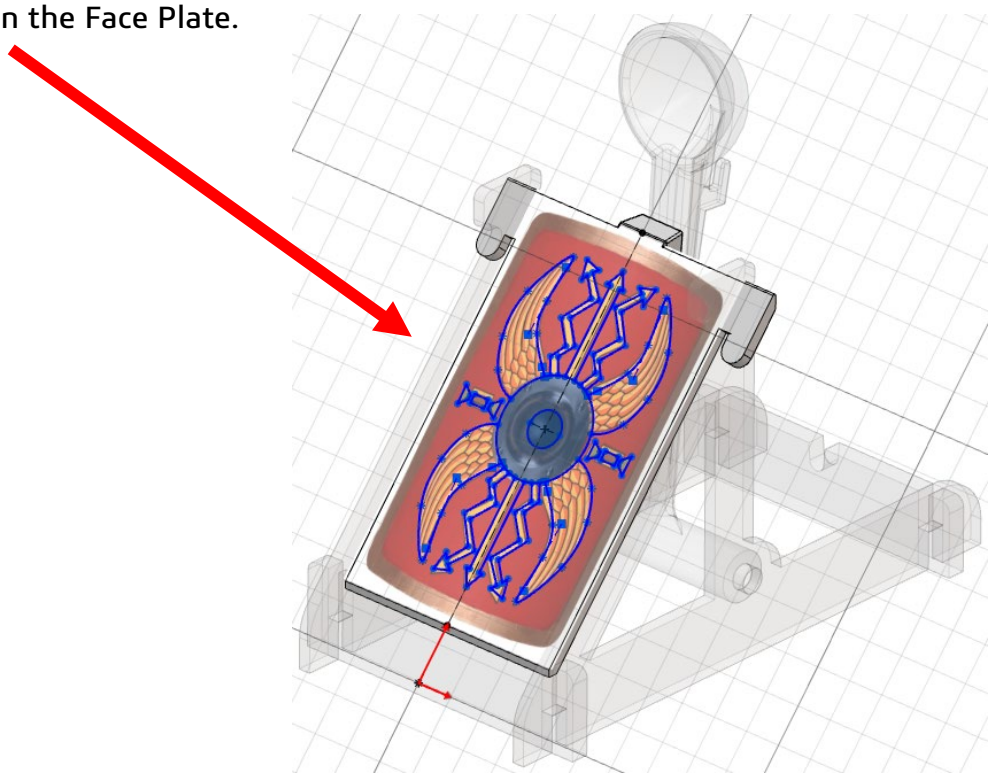
- Notches are used to slide into slots in Side Plates.
- The basket arm strikes the Face Plate at a reinforced feature that has an angle to increase trajectory.
- The front of the Face Plate rests on a ledge in the back of the Front Support.

DFAM

- No support material necessary.
- Components can be nested to print several at one time.

DESIGN TIPS:

- Create the Face Plate in the context of the assembly.
- Use Insert Picture to create the design in the Face Plate.



BASKET ARM

DESIGN INTENT

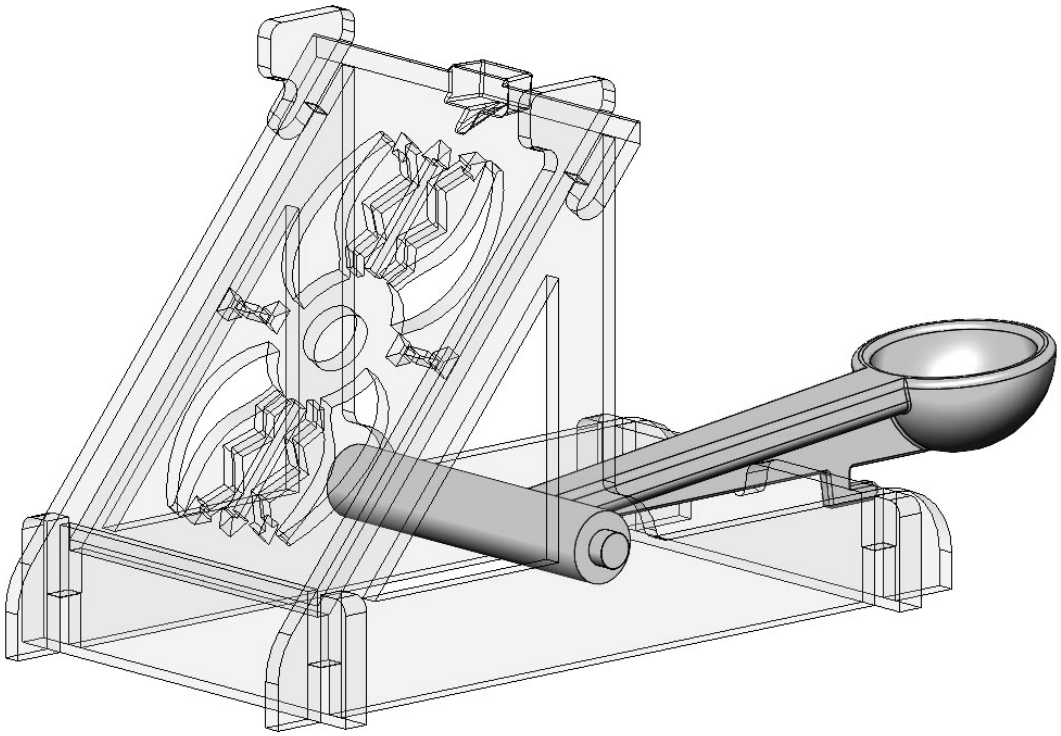
- Basket is designed to hold a 7/8" diameter foam ball.
- Rotates freely in corresponding holes of Side Plates.
- Has a hook on backside to hold a rubber band in place.
- Design in the context of the assembly.

DFAM

- Orient the part so basket is facing up.
- Use organic supports, if possible to, reduce support.

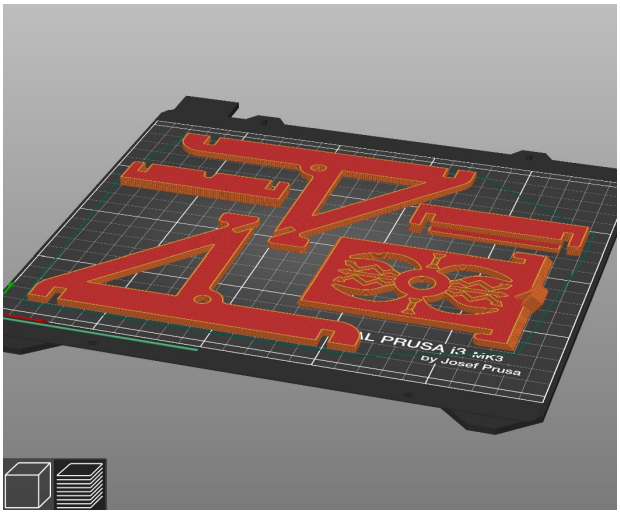
DESIGN TIPS:

- Create the Basket Arm in the context of the assembly.

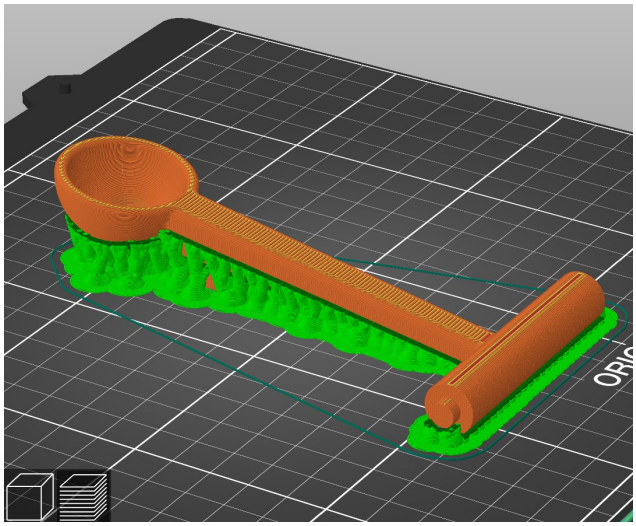


3D PRINTING

- Save the parts as .stl files.
- Import your .stl files into your 3D printer's slicer software.
- Nest your parts to print many at one time.
- Orient the parts to minimize the use of support material, (see images below).



NESTING



ORGANIC SUPPORT STRUCTURES