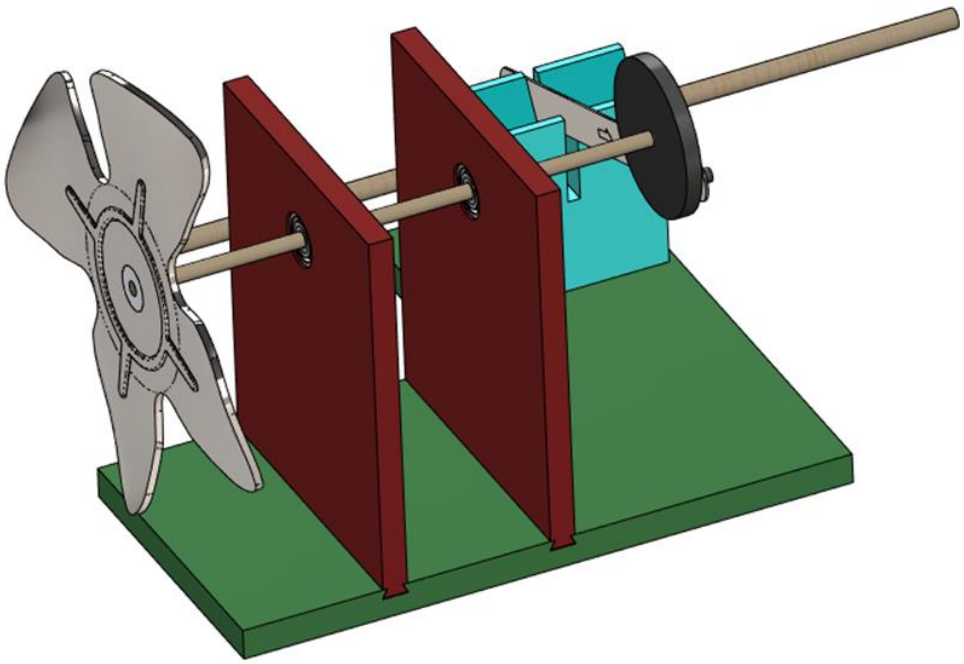
SOLIDWORKS / xDesign

# DESIGN PROJECTS

## STUDENT GUIDE

3DEXPERIENCE



# WIND-POWERED SAW

DASSAULT SYSTEMES

## DESCRIPTION

Welcome to the Design Projects Student Guide! The focus of this project is a Wind-Powered Saw, a mechanical system that converts wind energy into cutting motion. This project challenges you to think critically about energy transfer, mechanical design, and fabrication techniques.

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

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

## PROJECT TASKS

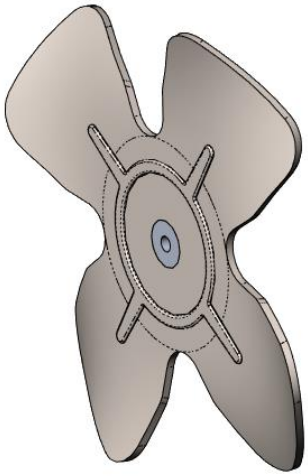
1. Research and purchase components.
2. Model the following components in CAD:
    - Base
    - Walls
    - Cam
    - Dowel Holder
3. 3D Print small sections to test fits for the following:
    - Wall dovetail
    - Bearing hole
    - Cam holes
    - Dowel Holder dovetail
4. 3D Print full assembly
5. Assemble all the components
6. Cut a dowel

## ADDITIONAL RESOURCES

- LINK TO DOCUMENTS
- LINK TO YOUTUBE VIDEO
- LINK TO STEP-BY-STEP

# WIND-POWERED SAW COMPONENTS

## (PURCHASED)

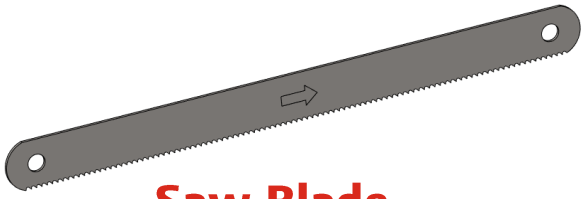


Fan

**Bearing (2x)**
(Match ID to Drive shaft)

**Dowel (2x)**
(Drive shaft & material to be cut)

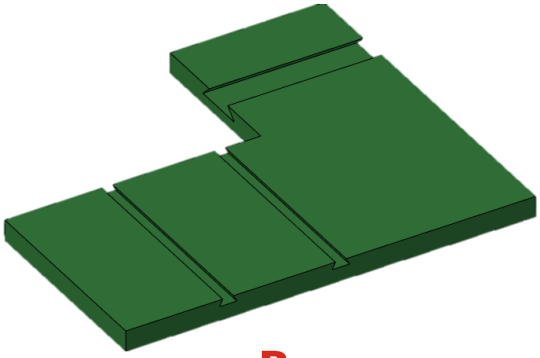
**Screw**



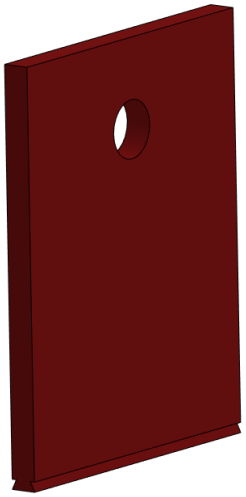
**Saw Blade**

# WIND-POWERED SAW COMPONENTS

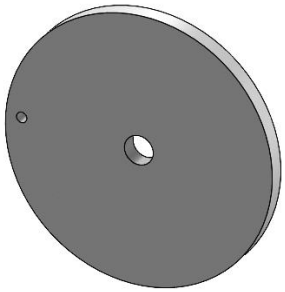
## (DESIGNED)



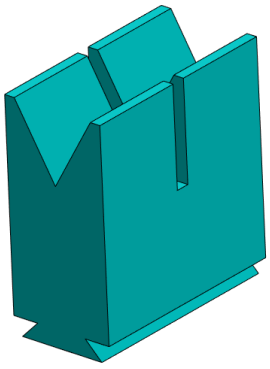
Base



Wall (2x)



Cam



Dowel Holder

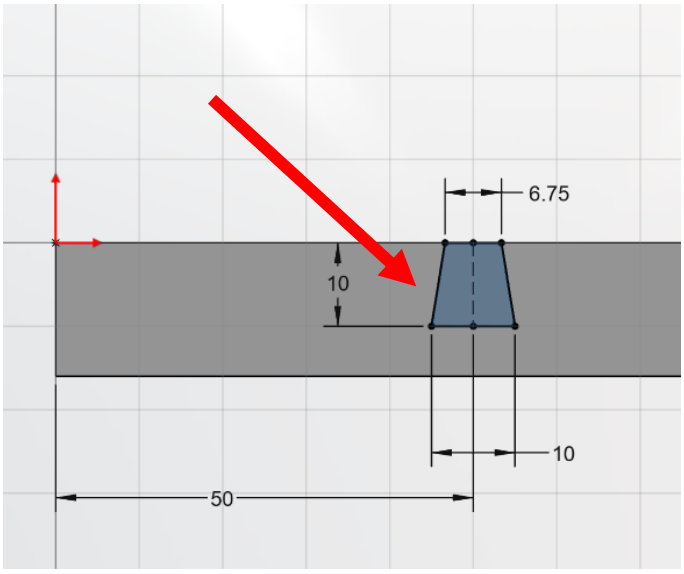
# BASE

## DESIGN INTENT

- Must securely hold supports and dowel holder.
- Must be large enough to space components apart, yet small enough to fit on the 3D Printer bed.
- Conserve material where appropriate.

## DESIGN TIPS:

- Dovetails are a strong and reliable method for attaching components. Research your 3D Printer settings to determine an angle that is printable without using supports.



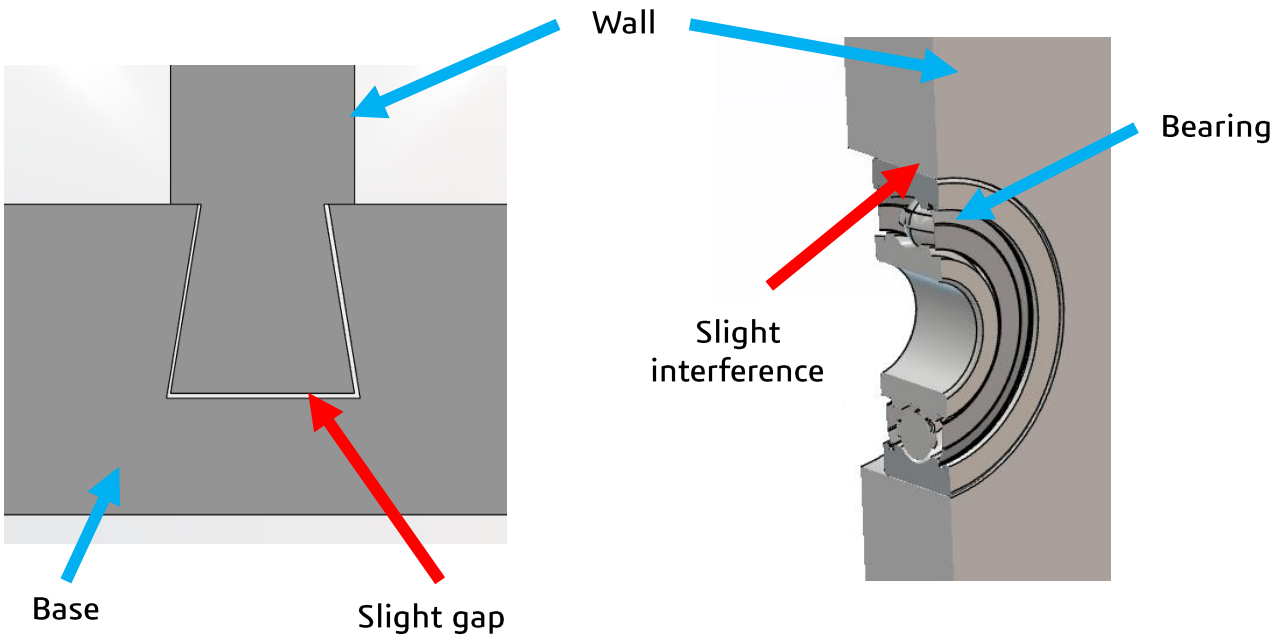
# WALL

## DESIGN INTENT

- Must securely hold the bearing.
- Must securely interface with the Base component.

## DESIGN TIPS:

- Create test prints to verify fits before printing the final component.



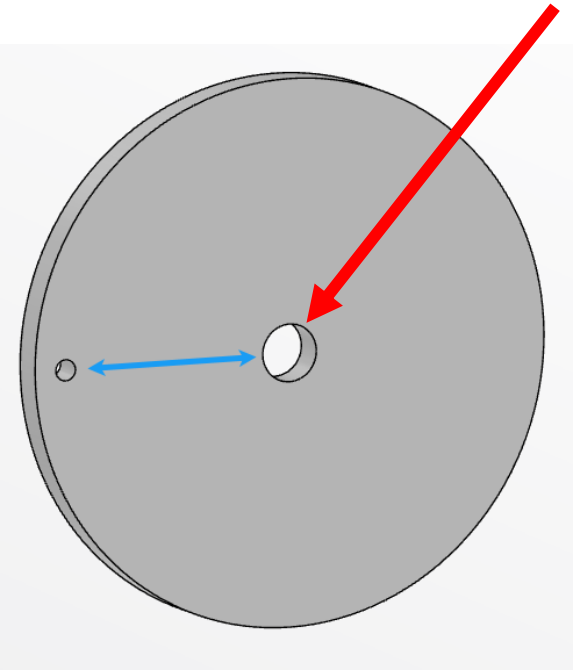
# CAM

## DESIGN INTENT

- Must convert rotational motion into linear motion.
- Optimize torque and speed.

## DESIGN TIPS:

- Use a slight interference fit for the dowel (red arrow).
- Make the screw hole small enough to hold the screw tightly.
- Test different locations for the saw attachment location to optimize torque and speed (blue arrow).



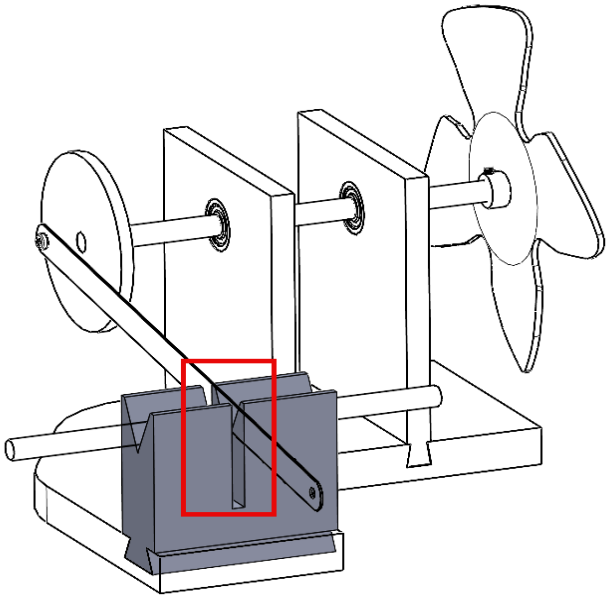
# DOWEL HOLDER

## DESIGN INTENT

- Must securely interface with the Base component.
- Must hold the dowel as it is being cut.
- Must not interfere with the saw blade.

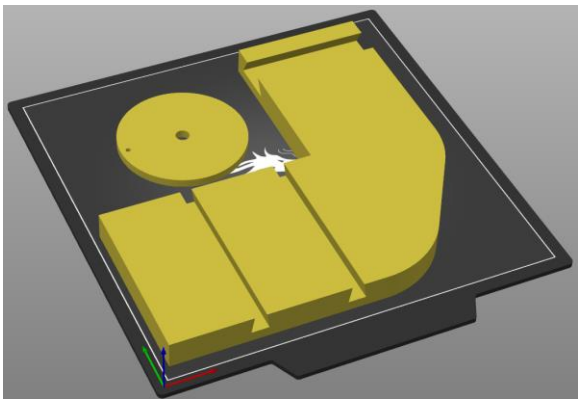
## DESIGN TIPS:

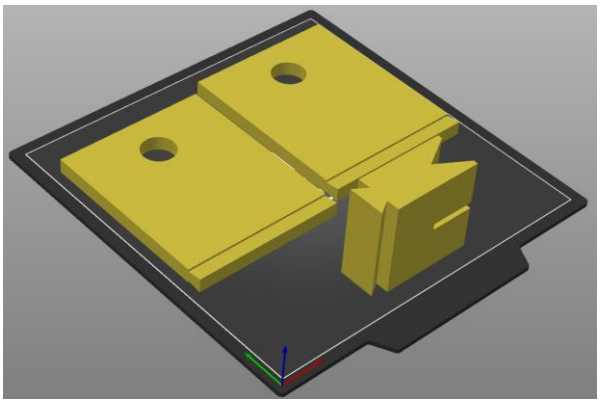
- Depending on the length of the transmission shaft (dowel), position of the fan, and position of the walls, the dowel holder should be the final designed part. The saw clearance cut width and location will vary from project to projects.



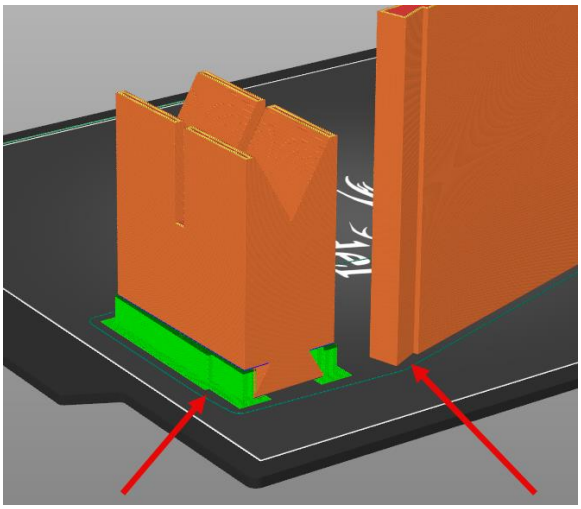
## 3D PRINTING

- Export each part as an STL file.
- Nest your parts to print many at one time.
- Every slicer/3D Printer will work differently
- Experiment with orientations, fits and minimize the use of support material (see images below).

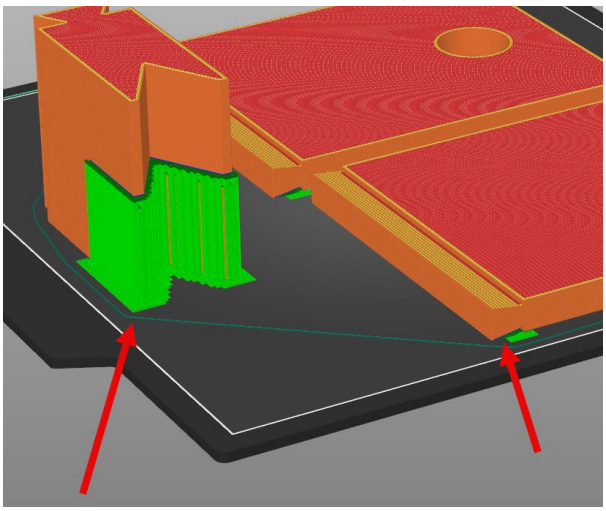




Nested components



Less support material - easier to remove.



More support material - difficult to remove.