

Background

The TXST recycling initiative started 3 years ago with this plastic shredder (V1).



We plan to improve the safety, power and usability into a new shredder (V2).

Problem Statement & Goal

The Problem:

Only 9% of 6.3 billion metric tons of plastic is recycled,

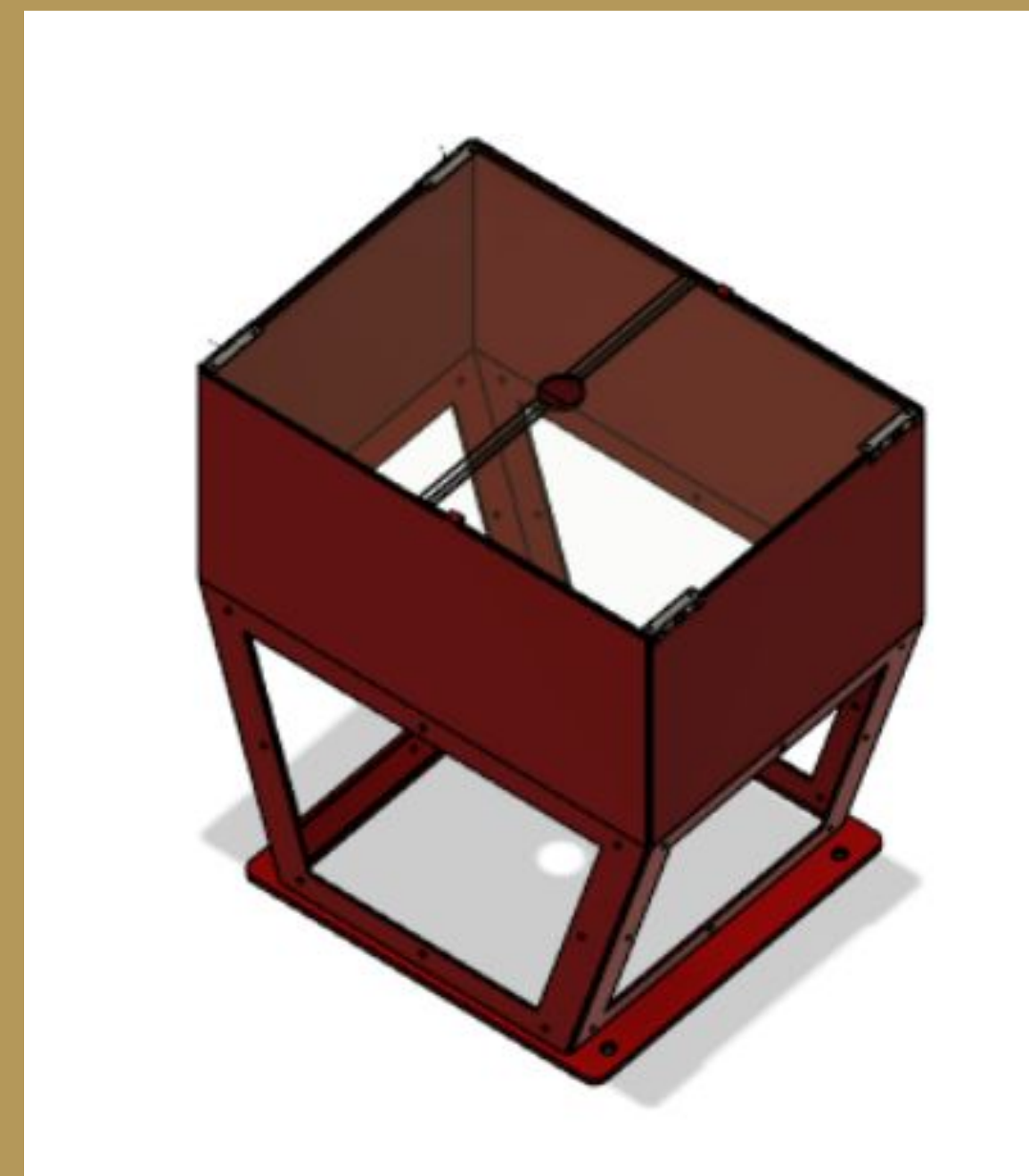


Our Goal:

The goal of this project is to **increase the shredding chamber** for larger plastics as well as **reduce the shredded particle sizes** and **improve the collection system**. We also plan to implement **safety guards** as well as provide an **operational video**.



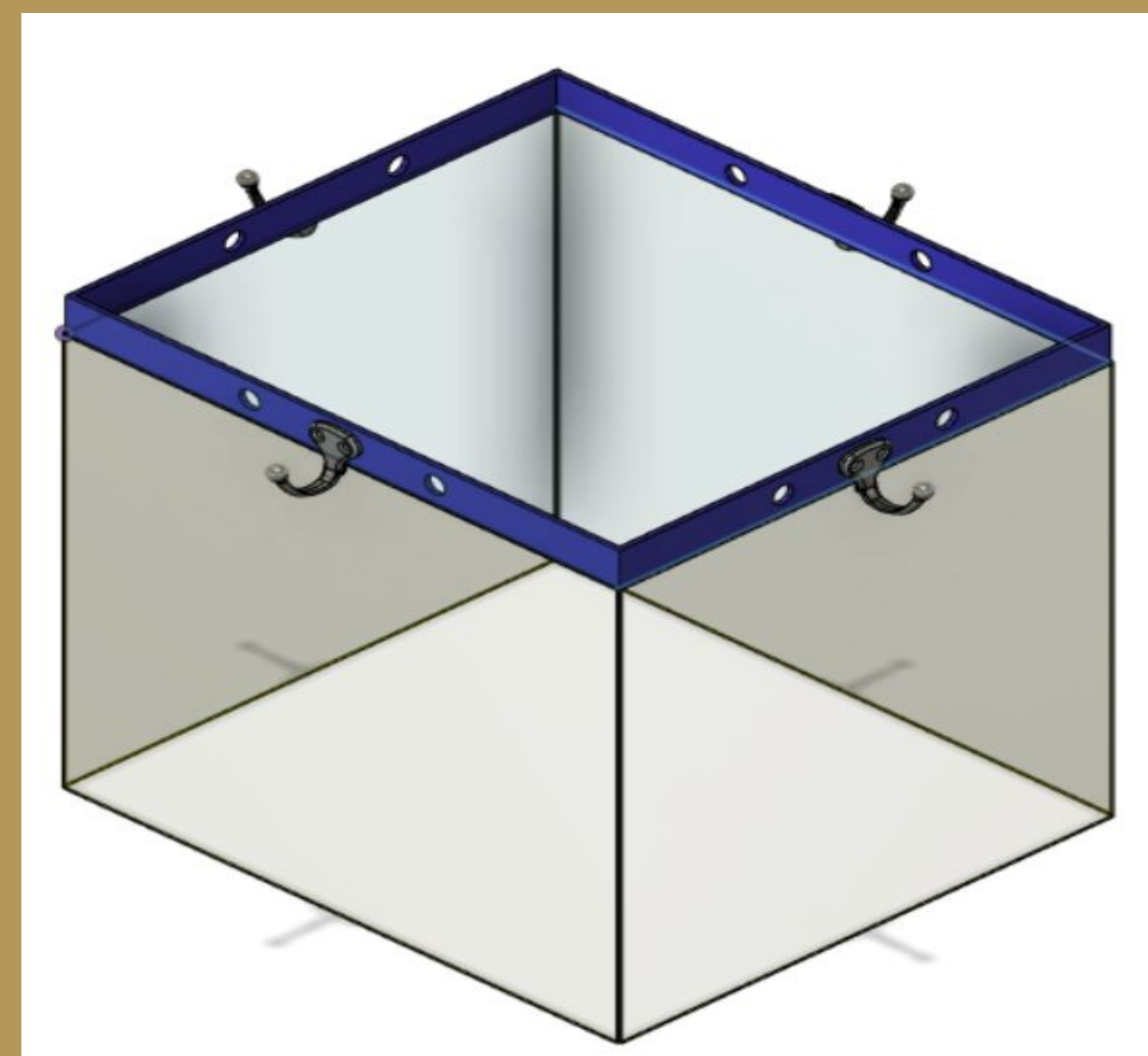
Shredder Parts



Discharge chute:
Directs shredded pieces into collection bins/bags with ease of use and scalability to any sized collection bin

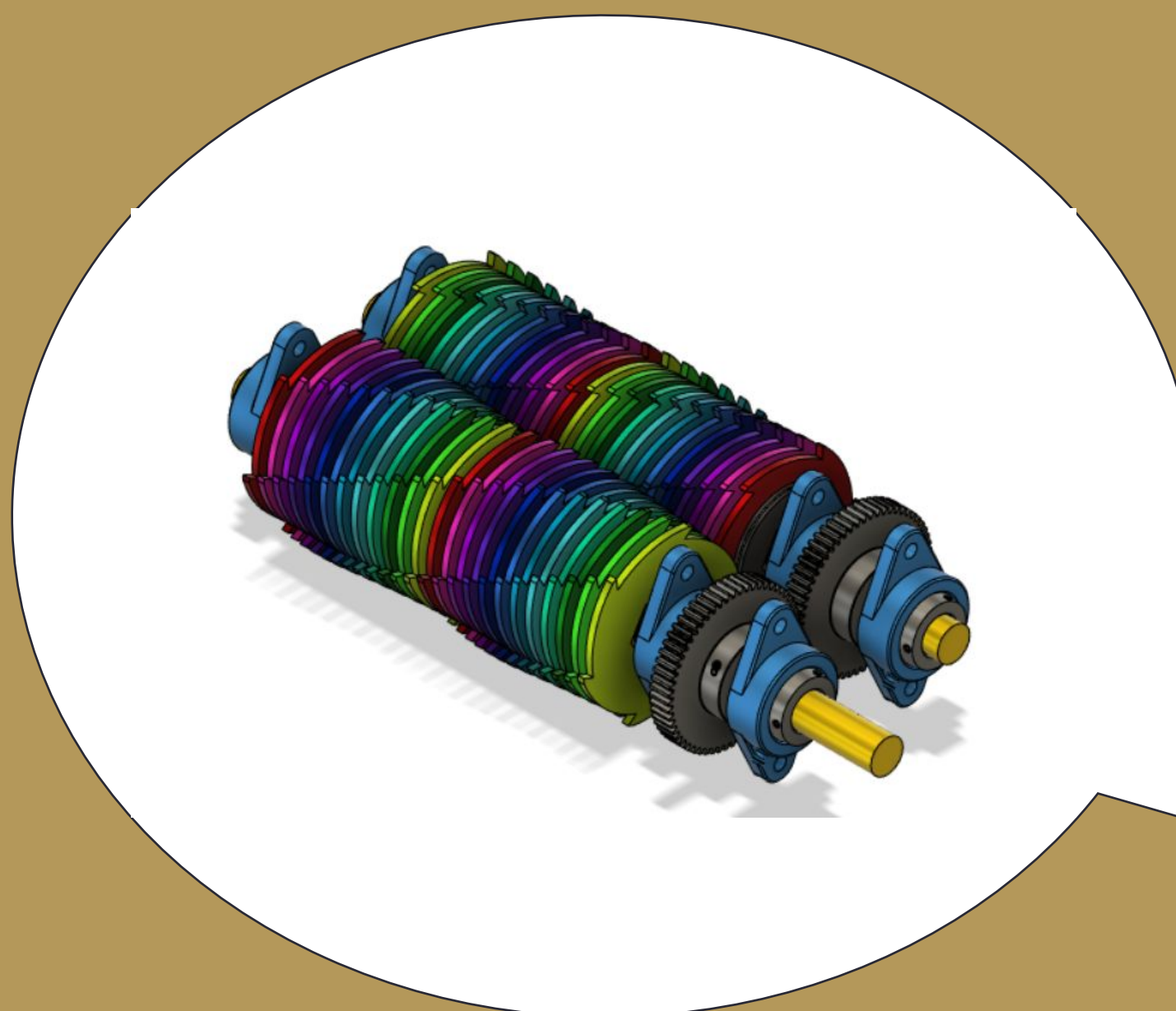


Frame Weldment: Square and rectangular tubing with full welds at all joints and holes to bolt components directly to frame. Once the electronics are selected we will design the user interface and electrical box to fit within the frame



Hopper: Features acrylic windows and spring hinge doors with safety sensors to prevent users putting their hands near shredder blades

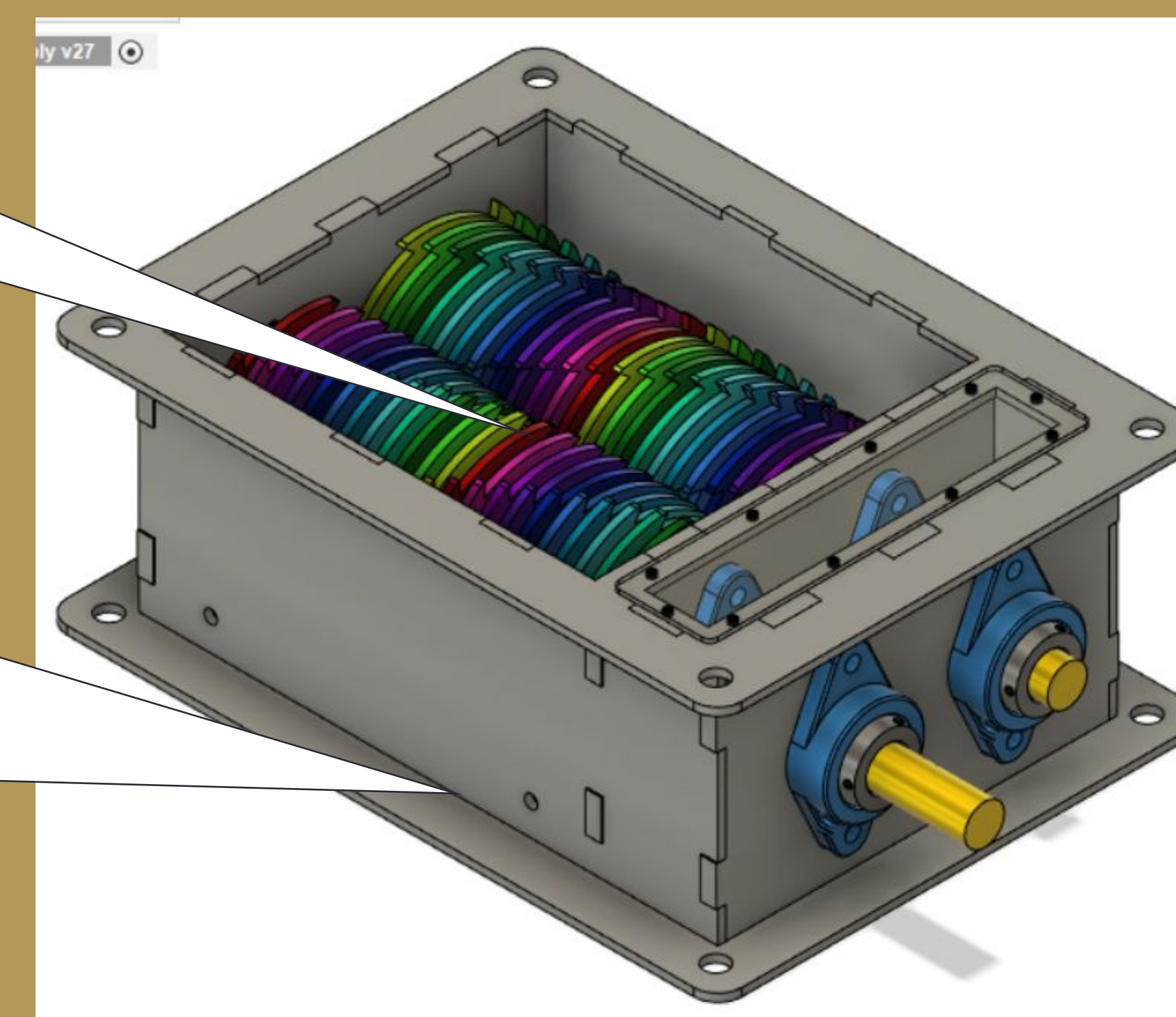
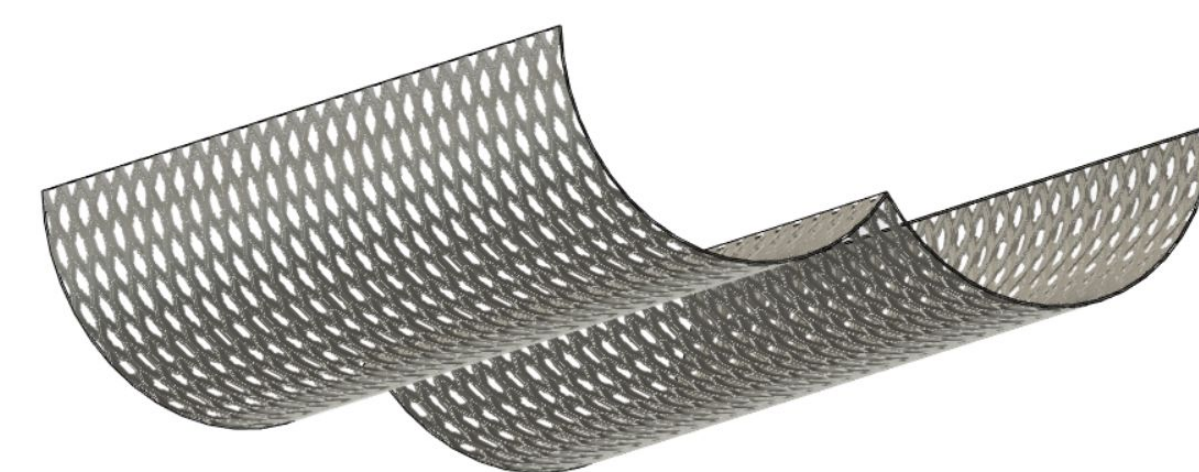
Gear Box



Gear box: Contains 2 shafts each with:

- 12: Blades offset by 5° for spiral shredding pattern
- 24: 1/8" Spacers + 12: 1/16" Shim Spacers
- 2: Lock nuts hold blades together tightly to avoid wobble
- 3: Bearings to ensure proper alignment through the box
- 1: Gear to transfer rotation from motor driven shaft to second shaft

Mesh liner under gear box with a range of hole sizes for different particle sizes.



Timeline

First Semester:

- 2/10 - Project assigned
- 4/5 - Sponsor design review
- 4/20 - Ordered motor assembly
- 4/28 - Initial parts order
- 5/2 - Senior Design Day

Second Semester:

- August - Cut plates/tubing and weld frame
- September - Machine parts and wire electronics
- October - Final Assembly
- November - Safety videos and SOPs
- December - Senior Design Day

Future Goals:

- Students recycle plastic on campus:



Makerspace Equipment

The equipment available in the Ingram Hall Makerspace is essential to the manufacturing and assembly:

- Wardjet E-1515 Waterjet
- Torchmate CNC Plasma Cutter
- FSL Compact Fiber Laser
- Kingston Manual Lathe
- Kingston Manual Mill
- MIG Welder
- Horizontal Bandsaw
- VLS Low Powered Laser
- Broaching Tool
- Various Hand Tools