

Post-Consumer Plastic Recycling Shredder

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Background

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



Our plan was to improve on this design for more longer term use..

Problem Statement & Goal

The Problem:

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



Our Goal:

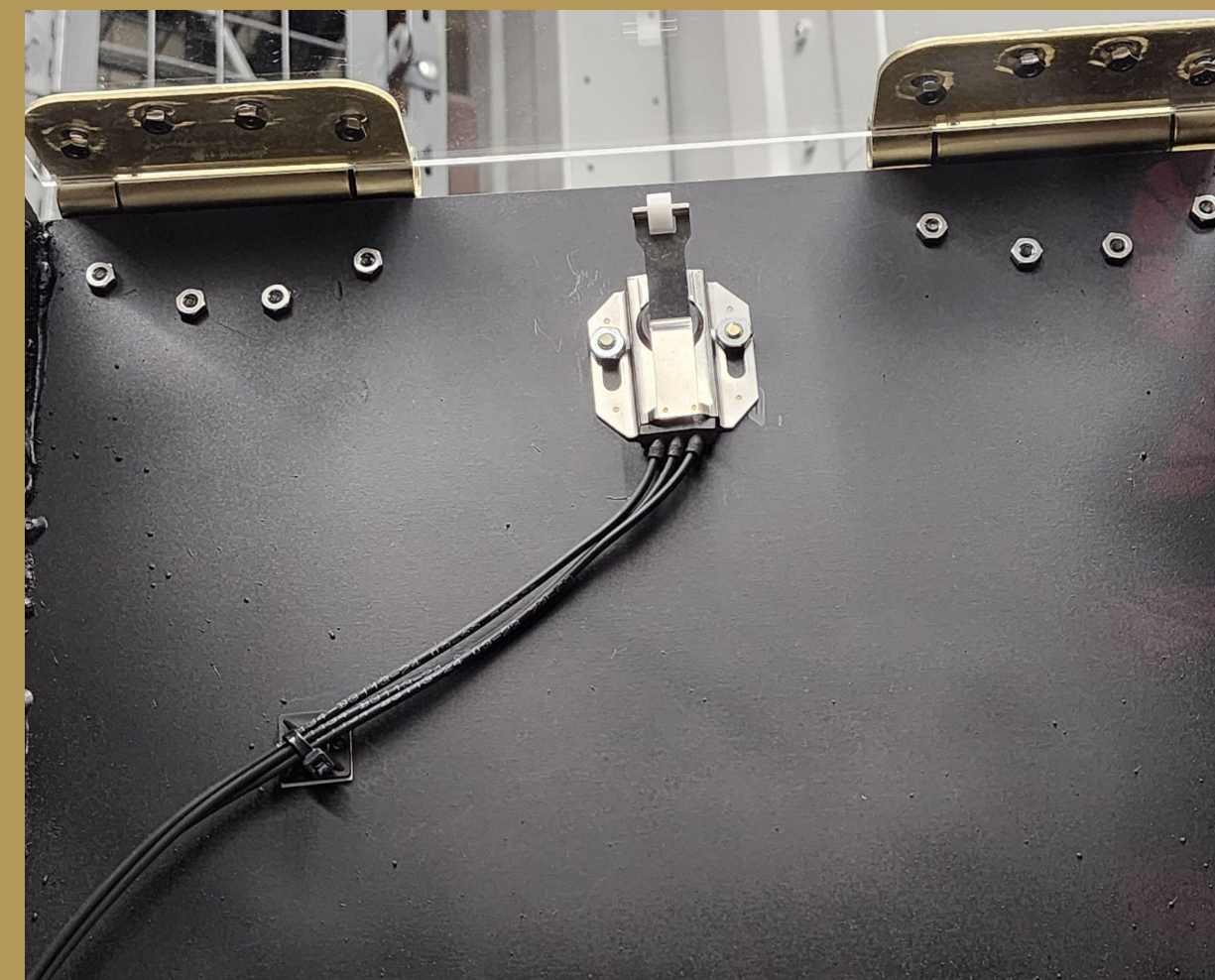
The goal of this project is to **increase the shredding chamber** for larger plastics as well as **reduce the shredded particle sizes** and **improve the collection system**. We also plan to implement **safety guards** as well as provide an **operational video**.



Final Product



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



Gear box: Contains 2 shafts each with:

- 24: Blades offset by 5° for spiral shredding pattern
- 48: 1/8" Spacers + 24: 1/16" Shim Spacers
- 2: Lock nuts hold blades together tightly to avoid wobble
- 3: Bearings to ensure proper alignment through the box
- 1: Spur gear to transfer rotation between shafts

For a total of **206** moving parts + **8** plates to hold it all together



Nearly all parts were designed and manufactured by our team in the Ingram Hall Makerspace



Slip Clutch: Set to the optimal torque through experimentation to prevent motor overload while still shredding various plastics



Electronics: Motor starters wired to reverse the polarity of the 3-phase motor to run forward or reverse with safe e-stop circuitry

Future Goals

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- Students recycle plastic on campus and create their own molds with any engraving.



- Future teams will continue building and developing plastic recycling machines



Challenges

- Finishing parts with tight tolerances and properly aligning them upon assembly
- Fabricating and redesigning components on the fly
- Teach ourselves the basics of Electrical Engineering without any outside help

