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## Goals

Creating a plastic injection molding system consisting of an injection molding machine and molds that use post-consumer recycled HDPE plastic to make products!

Bring awareness to the Ingram Hall Makerspace and entice students and faculty to visit, learn, and produce their own projects.



Figure 1: Shredding HDPE plastic



Figure 2: HDPE plastic (detergent bottles)



Figure 3: Molded parts from compression molding

## Customer Needs

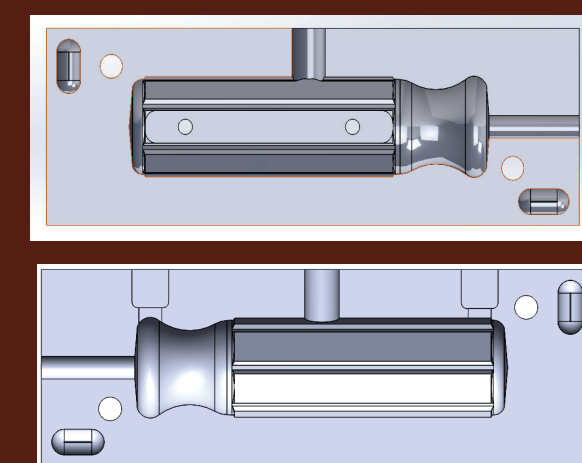
- Process time within 1 hour
- Library of molds for users
- Minimum training required to operate the machine

Our goal is to reduce post-consumer HDPE plastic waste!

## Progress

### Molds

#### Screwdriver Mold

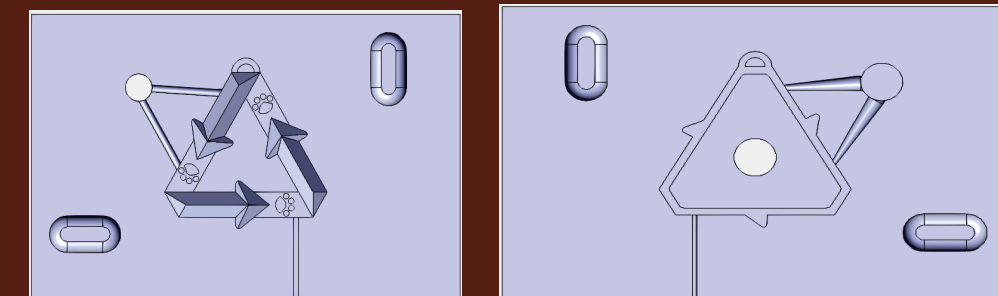


CAD Model

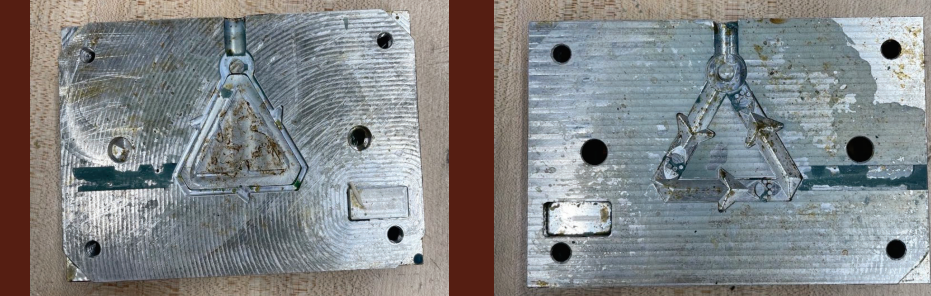


Manufactured Mold

#### Keychain Mold

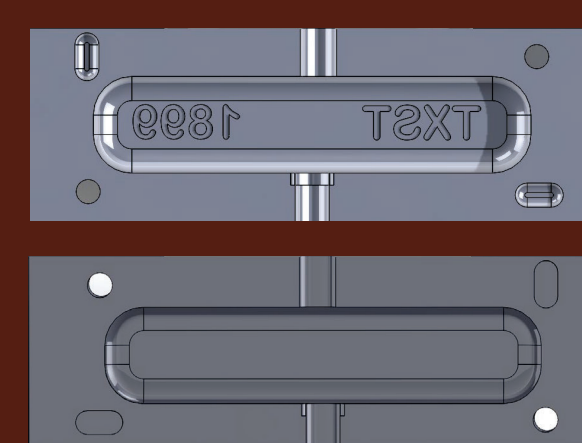


CAD Model

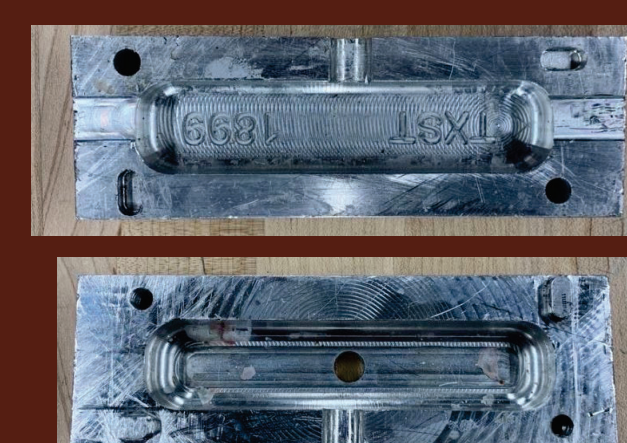


Manufactured Mold

#### Allen Wrench T-Handle Mold

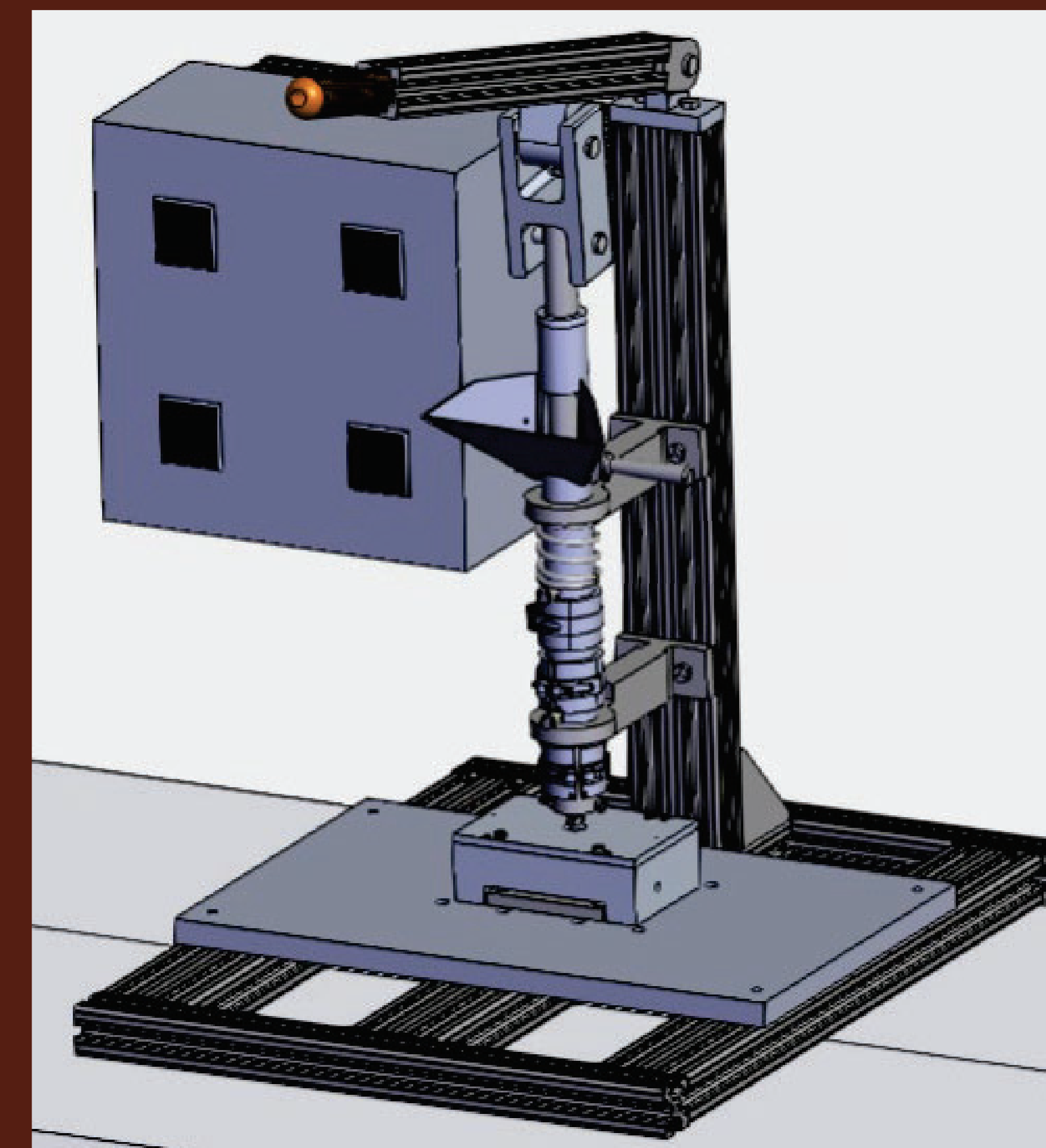


CAD Model



Manufactured Mold

### Injection Molding Machine CAD Design



The team has designed, manufactured and assembled the entirety of the injection molding machine & molds shown!



Figure 4: Team photo

## Manufacturing & Assembly

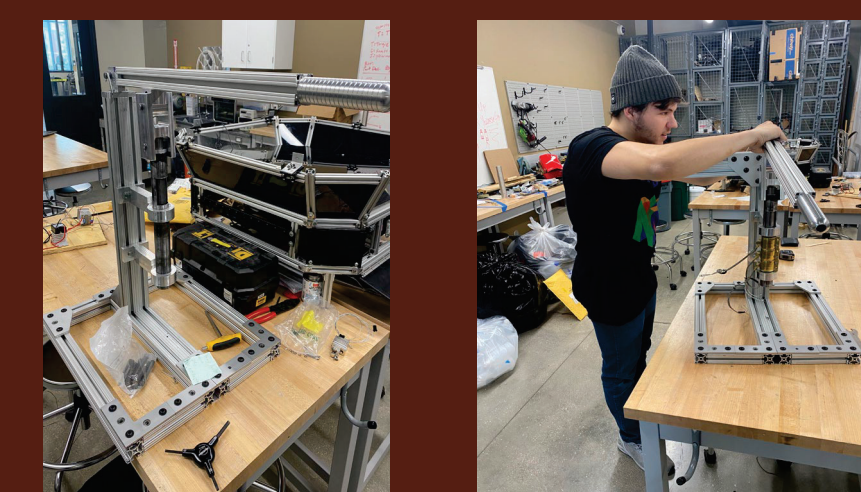


Figure 5: Assembly of Machine

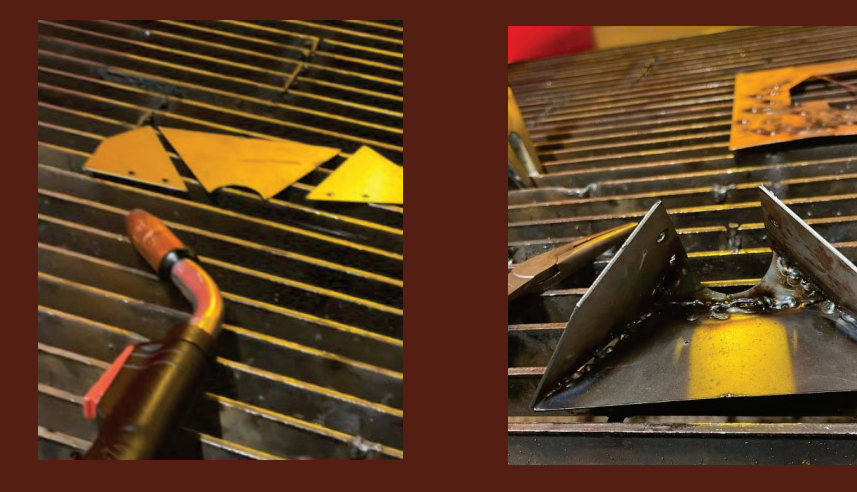


Figure 6: Welding of hopper

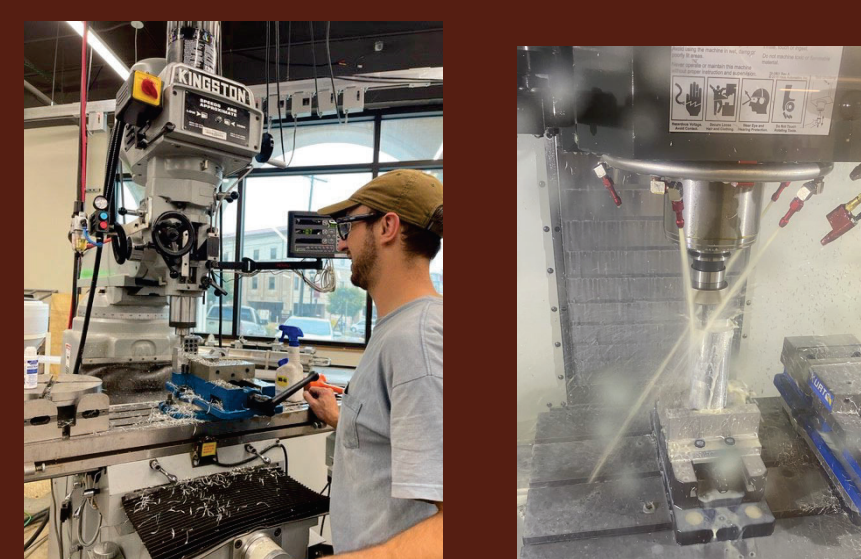


Figure 7: Manual/CNC Milling of parts and molds



Figure 8: Manual Lathing

## Testing



Figure 9: Products of molds

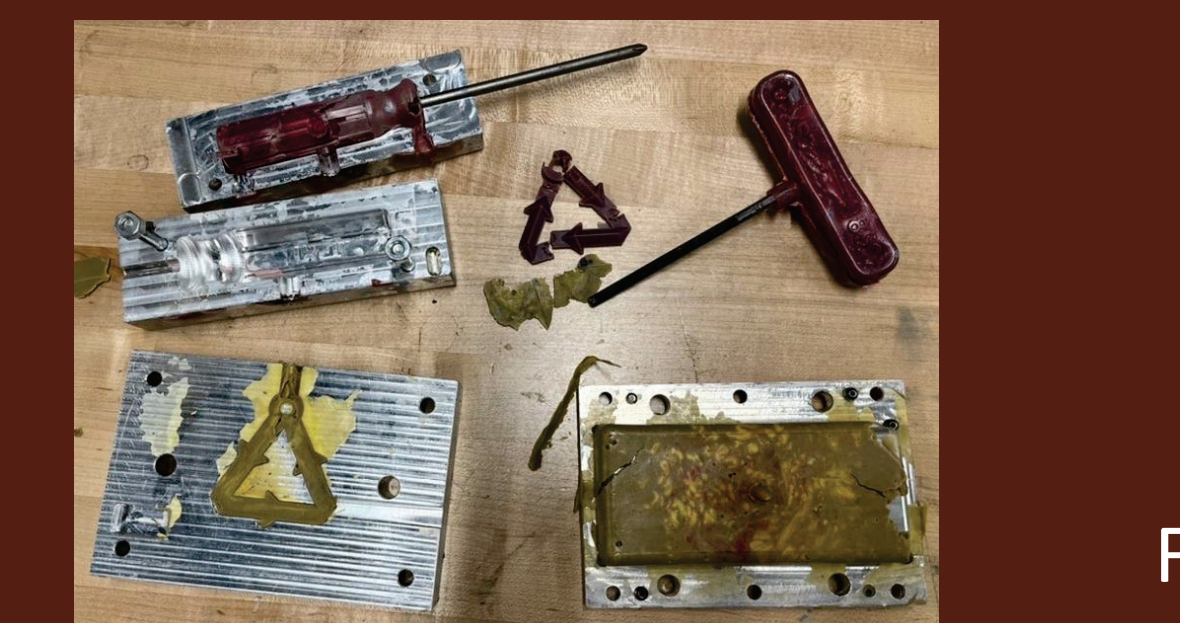


Figure 10: Outflow of plastic through nozzle

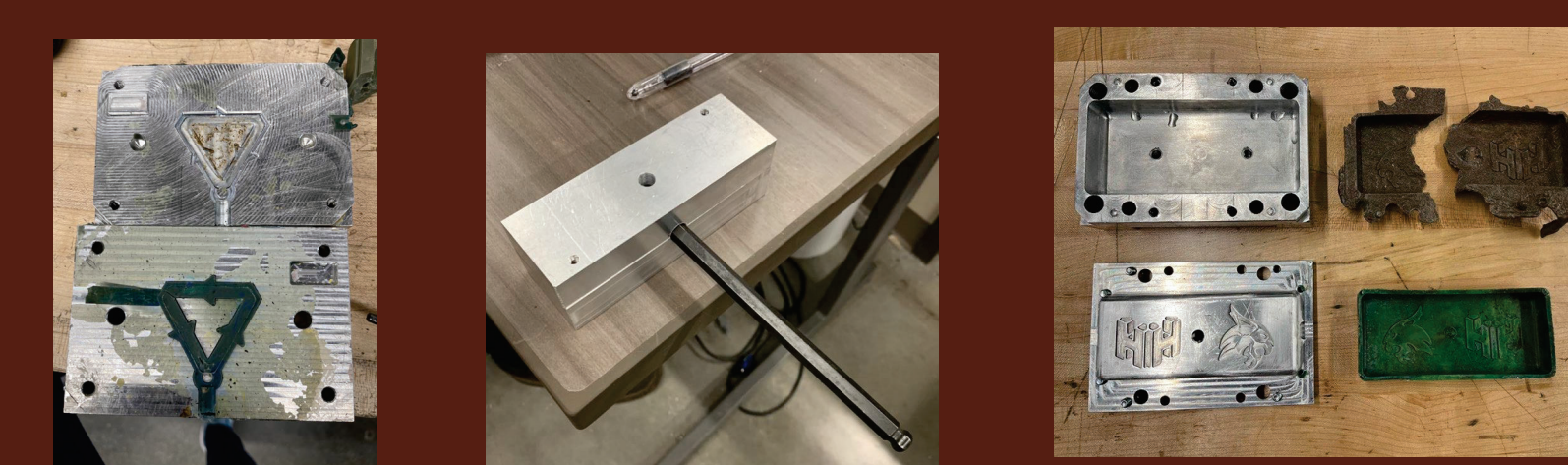


Figure 11: Testing molds

## How it Works

### Process of Injection

- Heat up machine and desired mold
- Insert shredded plastic into machine
- Allow for plastic to melt
- Insert mold in machine and inject
- Remove mold and allow for it to cool
- Release product from mold



Figure 11: Loading of the plastic into the barrel

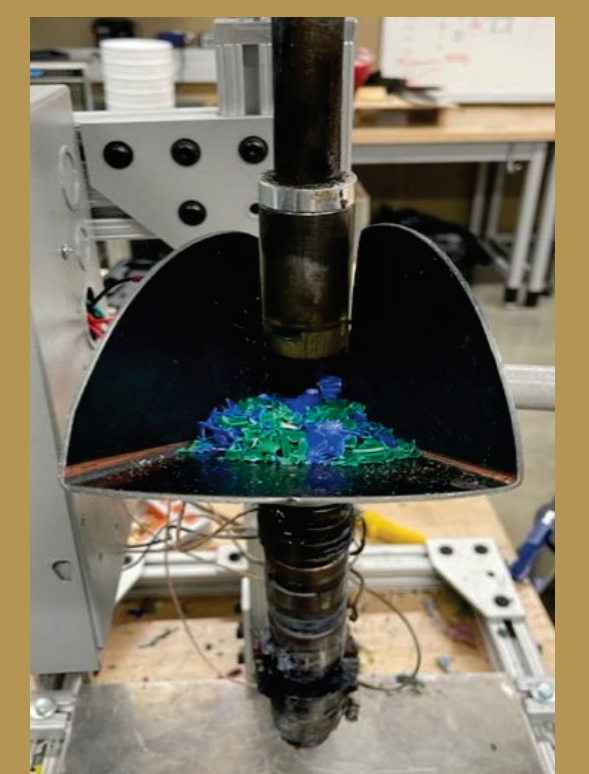


Figure 12: Full view of hopper



Figure 13: Mold being tested in machine



Figure 14: Molded Keychain

## Future Recommendations

- Improve reliability of injection machine
- Design more inserts for molds
- Move placement of thermocouples
- Improve on PID controller parameters
- Implement mold heater into system

## Acknowledgments

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