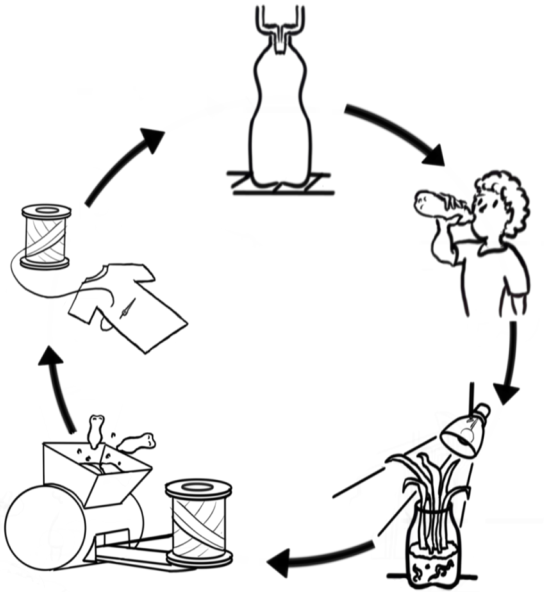
RMWSSS Countdown Team
Phase 1 Design Review

countdown™

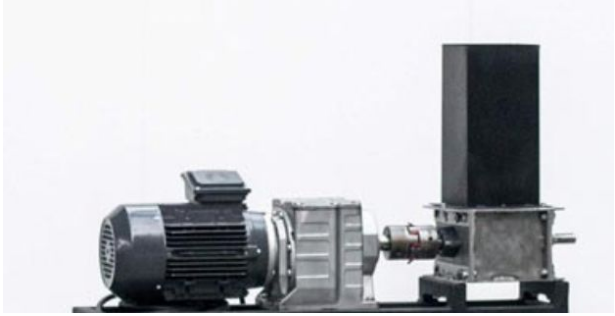
circular economy solutions

Goal

For our machine, our aim was to demonstrate recycling in context using an everyday item made up of various types of common plastics. We chose to focus on the everyday plastic water bottle We wanted this machine to improve sorting at the source while also demonstrating the capabilities of the different precious plastics machines. The idea is to add transparency to the recycling process as a whole.



Precious Plastic Machines in use



Shredder

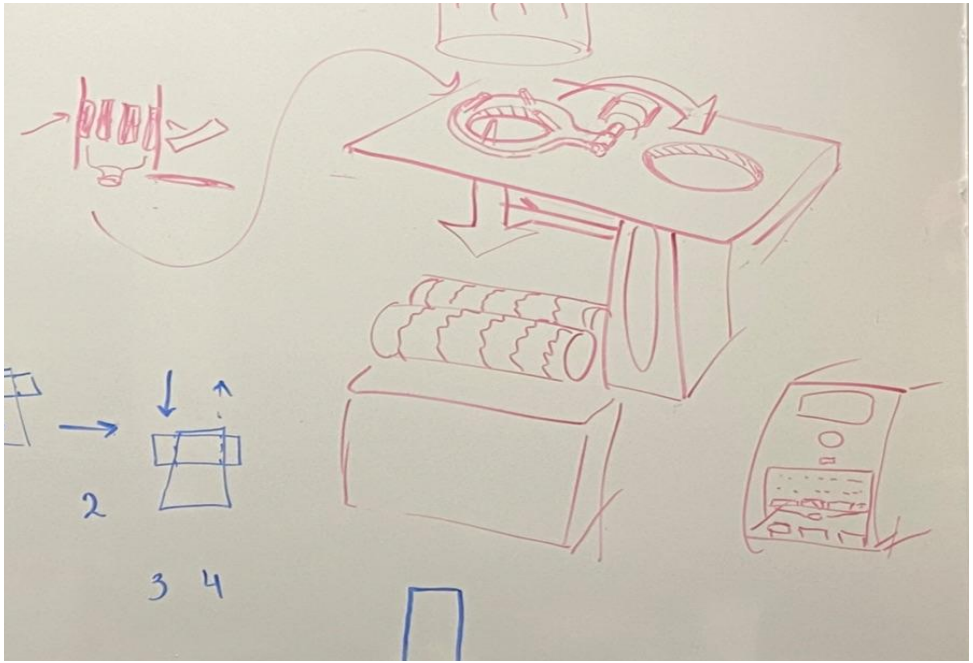
Injection

Extruder

Compression

Exploratory Process

During our exploratory process, we looked at how we can make use of nearly every part of the bottle. In this design, we heat up the bottle for easy removal of the label. The cap is manually removed by the user and the bottle itself is sent to a shredder for the PET.



Process Details

The machine utilizes gravitational force to move the bottle vertically through each step of the deconstruction process. To begin, the bottle cap is removed by the user and placed at one entry point and the bottle is placed ‘neck down’ into a second entry point. The opening of the bottle falls onto a blade which then cuts off the ring of the bottle and sends it to shredder #1 to be processed with the caps. Next, the bottle slides down into a spiked ring. The bottle is heated slightly to melt the wrapper glue, then a mechanical claw pulls it downward from the neck. As it is pulled down, spikes catch the edge of the wrapper and remove it from the bottle. The mechanical claw releases the bottle and it falls into shredder #2 to be processed. After the bottles, caps, and rings have been separated and shredded, the particles fall into the extruder, the compressor, or the injection machine.

Innovative Additional Features

We are also designing a user interface so that a screen may be attached to the device and can directly interact with the user. We intend to develop a basic app that the user can consult for additional information and redeem for incentives by using the machine.

We also intend to include robotics in the machine to automate the bottle processing. This would include the use of a robotic arm to pull the bottle through the vertical processes.

Prototyping

We have done preliminary testing on the mechanics of how the machine would ideally work in tandem with the Precious Plastic machines. Here we are creating the catch area for the bottle label after it is heated.

Current Design

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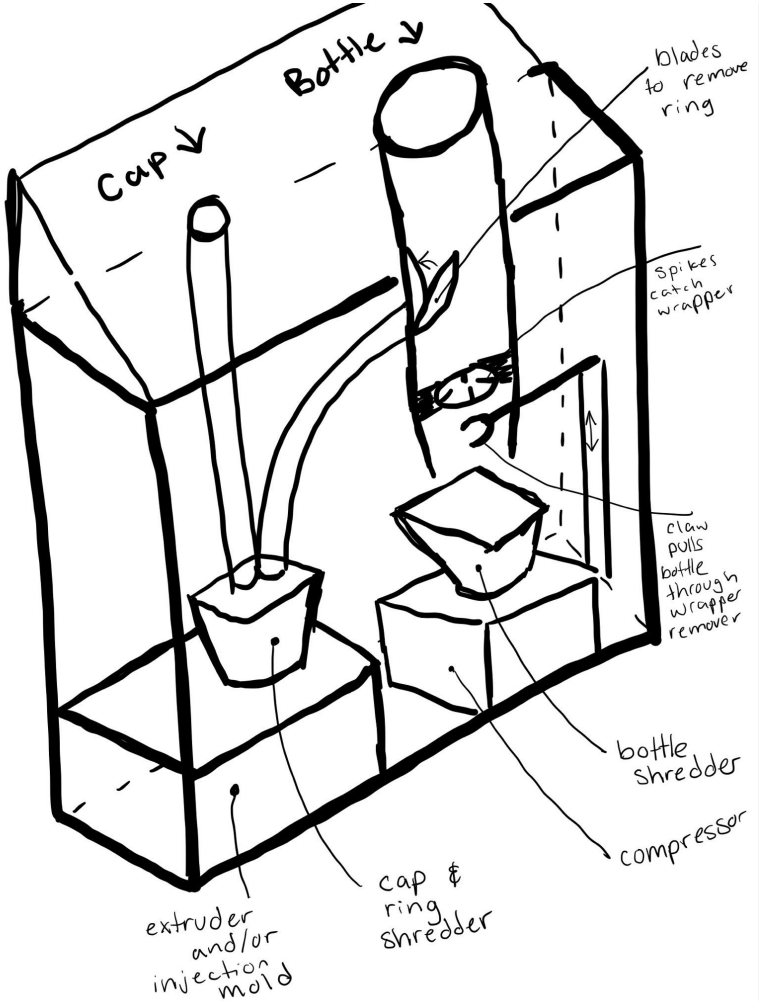
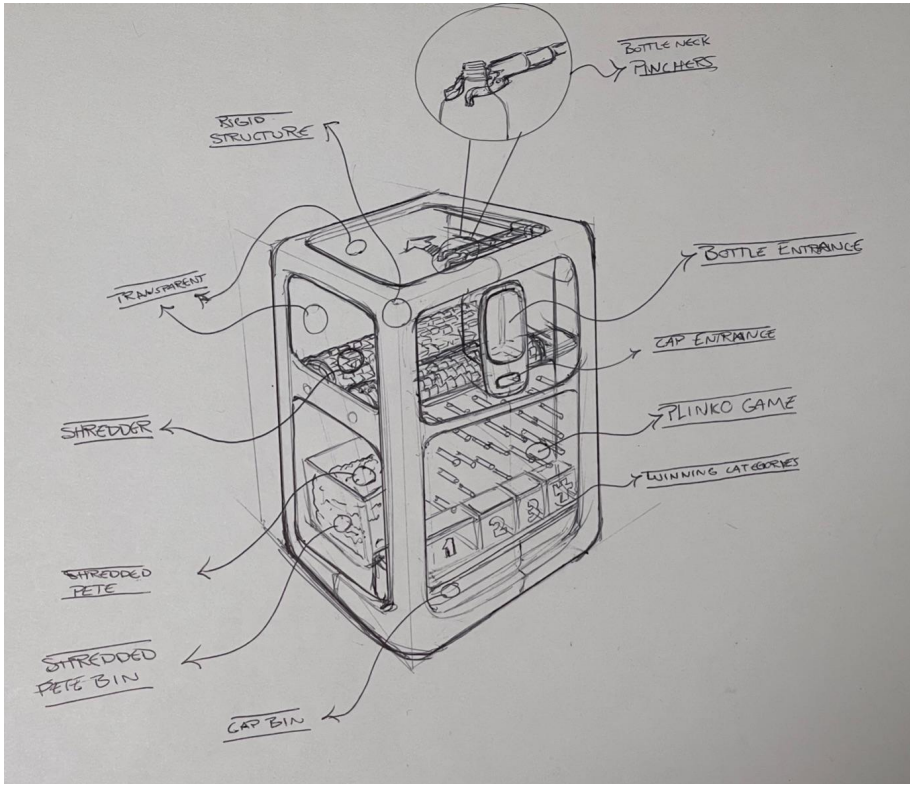


Current Design

Here is the current design sketch with the gamified element for the bottle caps on the front. The scale of this model size is still yet to be determined.

We intend for this design to be transparent so that the process is visible to users.



Next Steps

- Finalize the ring removing mechanism
- Create fully developed CAD model
- Determine the heat and power specs

Future Considerations

- How can we accommodate different bottle shapes/sizes
- Building in a drain for users to pour out unwanted liquids

Team

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