

# I am making a machine to recycle plastic bottles into usable filament for the ENT department's 3D printing lab.

## Description

I've learned that the entertainment industry is very wasteful. When it comes to scenery and set pieces they are regularly thrown out after shows end. I want to help mitigate that waste. 3D printing has the potential to create a ton of junk with failed prints being trashed or sometimes even successful prints being thrown away because they didn't meet the desired result. Creating a system to recycle plastic bottles will develop a practical use for the discarded trash. As well as supply the ENT department with an additional supply of filament.

## Methods

I will learn how to model complex hardware using Fusion 360 designing a system of gears to operate the collecting and spooling of the plastic filament. All Fusion 360 files will be exported as STL files into a 3D printing software called Cura, then printed in the 3D printing lab in the Ultimaker 3D printers. This will all be done by circuiting electronics such as a motor and heating element. Which will all be installed in an enclosure I will also model in Fusion 360. I will be learning how to use Fusion 360 by completing tutorials based on the fundamental tools and techniques need to use Fusion 360 effectively, and youtube videos on the soldering of electrical circuits.

## Deliverables

- A machine that processes plastic bottles into plastic filament
- Additional accessories. (mounted ribbon cutter, handle-held ribbon cutter)
- All 3D printing files. (Fusion 360 and Cura)
- A set of instructions on how to assemble or repair the machine.
- Notes that will include practice models, design drawings, and prototypes.
- Photos/ scene shots of the modeling process and videos of the printing process.
- Spools of printing filament for the ENT department.
- Poster
- OpenLab Portfolio

## Required Resources

Access to the Vorhes computer labs for drafting and designing in Fusion 360.

Access to the 3D printers in the 3D printing lab.

Access to the scenic shop.

Fusion 360 and Cura software.

Soldering equipment.

## Budget

Culmination Budget				
Filament Machine				
Michael Torres				
Material	Unit	Quantity	Cost per unit	Total Cost
<a href="#">3D printer</a>				
<a href="#">aluminum block</a>	block	1	\$13.99	\$13.99
<a href="#">NEMA 17 motor</a>	motor	1	\$12.99	\$12.99
<a href="#">m8 threaded rod</a>	rod	1	\$11.99	\$11.99
<a href="#">3D printer fans</a>	fan	1	\$9.99	\$9.99
<a href="#">608ZZ Bearing</a>	bearing	1	\$8.99	\$8.99
<a href="#">12v power supply</a>	power supply	1	\$12.99	\$12.99
<a href="#">Temprature controller</a>	controller	1	\$28.98	\$28.98
<a href="#">Motor controller</a>	controller	1	\$39.98	\$39.98
			Total Cost:	\$139.90

## Schedule

### Week(s) 1 - 4

Modeling and designing in Fusion 360

(Practice models, 3D files)

- Halfway through, I will start printing and testing.
- At the end of the four weeks, I should have finished the models for the mechanical components.

## **Week(s) 5**

Printing components and testing the fit as well as preparatory design of electrical components

(Prototypes)

- The outcome of this week is the functioning assembly of mechanical components.

## **Week(s) 6 - 7**

Assembly of electrical components.

(Design drawings)

- At the end of these two weeks, the electrical components should be properly assembled to be installed.

## **Week(s) 8**

Electrical components should be installed and functioning properly.

(Design drawings)

- The outcome from these weeks is the functioning assembly of mechanical components.

## **Week(s) 9 - 10**

Setting parameters for the machine.

(Operating instructions)

- This time will be used to dial in the machine so that the plastic bottles are being processed into a usable filament that works properly with the school's printers.

## **Week(s) 11 - 12**

Designing and printing machine housing in addition to accessories.

(Design drawings, Prototype, Final Machine)

- The outcome of this week is the functioning assembly of mechanical components.

## **Week(s) 13 - 15**

Extra time for printing using filament fabricated.

## Proposed Table of Contents (TOC)

- Introduction
- Methods of approach
  - Weekly updates in a written report.
- My Project Budget - Estimated vs Actual
- My Project Calendar - Estimated vs Actual
- Completed paperwork and documentation
  - Documented time spent modeling printing, and assembling
  - Notes that will include practice models, design drawings, and prototypes.
  - Photos/ scene shots of the modeling process and videos of the printing process.
  - All 3D printing files.
  - A set of instructions on how to use the machine.
  - A set of instructions on how to assemble or repair the machine.
- Conclusion
- Annotated Bibliography