



Element E

Problem Statement

One in six women are a victim of sexual assault. Women from the ages 18 to 24 who don't have the physical means to fight back are the ones most commonly attacked. The victims afterwards then suffer mentally, physically, and financially for something that they weren't responsible for.

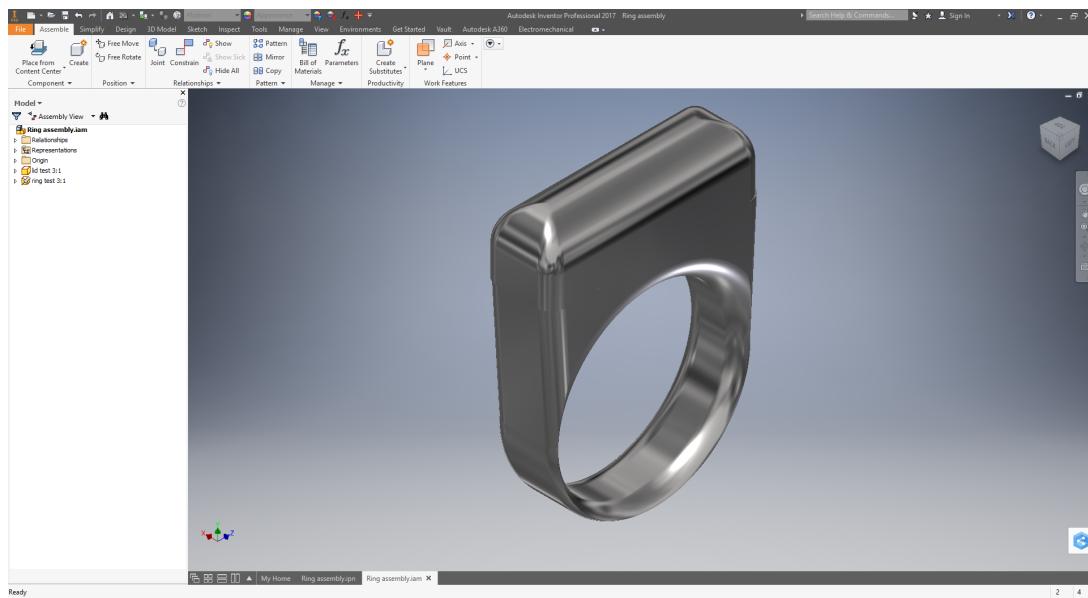
Introduction & Background Information

Stem principles were used throughout the entire project. Technology was used to research and build. Engineering to figure out and solve a problem. Math to determine statistics and tolerances. Each were vital in solving and even identifying the problem.

Technology

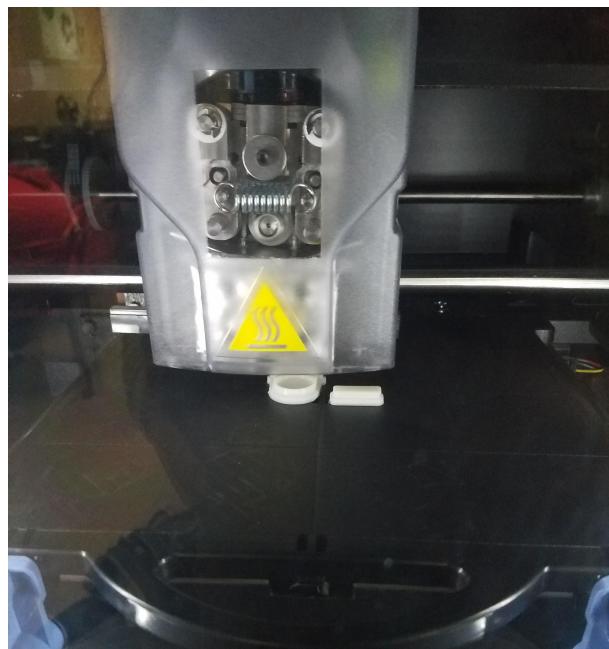
1. Inventor

-Inventor was used in the building process. Inventor is a 3D modeling software in which 2D sketches are constructed on a plane and then extruded to form 3D models of objects.



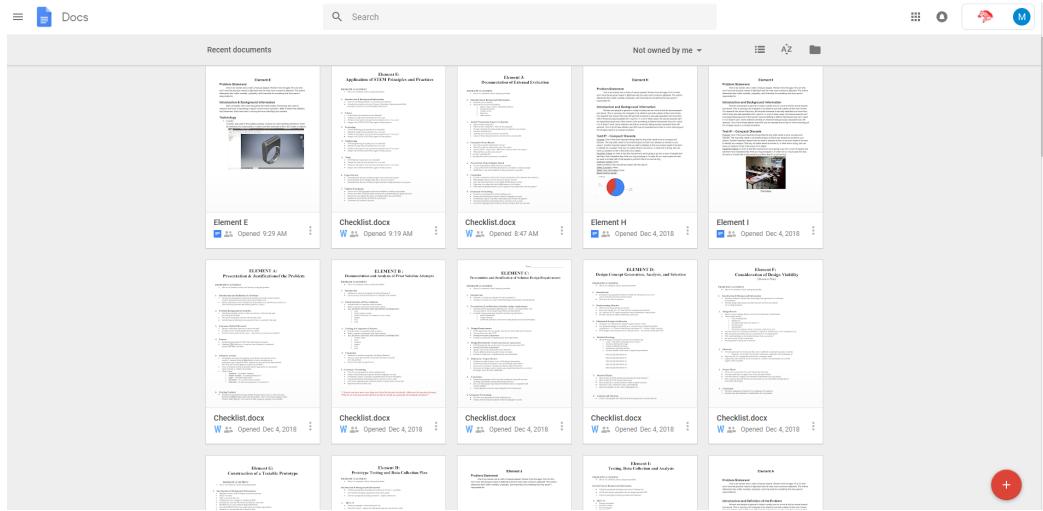
2. 3D printer

-The printer was used in the building process. It was what actually made the prototype.
The 3D printer is a process of making 3D objects from a digital stl file.



3. Microsoft

-Microsoft was used in every part of the project. It was used to make graphs for data, to record every step, and to create presentations for the project.



Engineering

1. Brainstorming

-Brainstorming was the very first step of the process. Brainstorming included listing things each person liked or disliked, then jumping in off other people's ideas until a problem that every likes is agreed upon.

Personal Experience or Interests

1

What do I know?

- I know math
- I know programming basics
- I know how to replicate art
- I know binary numbers
- I know video game logic

What do I love?

- I love video games
- I love art
- I love books
- I love Marvel
- I love lasertag

Don't you hate it when...

- wires get tangled
- batteries die
- you lose your keys
- you lose your bookmark
- your pen dies
- pants don't have pockets
- you have to get up in the morning.

5 Common Attack Paths

- Technical - people are complaining about it
- Health and Safety - people are getting hurt or killed
- Legal - people are being sued because
- Education - education programs exist to prevent
- Economics - Lack of a solution to this problem costs

2. Mock up

-Creating a design was part of the brainstorming and planning process. Each of the three team members came up with ten different sketches of possible solutions to the problem of sexual assault. The sketches were then limited down to one agreeable solution.

24

Sketch #3 MR

Needle ring

a needle that can hold out

25

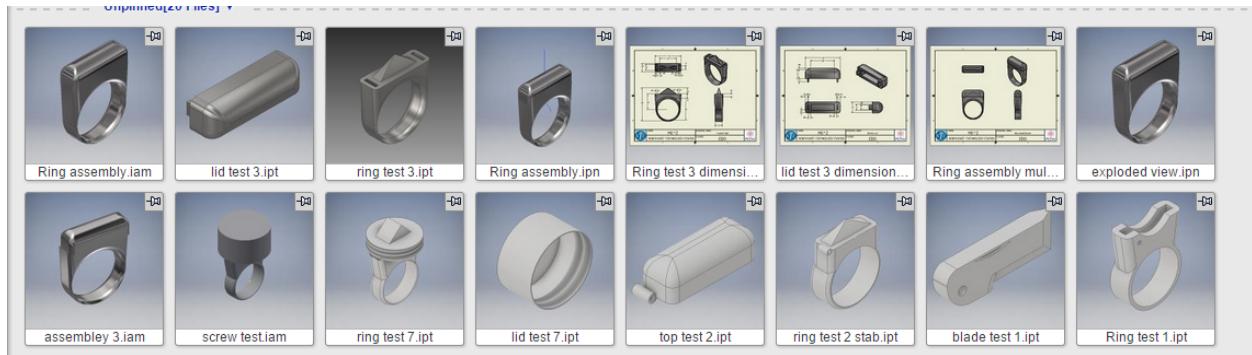
Sketch #4 MR

A press of a button allows the user to use

Taser Bracelet

3. Building

-The building process is one of the most important engineering steps. In order to create the prototype we had to think through how to create the prototype, how it would work, and how to make it. It started with a basics idea that was then changed multiple times. Finally tolerances had to be made until the ring and lid fit within a certain tolerance.



Math

1. Density

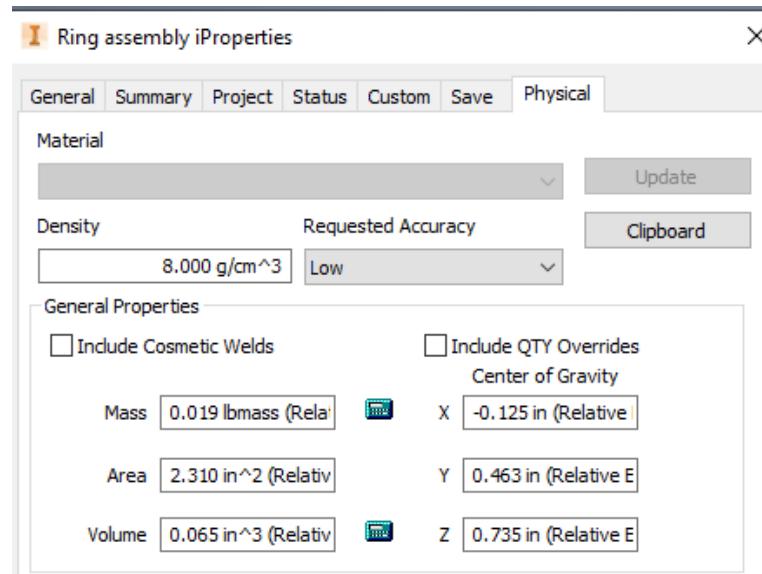
-Density was used in the review of the product. The density was used to estimate the cost of the product once it was made. The density was found by accessing the properties of the 3-dimensional model in which it gave computer calculated values.

2. Volume

-the volume of the product was used in order to determine the amount of materials used once the project was complete. The volume was sompute via the modeling software used to create the prototype.

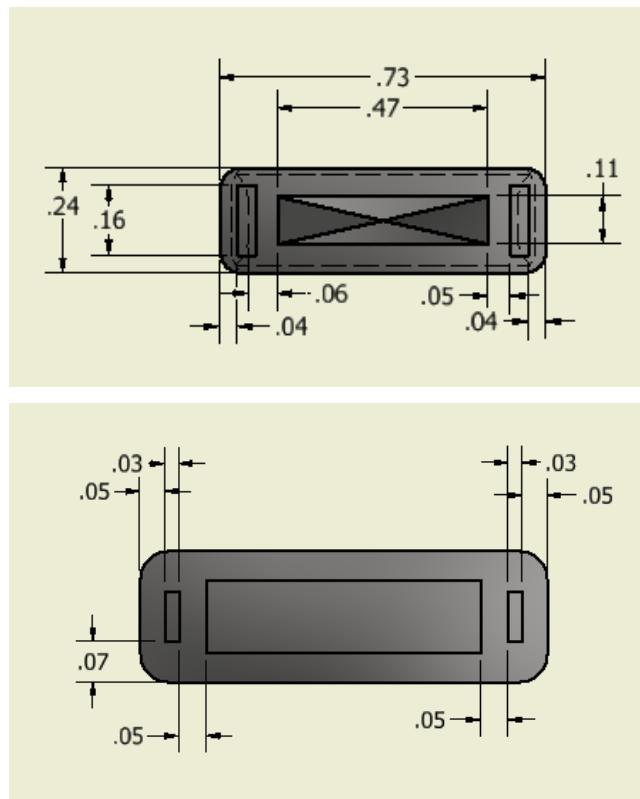
3. Area

-The area of the project was used in the testing of the prototype. Based upon the area value determined by the modeling software a calculation was made to determine that it takes 40,000 pounds to break metal in a one inch squared area.



4. Tolerance

-Tolerance was used in the creation of the prototype. In order for pieces to fit together they must have a tolerance or small area between the in order for them to fit. The tolerances had to be changed multiple times in the prototype to prevent breaking and for the lid to fit.



Validate/Conclusion

STEM principles were essential to the problem. Without the statistics provide in research it would be hard to even prove there is a problem. STEM also initiated the idea of a problem without being able to brainstorm a problem and then a solution there would be no project. TEchnology allowed us to build the project through software. Engineering allowed us to think of different solution and logically pick the best one. Math showed us how big of a problem we had and allowed us to estimate the cost of the project overall. STEM is the basis for solving problems, especially when it is something completely new.