Pneumatic VEX Stabilizer

This year for the "Make it Real Challenge", I designed a brace that stabilizes a pneumatic piston. The stabilizer allows the pneumatic piston to be held in place at a 90 degree angle. Integrating pneumatics into a design is one of the biggest challenges when building a robot. Not only do you have to understand how pneumatics work, but physically integrating them into your robot is very challenging. This pneumatic stabilizer will help the builder incorporate the pneumatic piston easily by allowing the pneumatic piston to be held in place securely and effectively in the design.

When working on my robot, I struggled to keep the pneumatic straight and keep it from wiggling. This is due to how there is only one place to secure the pneumatic, which is located at the bottom. The pneumatic would tend to loosen over time and cause it to not be stable. Not only that, but when I had to keep the pneumatic straight there was no way of doing it unless I zip-tied it or wedged it in-between two C channels. Which does not look clean nor correct. With this in mind, I now had a problem that I could solve. I would design a stabilizing brace that could hold the pneumatic piston.

Having used Fusion 360 for other projects, I decided to use this software for this project. After searching on VEX.com, I was able to locate the Standard Triangle Language, or stl file, for the Cylinder Rod Pivot. I imported the "Cylinder Rod Pivot.stl" file into Fusion 360 to base my stabilizer from. In Fusion 360, I used the sketch tool to add a cube in between the two existing walls so that the pneumatic piston would fit tightly within this cube. I did this by making an outline of the pneumatic base utilizing the sketch tool. I then offset the outline by 2 millimeters so that the pneumatic could slip in. I then used the cutting tool to cut into the existing cube so that it would be the exact size of the pneumatic. In order to stabilize the pneumatic, I used the sketch tool to outline the opening of the pneumatic and aligned it to my stabilizer. I used the cutting tool to provide the opening on my stabilizer. This allowed for a screw to travel through the stabilizer and the pneumatic opening, ensuring a secure fit.

In order to test the design, I 3D printed my first prototype. From this prototype I realized the following:

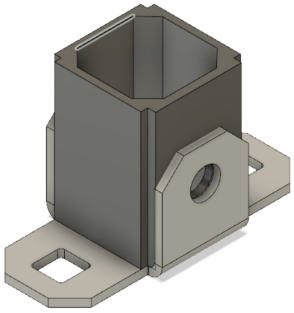
- **I had made the cut too deep, thus not allowing proper alignment of the pneumatic to my stabilizer. I used the extrude tool on the base in order to fix this alignment.**
- **I needed to add an additional cutout to the cube so that fitting could still be inserted into the pneumatic.**
- **The base needed to be stronger, so I used the extruding tool to thicken the base.**
- **For ease of use for the builders, I changed the square openings on the base to circular openings.**
- **To make the overall look of the design cleaner, I used the Fillet tool to round out the edges and corners for a cleaner design.**
- **Lastly, using the sketch and extrude tool, I made an outline of our Eastwood High school Trooper "E" and added this to the side of the stabilizer.**

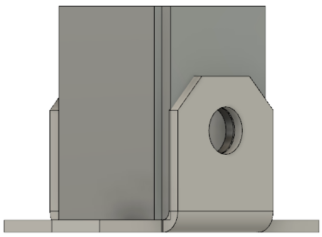
After my initial prototype and making the listed changes, I rendered my second prototype. I tested the stabilizer by inserting the piston and securing it to the robot. After analyzing the stabilizer, I was satisfied with this my final prototype design. In conclusion, I learned the following:

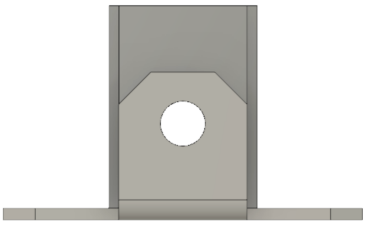
- **Became fluent with the CAD tools within Fusion 360**
- **Familiar with the process of problem solving and designing a new part**
- **How to make customizable designs to my liking**
- **Familiar with 3D printing and exporting files**
- **Familiar with pneumatics and how they worked**
- **Learned how to build off of an existing design to make a better product**

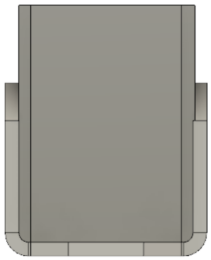
Images of the Design are Shown below.

First Prototype

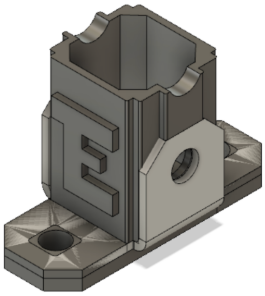


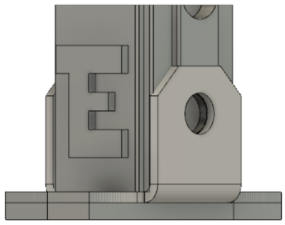


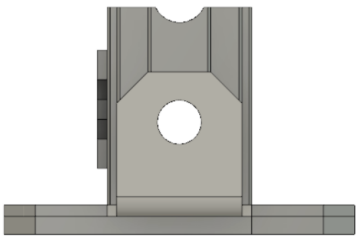




Second Prototype /Final Design







Prototype #1

Final Desgine