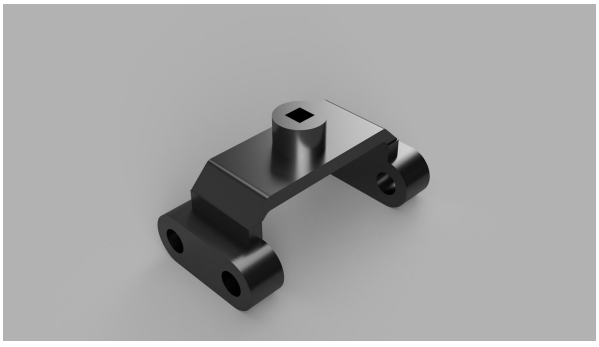
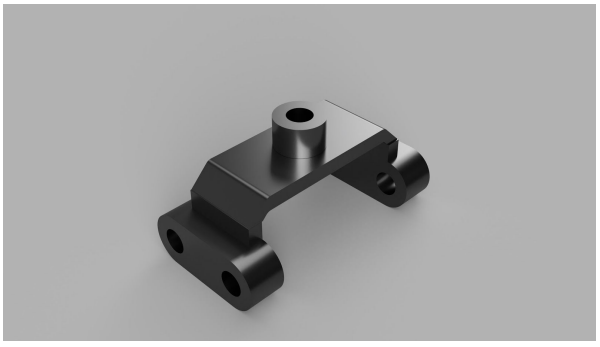
Single-hole Vertical Bearing

The component that team 6546A is proposing is a single-hole vertical bearing. The single-hole vertical bearing is made from Delrin plastic (the same as bearings) and has two different variants depending on your needs. The first variant has a circular hole the same size as a normal bearing and the second variant has a square hole that an axle fits snugly inside of. Both variants can be attached to a c-channel with a flat two-hole pitch bearing on either side of the c-channel. This supports a small flat piece that sits snug across a two wide c-channel, with a hole in the center for an axle to go through. The main difference between the two variables is the shape of the holes in which the axle goes through. These new components offer builders and mechanical engineers an increased level of complexity in designs; as builders can use the provided components to come up with more innovative designs without compromising the 18x18x18 size restraint given by the VEX Competition.



Variant 1

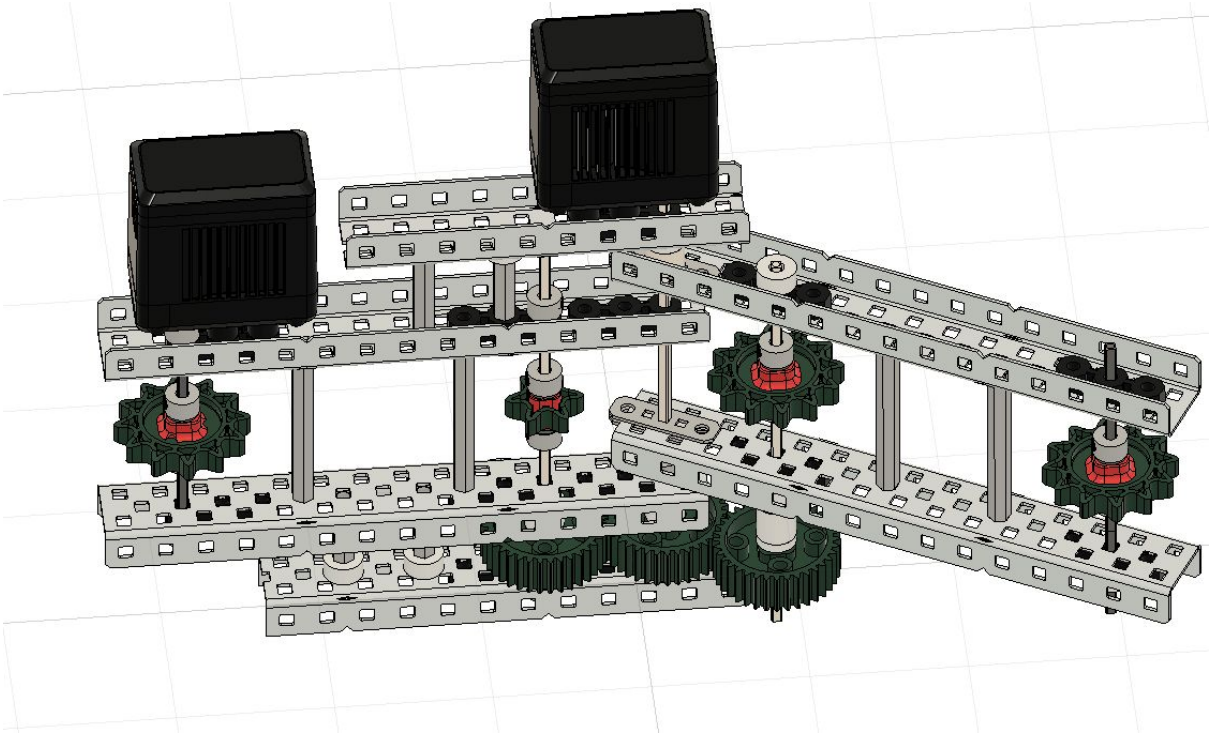


Variant 2

(Pieces rendered in Fusion 360 version 2.0.9313 by Diren Gomez)

Variant 1:

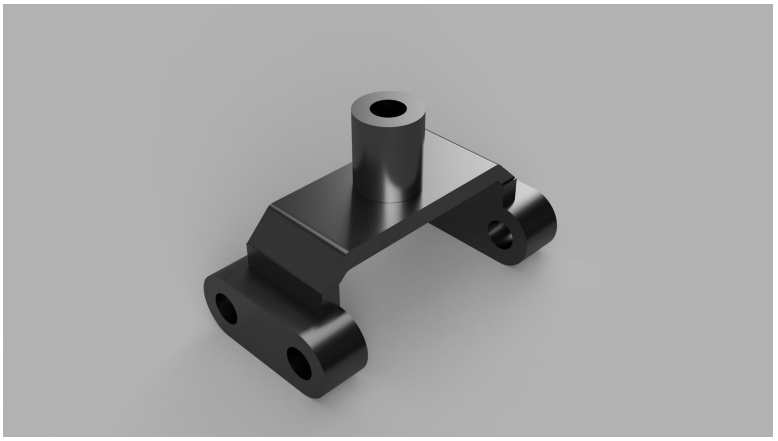
The design of Variant 1 was inspired when we were faced with problems from our intake. The problem as illustrated below, is when the drive shaft bar is hanging off the c-channel, otherwise the c-channel would interfere with the rubber high strength chain that would wrap between the sprockets on the first intake section. Ultimately, we moved the place for the drive shaft bar lock, which made our intake less stable. However, since the single-hole vertical bearing attaches to the side, it does take up less horizontal space, so it won't interfere with the chain in our intake. In addition to providing stability, it also provides spacing similar to a standard-issue bearing..



(Screenshot of intake CADed in Fusion 360 version 2.0.9313 by Benjamin Turney)

Variant 2:

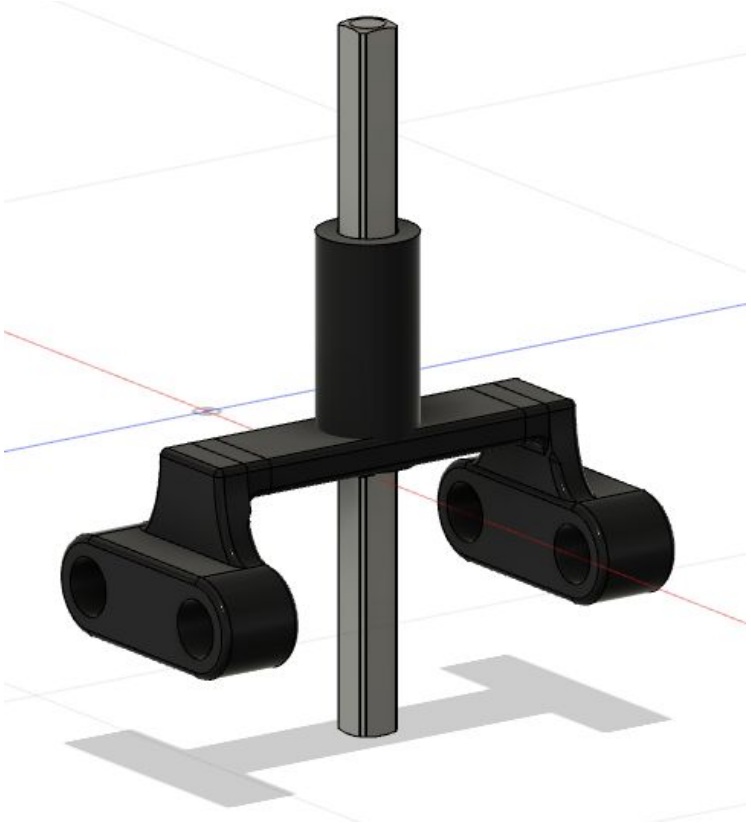
For Variant 2, the goal was to make the intake as compact as possible to get rid of interference. With it, we no longer need to sandwich axles between two c-channels. With this part, we now only need to take up space on one c-channel, and because of this, we can make the intake more compact. This would also apply to the drive base or uses in other robots where there is not enough space to include another c-channel, and this piece would allow for the wheel to be secured easier. Other possible variants of this would include a longer nub that keeps the axle straighter so that the axle has a smaller angle where it can move. This would be very useful where the extra space can be used. One such variation would look like so:



(Piece rendered in Fusion 360 version 2.0.9313 by Diren Gomez)

Benjamin Turney worked on the first iteration of the piece. After brainstorming and doing a little research, he decided on making a better way to keep axles straight, as this had been a prominent problem when designing the intake of their robot. At first, he was just planning on extending one hole of the current bearing, but realized that this design prohibited the use of actual bearings

and also would take up more space, however since the goal of this piece was to take up less space in the intake, he decided to attach it to the side of the c-channel, as this isn't used very much. However, his design was not very well planned out and didn't fit well on a c-channel, so he knew that the design would need to be revised.



(Screenshot taken by Benjamin Turney in Fusion 360 version 2.0.9313)

Then we decided to split up the work, and Diren started working on a new version while Benjamin continued to CAD the robot that they had built, to show how the part might be useful. The design process for the final version of the single-hole vertical pitch bearing consisted of taking Benjamin's design and improving it in some ways. One improvement was making the pieces fit more easily onto a c-channel. This allowed for everything to be more consistent and work together. Another way that it improved is that none of the bodies overlap as they did in the original design.

Fusion 360 will definitely be helpful in future seasons for designing our robots. Having a design to reference will significantly reduce the time that it takes to build our robot, while also improving the quality of the design. Furthermore, having a design to reference meant that team members were able to always update their design and no one was ever uninformed about design. This increased efficiency can result in having more time to practice driving before the competition, which makes our team perform better. If we choose to pursue careers in STEM, CADing will be an integral part of our jobs, especially when working on complex and expensive projects, without the risk of embarrassing mistakes when designs don't work. CADing has also shown how the software can assist in the co-operative side of the design process and how if two or more people work together, they can create something which is different and maybe even beautiful.