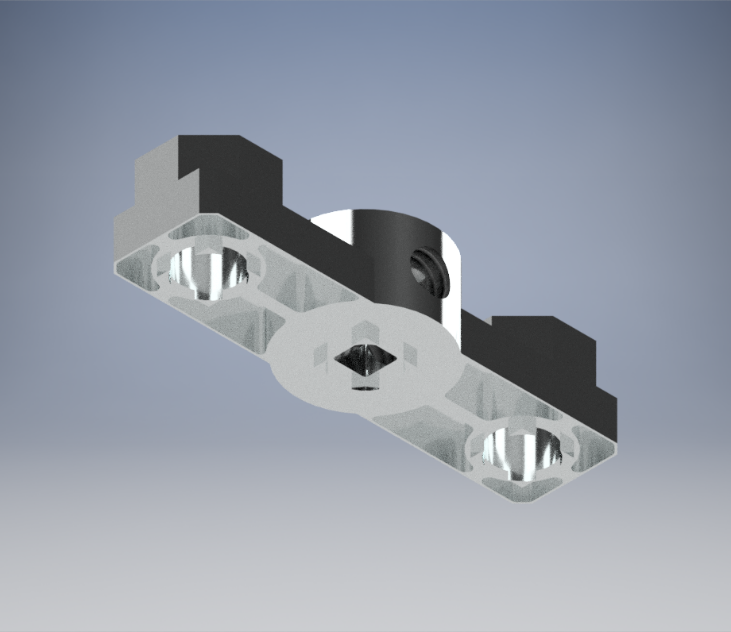


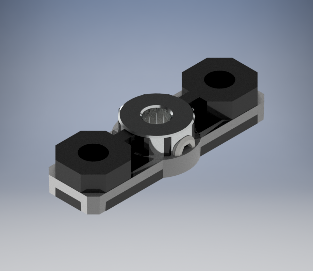
Ultimate Axle-Plate Interface

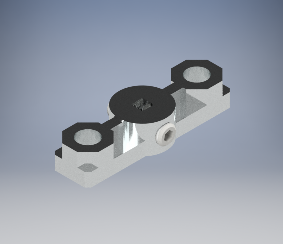
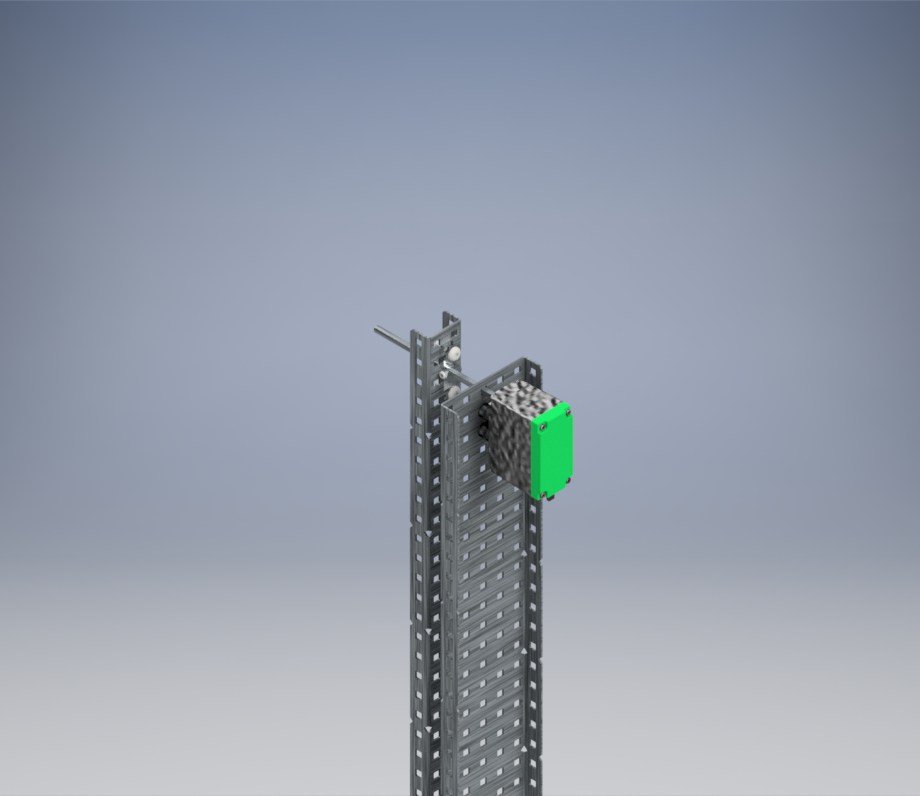
Make it Real Challenge 2018-2019 entry

Team 899A

Designer: Max Stine

I made this part to be the “ultimate” way of connecting axles and the sheets of metal in the kit, so that when the axle turns, the metal follows. I took inspiration from three other parts in the kit, the shaft collar, the bearing flat, and the lock bar. These parts all are useful for axles, and two are designed to constrain them to metal. I wanted a part that could have the locking ability of the shaft collar, the “square” hole of the lock bar, and the grips, as well as design, of the bearing flat. I called my hypothetical creation the “fusion” of these three components, as it was a much more descriptive name. The combination of these three parts allows for an axle to be held in place and used for rotating a metal piece. This allows for it to move metal, such as the metal of a lifting mechanism, like the one our robot has. Such a job would have been previously accomplished only by using gears, which are much larger than the part I have created.

The new part would be incorporated into robot design anywhere where axles are implemented to rotate metal, and it would be more compact than gears. I used ***Autodesk Inventor 2018*** to make the part, starting by using the vex kit of parts. I grabbed the three parts I wished to fuse and placing them inside each other, for a general idea. I saved it as “What I want to fuse”. It was very rough, as the lighting didn’t quite know what to do. I then opened the lock bar again (minus the insert) and proceeded to modify the design to have the qualities desired in the other two parts, I started all the way back at the first sketch. I increased the size of the center to match the shaft collar, and added holes going through it, to hold the screws that would hold the shaft in place. I removed the shape where the insert would go, replacing it with the square hole I wanted. I then added the grips onto the bottom and adjusted the top so that it would match the bearing flat. Although two out of the three original parts are made of plastic, I made this part solid steel, so that it would be strong and capable of having the regular shaft collar’s screws (ANSI B18.3 - 8-32 UNC - 0.1875(32)306) inserted in. Which I added in the assembly “Fusion Finished”. I also made a 5 second video using Inventor Studio, demonstrating how it may be used, the assembly of which is called “Fusion Animated”.



The key to this part is its simplicity. Although it is a fusion of three parts, it is only one part, giving it strength. It can accept other parts from the Vex kit of parts, including the shaft collar screws and standard axles. Its purpose is basic and common, and it performs its task well.

I learned from this little project that vex parts follow a few specific rules and sizes, so that it is easy to modify parts and stay within the system’s realistic boundaries. This is my first purely unique part I am making for Vex and will likely make more for later competitions. I will continue to use 3D design software in the future. I am even using Inventor to model the team’s entire robot. I will likely use it to update that design and make more new parts for future projects like this. This software helps me by allowing me to get my designs down in a place with unlimited parts, and it will help me along my career path as an engineer, who will need to prototype and design with ease.