

## 1069E Make It Real CAD Engineering Challenge Submission

For the VEX Robotics “Make It Real CAD Engineering Challenge” sponsored by Autodesk, our team, 1069E Critical Mass, created a wire clip that helps with the overall wiring process of a VEX Robotics Robot. As a team, we have stated every year that we are not fans of the wiring process and hate buying tons of zip-ties that we constantly cut off and replace while the robot is being evaluated for the current solution. That was when we came up with the idea of creating some reusable piece of plastic that would not only make wiring a little easier, but also help the environmental impact of plastic on the planet. The clip basically saps into any hole on a piece of VEX metal and has a bendable cylinder at the top that wires can be inserted into. This helps to solve our problem by providing an option that does not involve spending team funds on zip-ties, and allows for other options to be purchased.

The wire clip created would be used in place of other wire aligning methods to provide a cheaper, and more flexible option for teams to guide the wires on the robot. The part would mainly be used for guiding wires along the base, where the piece could be easily inserted. This part would be used as a more modular option for teams to handle their wires, rather than the more permanent option seen in zip-ties. This style of a clip that can contribute to robot design through reusability and modality. If a team was using a shaft encoder and decided to use a potentiometer instead, they could just remove the sensor and unclip the wires from the clips and then insert the new sensor instead of cutting all the zip-ties holding down the wires and applying new ones. Also, if a team wanted to do a radical redesign, but keep all of the same motors and sensors, they could simply leave the clips and then once the sensors and motors are attached, re-attach the clips. Another major benefit to this clip is that it can speed up the wiring process by simply having something that clips in instead of placing the zip-ties and cutting them.

The wire clip that was designed using Autodesk Inventor Professional 2017. This was done by creating two dimensional drawings and then extruding them or revolving them. Fillets were also used along the edges to provide a sleeker design to fit into the metal hole. Throughout the design process, the part was constantly tweaked to provide a better clip. The thickness of the cylinder was eventually thinned so that it would have more give, so it would be easier to fit wires into it. Also, the bottom part was eventually thinned also so that it would fit into the metal hole easier as well. We also used the VEX parts library to test our part in the virtual world, so we would know if our part worked and fitted into the constraints of the hole.

Much was learned by our team from this project of designing a new part for the VEX Robotics System. Since we began designing the part, we have integrated Inventor into our design process by testing some of our ideas in Autodesk Inventor. This shows that the software is useful to a competitive robotics team by providing a virtual world to build and test in. Many of us also plan on going into some sort of engineering field, and some of those will probably use software like Autodesk Inventor, which will give us a head start on that field.