VEX CAD Online Challenge: Shock Absorber

By: 6135W

The part we designed and created for this challenge was a VEX Shock Absorber. We took influence for this design upon watching the stress on the robots we had during the VEX Nothing But Net competition with how much force our pinball launcher inflicted on our robot and also the VEX Starstruck Competition when we had to brace the robot to absorb the impact of robots against the fence. This part will help solve the issue of large forces being applied to the robot that cause it to warp and to break by absorbing and distributing the large forces applied to the robot to help keep the robot from deteriorating.

This part is designed to attach to the robot using the two ends. The shock absorber uses compressed air on the interior and a spring on the exterior to absorb an impact of moderate to large force. The point connected opposite to the part of your robot that is receiving the force will be the point of distribution of the force. It will take part of the net force after the shock absorber absorbs some of the force.

I used Autodesk Inventor Professional 2017 to create this part. I first created the cylinder that would house the Insert that would compress the air. Secondly, I created the Insert that would move downwards into the cylinder that compresses the air to absorb some of the impact. Thirdly, I created the coil that would be attached to the base of the Insert and the Cylinder part to apply resistance between the other two parts. After I created those three parts I combined them together in an assembly file constraining the center axis of the insert, cylinder, and coil as well as mating the tangent of the coil to the bases of the insert and cylinder.

From this project, I learned a lot about how a shock absorber works and how it is made. It took a lot of research to understand a common shock absorber well enough to create a part with it. I first had to understand where they are commonly placed and how much room they take up so I could size it correctly. Then, I had to figure out what role the oil in the top of the cylinder and the insert had to replace it with something more legal in vex, which just happened to be compressed air. After all of that, I could design how it would fit into a robot and how long and wide it needed to be.

In the future, I do plan to use 3D design software because my aspirations are to study mechanical engineering in college. In my career path 3D design software might just be the most important thing we do. We can construct the entire project virtually, in less time, and without spending a dime. If I were to be building a robot in the future and I used a 3D design software to mock it up before building it, I would be able to decrease space used in multiple parts to help it fit through odd places, I would be able to decrease the pricing by eliminating several functions that were not as necessary, I would be able to see flaws in the design, and so many more things as well, all without spending a dime on the product itself.

The Autodesk Inventor Professional Software helps tremendously on a VEX Robotics Competition Team. This year thus far, we have made a total of 3 complete robot CAD assemblies as well as 6 different intakes for this year’s game. We could not have come this far this fast this year if not for the 3D design software we have been using. We have been able to manipulate the design, test the design, and construct this design all from the Autodesk software. This is such a help to us because if we were to build each individual intake or robot assembly by hand it would take about 8x the time it took to CAD it. Inside of the CAD as well, we enjoy the luxury of measuring the part and animating it to see how it will look on the actual robot as well without going through the hassle of building it.