

7316B The Team With Labcoats

Firestone Robotics

Online Cad Challenge

12 January 2020

The Sprocket Wheel

This year as our team 7316B when designing and building our robot for tower takeover we realized something very important for the game. This year it is very beneficial to make your drive train as skinny as possible allowing you to access the goal zones easier. One problem with this is that if you cannot run your wheels with direct power (a motor connected to the same axel as the wheel), then it is very hard to shorten the width of the drive train. This is because to power the wheels when you are not using direct power you must use a gear train or use sprockets. The problem with this that both options take up a lot of space. Our team decided to solve the problem of the size of sprockets and gears by creating the “Sprocket Wheel.”

The “Sprocket Wheel,” is a combination of a VEX sprocket and wheel. It is any VEX wheel split down the middle with a shortened sprocket in between the two halves. What this does is significantly reduce the amount of space required for a sprocket and a wheel on the same axel. This can also be very versatile as there inside pegs/inserts that connect both halves of the wheel to the sprocket, and this allows the size of sprocket or type of wheel to be changed very easily. Once the builder has the size sprocket and the type of wheel they want then the pieces just snap together and are ready to be put on an axel. There is also another benefit or problem solved as a bonus. Sometimes, when a robot is heavier it is possible for an axel to twist because of the resistance of the wheel to turning and the force applied to the sprocket. With the “Sprocket

Wheel,” the force that is applied to the sprocket is directly in the center of the wheel and the area of resistance force (The two halves of the wheel which touch the ground). Overall, the “Sprocket Wheel,” is very versatile, comes with many benefits, and solves the problem of drive trains being too wide due to sprockets or gears.

For creating this part our team used Autodesk Inventor Professional 2020. All of the members of our robotics club are enrolled in Firestone’s PLTW program; in which, we learn the basics of using Autodesk Inventor. To start this project we first went to VEX’s website to view their products. Next, we downloaded the provided cad models of VEX wheels and sprockets. Then we used Autodesk Inventor to modify the parts into a new invention. To do so, we made a sketch of a thin line down the center of wheels and extruded it (in cutting mode). This cut the wheel into two separate parts. Then, I did the same in order to remove the spacing/spacers that is attached to either side of the sprockets. We then made a new assembly file and used a number of constraints such as mate and flush in order to attach the two halves of the wheel to either side of the sprocket. This resulted in our final model and we were able to then make a .dwg or drawing file of this part through Autodesk Inventor. This project taught all of our team that it is very possible and a great thing to chase after a design or idea when it comes to you. If everyone followed this rule then technology and society would evolve and change for the better so quickly. New medicines, products, computers, parts, etc., the list is endless when you chase after your imagination. We will definitely use more of Autodesk Inventor in the future because for starters it is a great tool for a robotics team. It allows us to build our robot in CAD first to make sure it works, give us a plan, and do early testing and simulations. Also, knowing how to use Autodesk Inventor is a great skill that many of us will most likely use on a day to day basis as the majority

of our team wants to one day be engineers and product designers. We can proudly say that even if this product does not become a real item, this project has taught us so much and it was a great experience that helped to prepare us for our future!