

Gear/Sprocket Wheel Inserts

January 5th, 2019

The Problem:

With the 3.25 inch omni or traction wheel, teams are able to have a geared drivetrain by attaching a gear or sprocket directly to the holes on the wheel. The issue with 4-inch wheels is that there are no holes to directly mount a sprocket or gear. Instead, the wheel must be connected to gears and sprockets with an axle, which creates a lot of “play”. In other words, the gear or sprocket could be stationary, but the wheel could rotate a couple extra degrees in either direction. This creates an inconsistency with teams’ autonomous, where the position of the robot must be very accurate. This issue is especially worse in this year’s game. Robots must be on a very accurate angle to hit flags, and 4-inch wheels are required to climb on top of the platform. Being unable to attach gears or sprockets to wheels also leads to axles twisting and causing damage to it. If a robot is to run into a wall and the wheels stop but the motors are still turning the gear, the gear will cause the axle to twist. If the wheel was directly attached to the gear, this problem would not occur. In the past, our team has created a solution in which we use a cut piece of an aluminum plate, and use the holes and lots of squishing/friction to keep the gears attached to wheels. This is difficult for some teams to accomplish, due to being unable to access machinery for this task. It also relies on being able to squish an aluminum plate and use as much friction as possible, creating a plausible inconsistency.

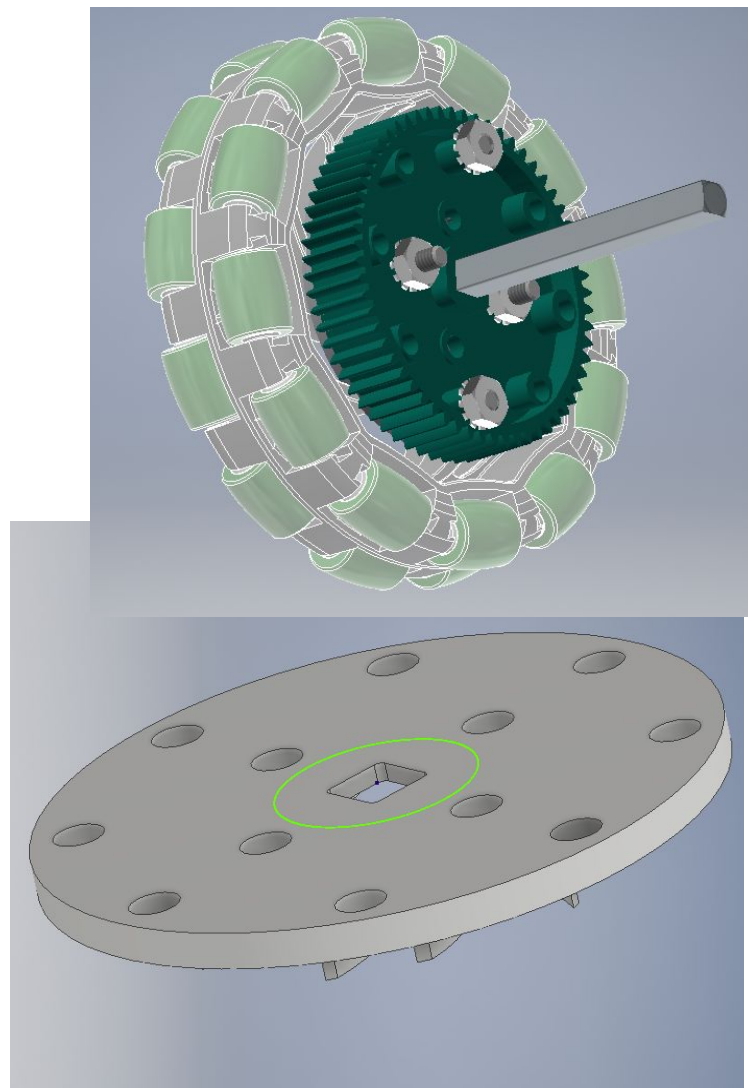
Our Solution:

The design we came up with is not so different from our aluminum plate idea, but is plastic and requires a lot less squishing. The design is a plastic piece with an axle hole and other holes that are lined up with the holes on gears and sprockets. There are also small pieces that were designed to the shape of the wheel’s interior curves to make sure the piece does not spin without the wheel. The design can be used in two ways. Using one, you are able to attach it to the wheel and screw it from the gear to the insert, and have an axle collar keeping the pieces together. The other option is to put one insert on each side of the wheel, and have screws going from the gear to the insert on the other side. This design can be made for different sized wheels, given that they have the space for holes (which mecanums do not unless you cut off some of the interior curves).

The Process:

To come up with this idea, we first went to our alumni, one of which who suddenly said, “Do you know what would be great? If there was a part that let us NOT use our smushed aluminum pieces to gear drivetrains.” From there, we started designing the simplest mechanism we could. At first, there were small pegs that would insert to the interior wheels, but they got in the way

of screws and were deemed unusable. We then moved to the specially curved pieces to keep the wheel in place. From there, if any screws were to ever interfere with parts of the insert or even the wheel, you could either shave the screw down or simply move to any of the other holes. In any position, at all times, there are multiple spaces available to screw it in. Not too long after, the CADing for our simplistic idea was done. We also needed to create the adjacent piece for the other side of the wheel, which you will find in our .iam. This piece makes it so you don't have to buy a new and special wheel simply for gearing a drive base, and is easy to use with pieces you already have.

Pictures:

Authors: Edward Gao + Alice Montes

