

Make It Real CAD Engineering Challenge

Sponsored by Autodesk - 2019

Team 1313A - RoboRunners (Elementary VEX IQ)

Brief Introduction:

Identify why you created the part - what functionality are you improving or what issue are you solving?

In many beginning level VEX IQ workshops and classes, we have helped kids build their first robot. An easy beginning design is the [VEX IQ Speed-Bot](#). We made this part because when kids drive a VEX IQ Speed-Bot on carpet, or play this year's "Next Level" IQ game, the "standoff and connector" that sticks down gets stuck on carpet or blue barriers and drives jerky. This is a problem if you want to use the Speed-bot on anything other than a smooth, hard surface. To solve this problem, we

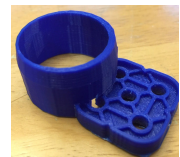


tried to modify that area of the Speed-Bot with existing VEX IQ parts but could not find a solution. One idea we had was a wheel that moves in any direction but VEX IQ does not have that part. Our mentor said that was called a caster or ball wheel. We found a similar wheel online at www.thingiverse.com but when one of our team members printed the part, it easily broke because of bad design. We decided that our design could be tougher, should easily connect to VEX IQ beams and use the [VEX IQ 25mm Ball](#).

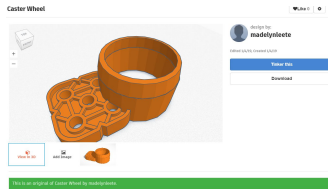
Explanation of how the new part would be used and how it fits into an existing design.



The caster wheel is used on a Speed-Bot in place of the "standoff and connector" that sticks down in the front and back. The caster wheel helps because the robot won't get caught on carpet and drives like it is on a hard surface. The caster wheel will help kids in classrooms when there is carpeting instead of tile. With our caster wheel design, the Speed-Bot can now drive over the blue barriers in this year's IQ Game "Next Level." It turns as well as a 4-wheel robot with all omni wheels but drives smoother.



Explanation of how you used Tinkercad to design the new part AND clearly state the version of software used.



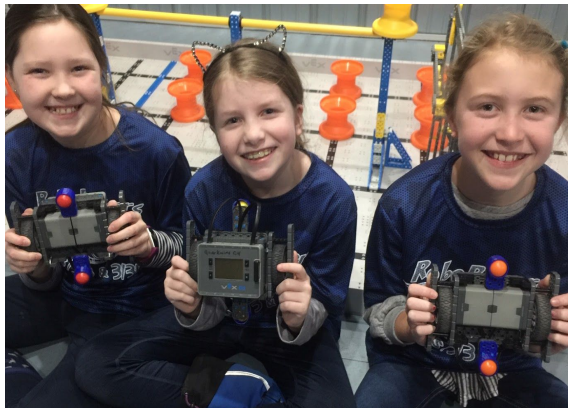
For this design I used:

- Online Autodesk Tinkercad, 2018: www.tinkercad.com
- Slicing software, Cura 2.7.0 by Ultimaker.com
- [Monoprice Maker Select 3D Printer](#)

I used the import function to make a VEX IQ standard 2x2 beam. Then I used two cylinders, one solid (28mm-O.D.) and one hole (26.5mm-I.D.). The hole was used to cut out the inside of the solid cylinder. Next, I used two cones (one solid cone and one hole cone) to keep the VEX IQ 25mm Ball from falling out. I used the hole cone to cut out the middle of the solid cone. Then I put the cut-out cone on top of the cut-out cylinder, and put that on the VEX IQ 2x2 beam. To make sure the pins would be able to fit in the 2x2 beam holes, I used two very small cylinder holes. The last step was to use a big cube hole as a cutting object to cut off the top of the cone so the VEX IQ 25mm Ball can touch the ground. The final height of the assembled ball holder is 17.5mm.

Brief conclusion:

What did you learn from this project? Will you use 3D design software in the future? If so, for what? How does this software help you if you are on a competitive robotics team? Will learning 3D design software help you in your career path? If so, how?



This project helped me get more comfortable with Tinkercad and 3D modeling. I plan to continue to use 3D design software for my competitive team. This year I started using Snapcad to create good representations of our competition robot for our engineering design notebook. We also use Snapcad to prototype ideas for different design iterations. I haven't decided what my career path will be, but I think understanding computer software will help with many different jobs.