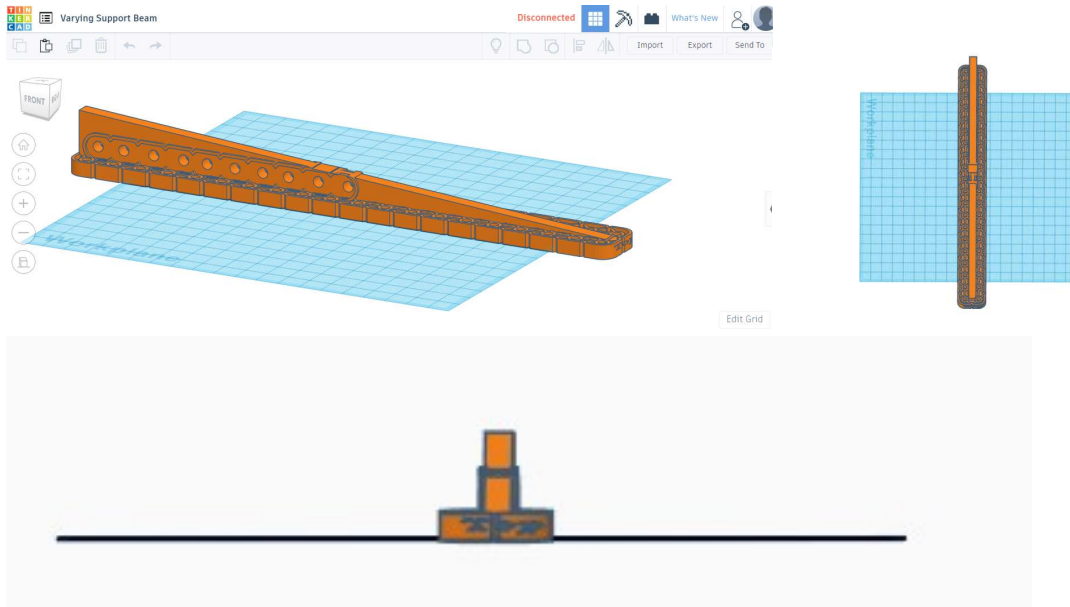


Varying Support Beam



Various angles of our part, screenshot in Tinkercad

Our Problem

Supporting our arm is a 2x20 beam. It is only supported at one end, near the the base. This, combined with our heavy arm, causes the supports to bend, often causing the arm to snap off the base completely. This, as you can imagine, is a problem for our team.

The Solution

Our solution is a reinforced 2x20 beam. However, a solid support in the form of a rectangle on top of our beam is unnecessary. So, we created a 2x20 beam with a triangle support. We chose a triangle because It saves material and weight, while providing plenty of support where it is needed. We added the holes to save weight, as well as to provide places to connect other pieces.

The Design

We designed our part in Tinkercad. Instead of designing the part from scratch, we went to

Snapcad, a VEX IQ CAD program, and downloaded a CAD file of a 2x20 beam, and imported it into Tinkercad. Then we added the support from the primitive shapes on Tinkercad, and added the holes by downloading a 1x10 beam from Snapcad.

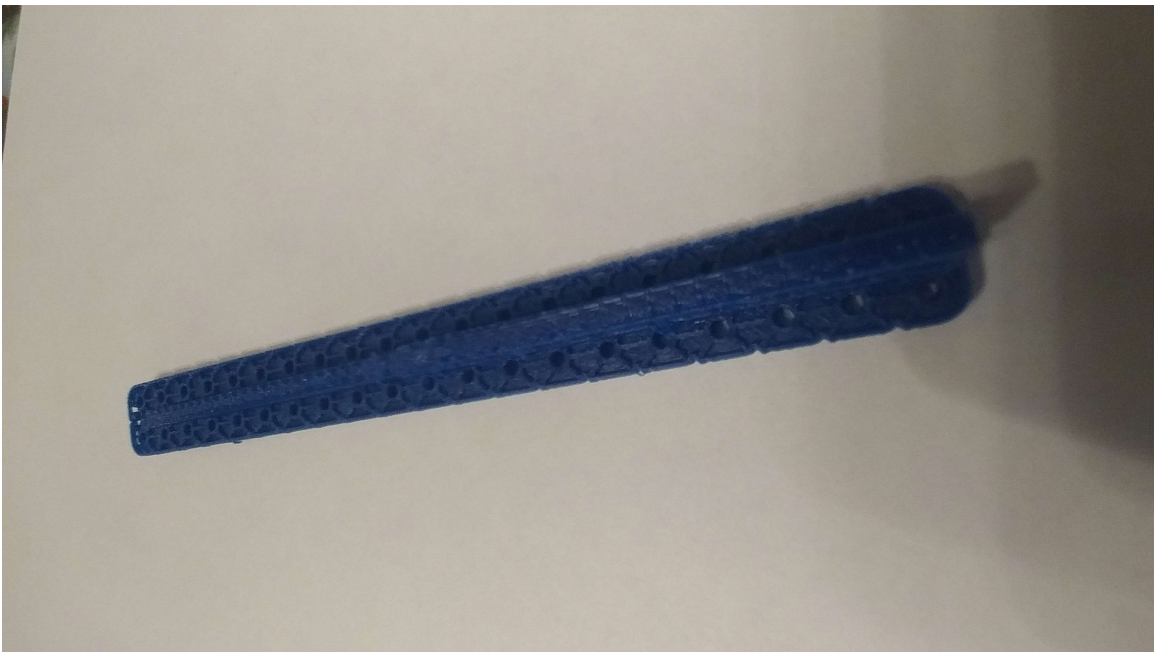
Usage

The Varying Support Beam could be used in a variety of ways. The implementation we developed it for, however, was to support our arm. To fix our problem, we would attach the bottom of our part, where the triangle is widest, to the base. The top would attach to our arm. It would attach this way because if you bend a Vex IQ 2x20, you will see that it bends the most on the bottom of the piece, while flexing very little on the top of the piece. That is why we have a triangle on the top for support, instead of a normal bar. It provides the most support on the bottom of the part, where it is needed the most. We even labeled the top and bottom (see above screenshots).

Conclusion

We have learned a great deal from this, and one of the lessons was that it is Hard to design Vex IQ pieces. There are thousands of little details, all of which you have to design perfectly. We also learned that often in 3D designing, there is someone who has designed a part that will help you. That is why we downloaded all the Vex parts, instead of creating our own. We hope to use 3D design software in the future, since our team has a new 3D printer. Most of our team wants to be engineers or have robotics-related jobs as adults, so we would probably use this technology in the future.

BONUS PRIZE



We used a MonoPrice Select 3D printer to print the Varying Support Beam, and our slicer program was Ultimaker CURA. It was printed using blue PLA plastic.