Team 1437
Patriot Robotics
Viewpoint School

The VEX Hinge

We decided to modify the hinge VEX already offers to give it more applications in the competition based off our previous experiences using the VEX hinges.

Because VEX uses hinges made by a third party provider, the hinge is much larger than what is sensible for VEX competition robots and does not have VEX EDR spacing. The current hinge is also steel which adds unnecessary weight, and the current range of motion has room for improvement. In addition to solving these problems, our hinge design had a special catch for rubber bands as most of our pieces that require hinges have an "open" and "closed" state that requires rubber bands to flex between the two states.

Before we began making the CAD model, we prioritized each of the desired modifications using an engineering matrix, ultimately deciding that adapting the hinge to fit other VEX parts was the most important change. Taking all of the merits into consideration, we were able to draw two different hinges and choose the more adventitious of the two using the merits described by our engineering matrix. We then considered what the rubber band hook should look like and chose the "T model" as it allowed us to attach rubber bands from either direction.

We then drew the hinge in Solidworks and used a 3D model to print it, finding that we needed to make it less wide across in order to nestle into a C-channel and less thick so that we could add a screw from the side wall of a C-channel. We also found that our first model was too long which would make the mechanism using the hinge unnecessarily large.

In our second draft, we also decided that it would be better to remove the rubber band catch in order to further increase the range of motion which we prioritized over the mechanism itself. Also, the size of the catch is entirely dependent upon the desired number and density of rubber bands required for the mechanism to flex between the two states which can vary widely depending on the type of project. We decided that the range of motion of the hinge should not be limited by factors that may not even be applicable to certain projects, and printed a third version without the catch.

The new hinge greatly increases the range of motion compared to the old hinge, has VEX EDR standard spacing, and is small enough to fit the needs of most competition robots. We also chose to make our hinge modular, using a screw and lock nut as the pin so that it can be easily disassembled. We cannot wait to see what creative teams will do to modify this hinge.