CAD Challenge – New Bearing Flat

When reflecting on what part to create for the CAD challenge I quickly decided to create a new bearing flat. The program I choose for my design was Autodesk Inventor Professional 2015. I choose this program due to my familiarity with it from using it to design our current Nothing But Net robot. I chose to redesign the bearing flat because it is a part that is use frequently in the design process. With the current bearing flat design there are two main problems. First, it does not fit up next to the inside edges of the c-channels because the inside radius of the c-channel interferes with the sharp corner of the bearing flat. Secondly, the bearing flat is too long preventing it from fitting within the new 3x1 metal c-channel introduced this year.

The new bearing flat that I created is an improvement to the vex bearing flat that currently exists. The new design is able to fit in two more configurations than the original part. The new bearing flat has been shortened so that it will fit in the width of a 3x1. It has also been narrowed to allow it to mount along the inside edge of the C-channel without modification. With the old bearing flats the edges had to be filed in order to fit in either of these two configurations. For my new design, a radius was added on the outside of the bearing flat so that it would clear the inside radius of the C-channel. The overall length and width was also minimized to avoid interference. The new design will be more helpful because it can be used in many more places without modification than the existing one.

We realized that the most cost effective manufacturing method for this type of part is injection molding, we added features to allow the part to be easily made. Plastic parts cannot

be removed from the molds after curing with sides that are perfectly flat (90º angle), so we added 2º of draft to all sides.

In our new design we duplicated the locating tabs on the bottom side of the bearing flat the same as the current design because they work well as is. We also left the recessed pockets on the bottom side of the bearing flat to reduce the amount of plastic needed for the part effectively making the part to be lighter. Also, consistent wall thickness is required for the plastic part to cool uniformly in the mold.

Inventor helps our robotics team become better and more efficient builders. It also helps us with our budget because we don't make costly mistakes making incorrect cuts on the metal. This year we have incorporated it into our design process. After discussing our ideas and a completing a bit of prototyping we use Inventor to design the part that we would like to build. By having the design on Inventor it helps our team build correctly the first time. We found it extremely helpful when cutting our metal when we built a holonomic drive. There were many odd shapes that needed to be cut and we were able to make the cuts correctly and not waste any metal or money. It is like an instruction model with helpful directions as we put the robot together. I am confident that our team will continue to use this great tool.

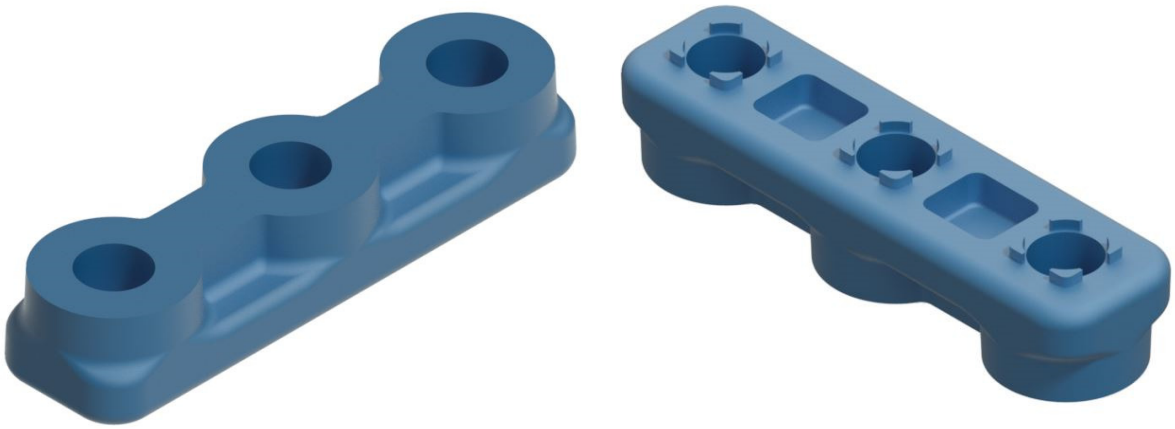

Figure 1: New bearing flat design

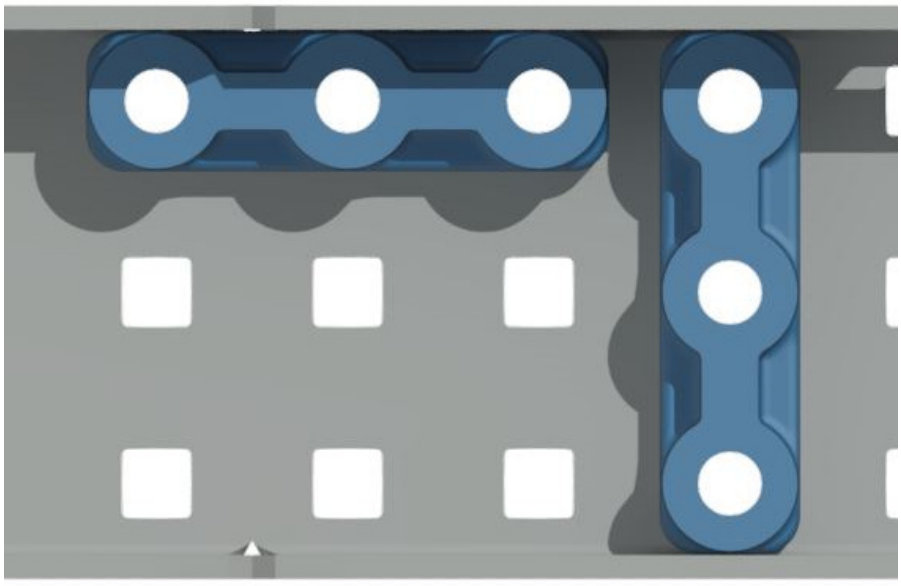

Figure 2: New bearing flat assembly – Top View

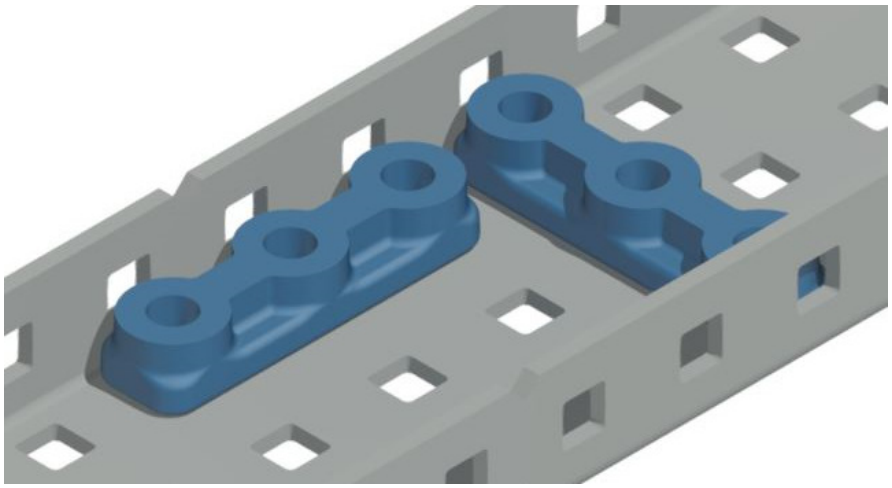

Figure 3: New bearing flat assembly – ISO View

Figure 4: New design mounts on the inside edge of any C-Channel

Figure 5: New design mounts within the 3 x 1 C-Channel.