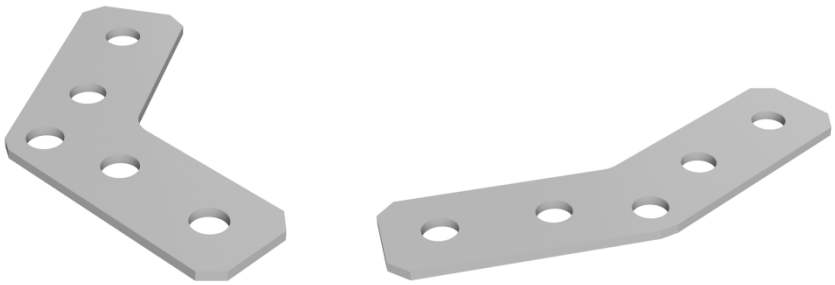
UC ROBOTICS

University of Canterbury Competitive Robotics (UCCR1)

30° & 60° Angle Gussets

Make It Real CAD Engineering Challenge Sponsored by Autodesk



AUTODESK.

Charlie McCourt

Table of Contents

Introduction

The 45° angle gusset is one of the more useful structural parts in the VEX library but it also limits a robot's design. This is caused the inability to easily select other angles. We have created two new gussets of 30° and 60° that will compliment the current 45° gusset while allowing an increased variety of design options. With these new parts, the greater flexibility of designing robots will allow teams to avoid cutting metal to make their own parts.

Design

These two parts were created using Autodesk Fusion 360, based on the 45° gusset designed by VEX. By basing our new parts on a current design, we have been able to ensure design compatibility with other VEX parts.

To start, we took the CAD file for the 45° angle gusset and dimensioned it using the drawing tool in Autodesk Fusion 360.

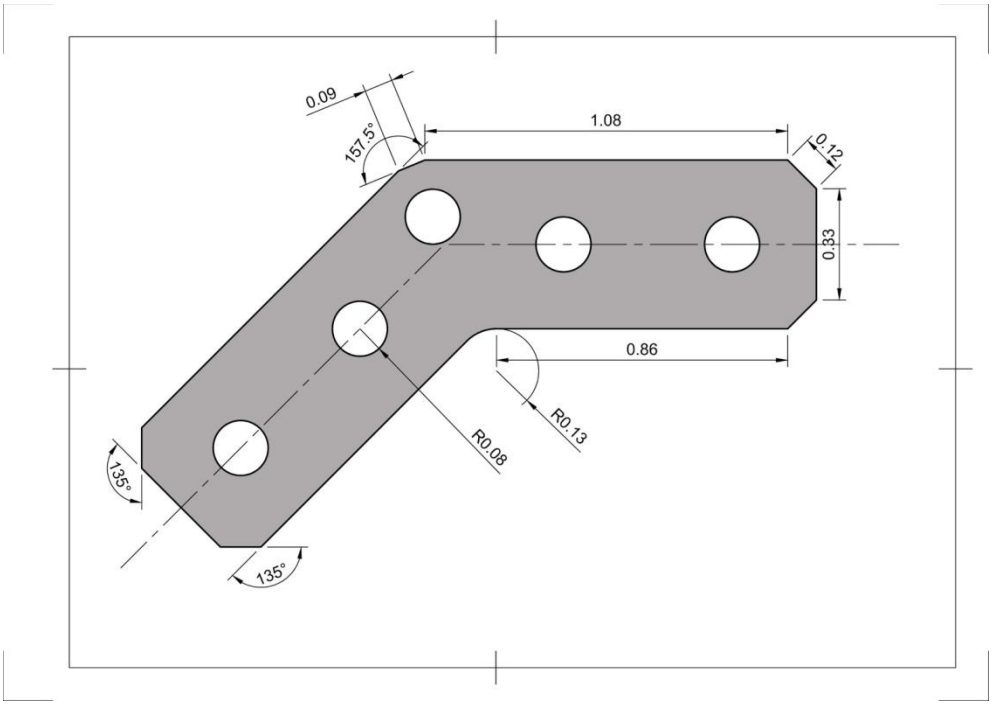


Figure 1: *45° angle gusset designed by VEX.*

From here we effectively bent the 45° angle gusset using the outer corner as the point of rotation and tidied up the inside to make them look similar to the 45° angle gusset so they could be sold as a set.

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Figure 2: *30° & 60° angle gusset designed by UCCR.*

Functionality

The 30° and 60° angle gussets are simple in functionality but allow a great variety of design concepts that are currently feasible but not structurally sound. An example of this is the triangular “kiwi” drive seen below.

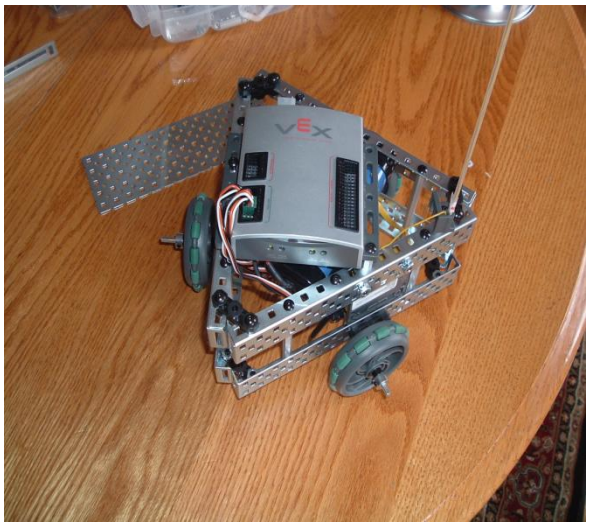

Figure 3: *Kiwi drive robot using bearings to brace c-channel.*

As a good example of a more complex drive chassis, the 60° gussets would add greater structural rigidity than the bearings and ensure the triangular drive remains equilateral. These gussets would greatly benefit structural integrity in robots requiring 30° or 60° angles. The design of the gussets also maintains compatibility with existing VEX parts.

Conclusion

These new 30° and 60° angle gussets will give teams the ability to broaden their designing horizons with 100% more angles to choose from. Perfect for any chassis, bracing structure, intake design, or anything else that could be dreamt of, these new gussets will survive anything thrown at them.

Autodesk Fusion 360 was a great program for this project as it is much easier for someone new to CAD to pick up than Autodesk Inventor while still being a powerful CAD software. We learned a lot about CAD and we will be trying to use it in the future to help with developing our robots.