

VEX OCTO-GUSSET

A 45 degree gusset designed specifically for octagonal chassis

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INTRODUCTION

For the entirety of our careers in VEX Robotics, our teams have gravitated towards octagonal chassis for the basis of our robots. Octagonal chassis come with useful advantages: it is the only chassis that can reliably and safely support true holonomic drives, they can fit into corners with greater ease, and they place significantly less emphasis on a specific “forward direction” for the robot to maintain. However, the disadvantage that tends to discourage teams from using an octagonal chassis is the fact that 45 degree angles tend to make the robot an irrational length, which prohibits the placement of a C-channel or any other VEX part that is of a rational length.

THE NEW PART

These 45 degree gussets are a simple but powerful part designed specifically to accommodate an octagonal chassis of a specific size. The screw hole pairs are spaced to an irrational length so that the final chassis length is rational. The gusset labeled “13 35” is designed to form a 35-hole-long octagon made from eight 13-hole-long C-channels. The gusset labeled “9 28” is designed to form a 28-hole-long octagon made from eight 9-hole-long C-channels. While these C-channel lengths may seem inconvenient or confusing, this allows for an exceptionally greater degree of freedom for building the rest of the robot on the chassis.

FUSION 360

The Fusion files for the two gussets are modified from the original 35 degree gusset STEP file provided by VEX using Fusion 360 version 2.0.3800. The length the screw hole pairs on each gusset should be spaced was calculated using the equation $L = \frac{c}{\sin(s)}$, where s is equal to the spacing amount in inches, l is equal to the length of the chassis, and c is equal to the length of each C-channel.

CONCLUSION

Autodesk software has always been known as the industry standard for their fantastic capabilities. Some of us have used Maya and AutoCAD extensively in the past, and plan to continue to do so in the future.