

C-Channel T Gusset

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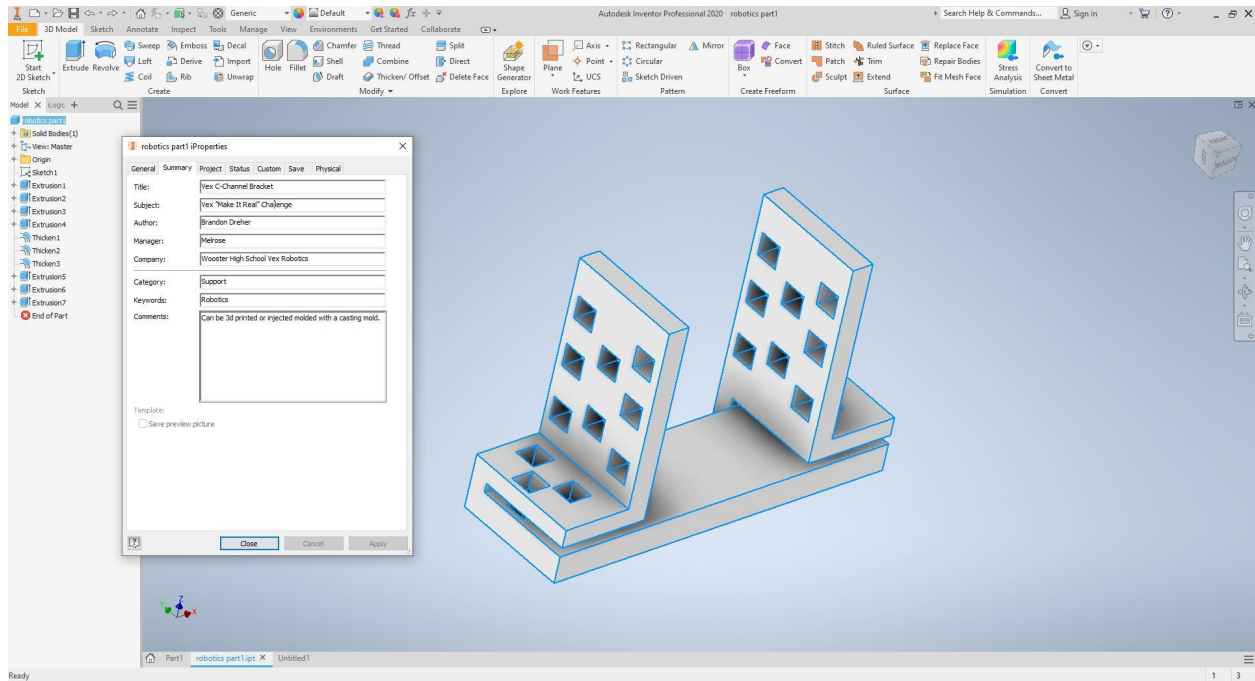
Brandon Dreher

(Using Autodesk Inventor Professional 2020)

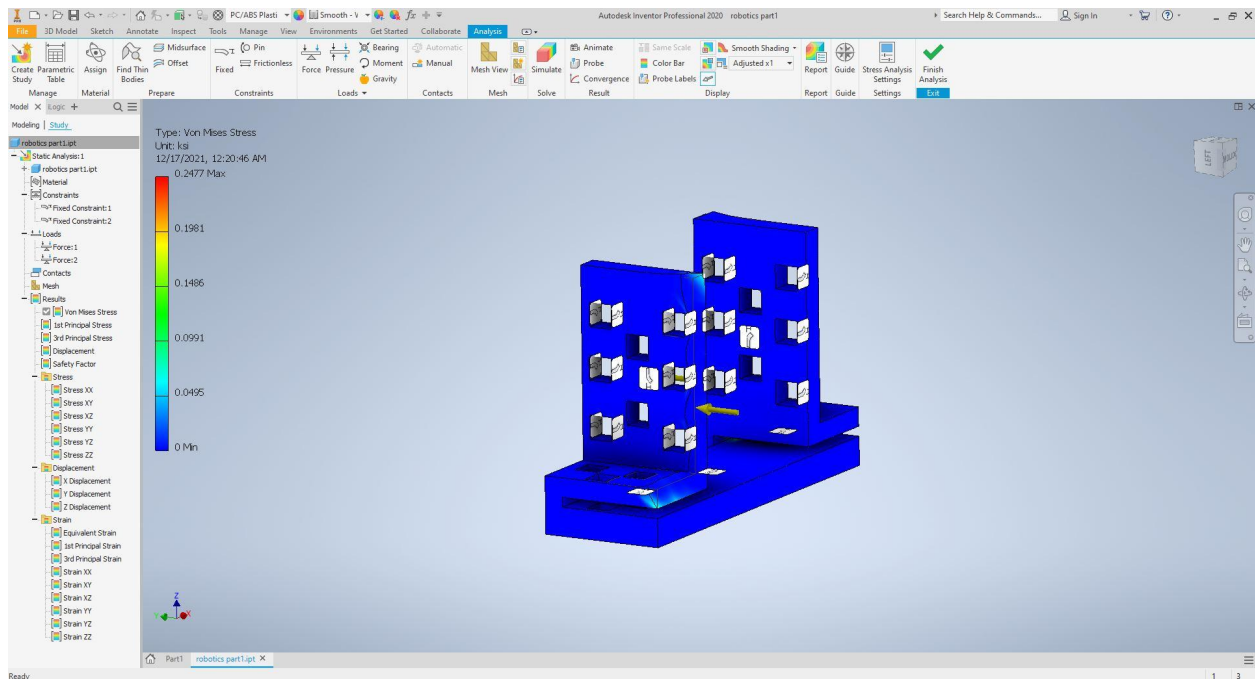
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Pictures:



This is the final product of the design that we all came up with as a team.



In Autodesk Inventor Professional we did a stress test on our new T Gusset. The stress test showed that the design could in fact take a lot of stress without bending or breaking.

Summary:

A huge part of this year's Vex Robotics Competition is Lifting mobile goals or game elements. In order to be able to lift these elements, robots must be equipped with some kind of lift, whether it be a four bar, cascade lift, double reverse four-bar, etc. One thing that all of these lifts have in common is you need bars built up from the robot in order to build off of.

The problem with this is, these bars are usually very unsteady. Most teams use 90-degree gussets which are very useful for keeping the bars square. Over time these 90-degree gussets begin to bend or break and this is a huge problem especially since this is the most important part of most robots because everything is built on or around these support bars. This season we have had this problem ourselves and when we were given this challenge we were so excited to solve it. After lots of research and designing as a team, we came up with what we call a C-Channel T Gusset. With this T gusset, we would be able to fix this problem, and instead of using a bunch of parts to keep support bars stable and square all you would need is one of these T gussets and a few screws with nuts. In order to use this new part all that is needed is, first slide the T gusset onto a horizontal piece of metal that is mounted to a robot chassis. After sliding it on you will use another piece of metal that you want to use for a support bar and slide it into the middle of the bracket. Finally put in 4 or more screws and you've got a support bar that is kept perfectly square and braced on both sides to ensure it does not move. Right now our robot uses 90-degree gussets so all we would have to do is take those off and slide this on and we no longer would have to worry about that part of the robot. To create this new design and bring it to reality we used Autodesk Inventor Professional 2020. I started by mapping out the base where it would attach to the horizontal c-channel. From there I extruded up and left a gap where the vertical bar will sit. I also left a slit where the part will attach and then be screwed in. Then made the two vertical sides will go on both sides of the vertical c-channel. Then I used the cut tool to place the holes for the screws. I finished it off by doing a stress analysis to make sure the part would not break or buckle under reasonable pressure. While coming up with this design and creating it the team realized that there are ALWAYS ways to improve something. Nothing is ever perfect. At first, we thought that our design using the 90-degree gussets was the best design and nothing would make the support stronger or better. After being prompted to think about it more we realized that it could easily be improved. This will definitely help us in the future as a robotics team because we will be able to prompt ourselves to dig deeper and use the engineering design process to come up with even better designs, even if they do seem perfect. We also realized that this is not just a lesson for a robotics team but for anyone, as long as you are willing to think and learn you can definitely make something better!

