

It was in the heat of competition at the annual robotics tournament. We were in the thick of a match when to our dismay, our robot started to malfunction. We could not get any help or the tools we needed to fix it right at that moment. It would have been invaluable to our success if we could have had the tools right by our side or someone to bring the tools to us. The rules state that there can only be two drivers per team in the pit, but what if teams had a helper robot on the side to come to our aid if a team's robot breaks down? Well, our team has come up with a solution to this problem! Our team has a design that can carry parts or tools needed in a competition, which is attachable to a VEX robot. The part is mainly attached to the top of a chassis to provide as much sturdiness and capability as possible. A team can also attach the part to a robot lift, but it would not be as capable or sturdy as the chassis because of the weight. Another fact about this part is that it is straightforward to remove, attach, and very portable. This is also solving another problem that teams have, which is transportation. Our part is a reliable source for transportation, a toolbox, and in competition.

We first brainstormed on different ideas and shapes to make it the most compatible part it can be. Then our team decided to base our part on a box design because it is more efficient and it is easier to sort parts or attach to a robot. We also believe that if we don't use a box or rectangular shaped part, then it is going to be harder to fit VEX tools such as, screws, gears, beams, etc on the inside of it. The team that will be using our part will also have to design a more complicated robot to attach this part to if we didn't choose the rectangular design. This part that our team has created has the dimensions of: 10 inches in width, 10 inches in length, and has a height of 5 inches. Our team decided to make this our dimensions because it will have enough space or room to store the parts necessary. This part includes a total of 6 components inside of it in which you are able to store your tools or VEX parts safely. The dimensions in each

compartment are about 3 inches wide, 5 inches in length, and 5 inches in height. Our team knows that 6 components is the best way to go because if we do too many then the components are going to be too thin and the parts or tools won't fit. To include more to our part, it has 4 holes on the outer side, which are on opposite sides of each other, so that the part is able to connect to the robot. The holes are about 11 mm wide. To fully make our design real, we have decided to use Fusion 360 to design and complete this unique part.

Our team had come up with the decision to use Fusion 360 (2.0.9313 Active Plan: Fusion 360, Student, macOS 10.15.7) to build our part. We have used multiple tools in Fusion 360, which has made our experience far easier. Our team used tools such as extruding, filleting, shelling, and etc to make our part. Our team has used extruding to make our part 3D and to form it to its actual size. Extruding is very important because without it we aren't really able to make our design compatible with a robot and the ability to hold tools. Without extruding, it will only make our part come out as a 2D rectangle. Then we have used a tool called shelling to make an insertion in the box so that we could add components such as the 6 dividers in the part. Shelling is important because without we are just going to have a regular box that you wouldn't be able to edit the inside of. Then we used a tool called filleting to make sure that our part has a rounded edge so that the chances of someone getting poked or hurt are very low. This tool is probably the most important when it comes to a user's safety and it is our favorite tool. Thank Fusion 360 for making this effortlessly possible and we are extremely thankful for the thousands of other aspiring young engineers you have helped.

Our team has learned a lot of amazing concepts from this project that will be useful to us in the future. Not only has our team learned how to use Fusion 360 for the first time, how to make different types of parts, but most importantly, our team has bonded and has had an amazing

time doing this project. Our team will most likely use 3D design software in the future either for fun or to pursue it as a job. Our team plans to use Fusion 360 in the future to build and come up with ideas of next year's robot, which we will present or display in our team's notebook. This software is beneficial to a competitive robotics team because you can come up with a variety of new ideas and successfully create them. This will help push teams to have a more creative mindset and think outside the box. Our team believes that learning 3D design software helps you in your career path because it will help users in the future realize that 3D software is an option to pursue and it is something that you can enjoy doing. Our team thanks VEX for this opportunity because this 3D design software challenge inspires us to pursue the path of engineering and become producers of technology.