CAD Engineering Online Challenge

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For the REC Foundation “Make it Real CAD Engineering Challenge”, I designed a **5x5 Aluminum Angle Bracket**. This part design is a right triangle. I decided to create this part for several reasons. One being this part or one similar is currently not an available part in VEX Robotics. Additionally, when engineering our robot this year, I came across a problem with my towers being unstable. I used c-channels to connect my two towers; however, the c-channels did not provide adequate support. From an engineering standpoint, triangles can be considered the single most important shape. Triangles cannot be deformed without changing the length of one of its sides or breaking one of its joints. Triangles are used to support or strengthen rectangles by adding supports that form triangles at the rectangle’s corners or across it diagonally. By using this new **5x5 Aluminum Angle Bracket**, I am creating more stability in its uses.

As stated earlier, the **5x5 Aluminum Angle Bracket** can be used to create support in corners connecting two c-channels or two other components at a 90 degree angle. Also, various metal components can be attached or supported at 45 degree angles allowing for more creativity in engineering.

In creating the **5x5 Aluminum Angle Bracket,** I used Autodesk Inventor Professional 2018. I began designing the **5x5 Aluminum Angle Bracket** by using a 25 x 1 flat plate. The plate was then cut into a 5x1 flat plate. I placed the 5x1 plate into an assembly file and combined two 5x1 plates to create a 90 degree angle. Once I created the 90 degree angle I created a plane. I started a 2D sketch on that work plane and outlined all the outside edges of the 2 5x1 plates. I then created two 45 degree lines to connect the two ends of the 5x1 plates. I extruded the entire shape to 0.074 inches in width. This gave me a triangle in the correct width of a normal VEX part. I took a 25x5 plate and placed it over top of the triangle. I aligned the hollow squares in both parts using the Flush Constraint Tool.. This allowed me to make three extra holes along the hypotenuse of the triangle in case I need to attach a part along the hypotenuse. I added extra detail by using Dark Aluminum Paint that is also used in VEX aluminum CAD parts.

In creating this part, I learned that there is a multitude of VEX parts still not created. I would love to be able to utilize the part that I designed with this year’s robot. I would also love to be able to create so many different parts that myself and other VEX students could use. Autodesk Inventor Professional Software is so useful in VEX Robotics. Teams that do not CAD their robot have a disadvantage. Using this software allows teams to visualize what their robot will look like and how it will function before actually touching any parts. I definitely will use 3D CAD Software in my future. My passion is definitely in this field along with mechanical engineering. My father’s background of structural and architectural engineering I feel gives me an insight to my future and where I want to go from here. I look forward to pursuing a career where designing with 3D CAD Software is a large part of my daily activities.