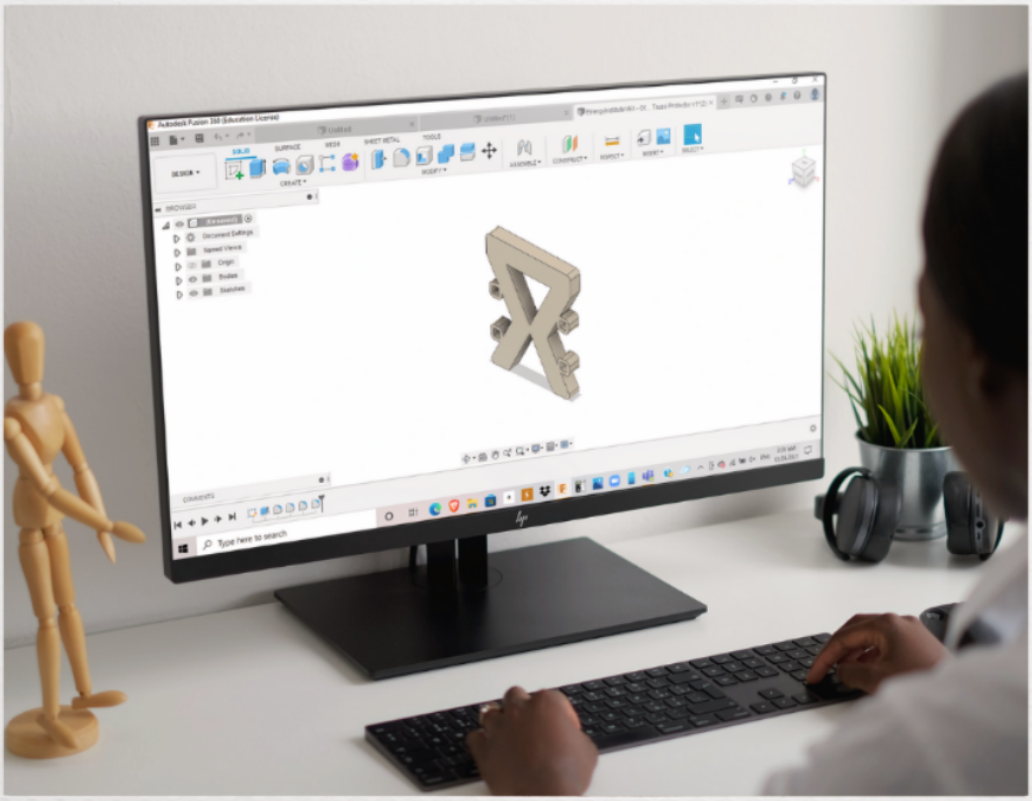
2022 VEX "Make it Real" Challenge: Truss Protector



Energy Institute High School's VEX 3674R

By Prince C. Williams

ENERGY INSTITUTE HS

Credits

Energy Institute High School

Energy Institute High School (in Houston, TX) -

Energy is STEM-based school focused on preparing students for careers in the energy field. Energy host two VEX Robotics Teams, VEX 3674N and VEX 3674R.

Mr. Hamilton -

Mr. Hamilton is a highly respected Engineering teacher at Energy. He teaches courses including AP Computer Science Principles, SolidWorks, Robotics I, and Computer Science I. He is the lead coach for both VEX Robotics teams at Energy.

Our Faithful Leader

CAD Master

Prince Williams (CAD Designer) -

A junior currently studying under the Engineering program at Energy. Prince aspires to go into the medical field, particularly for CAD Design. Prince is a part of the Energy 3674R Team.

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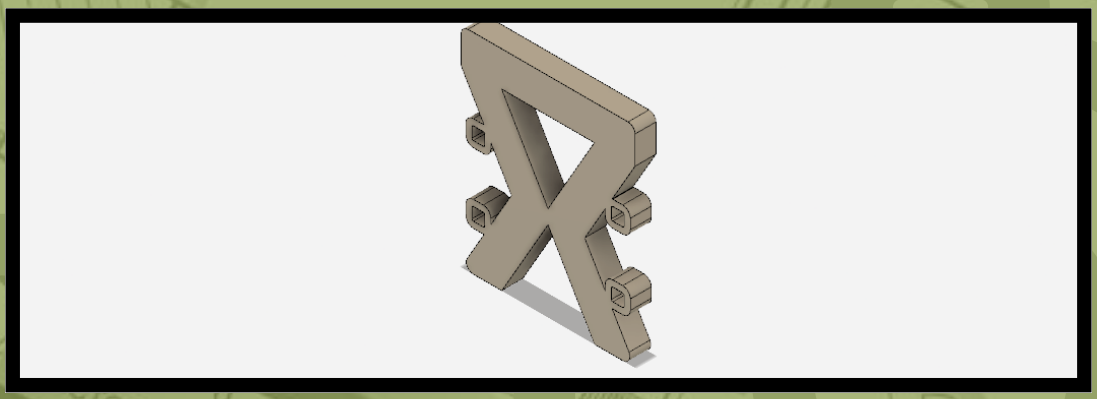
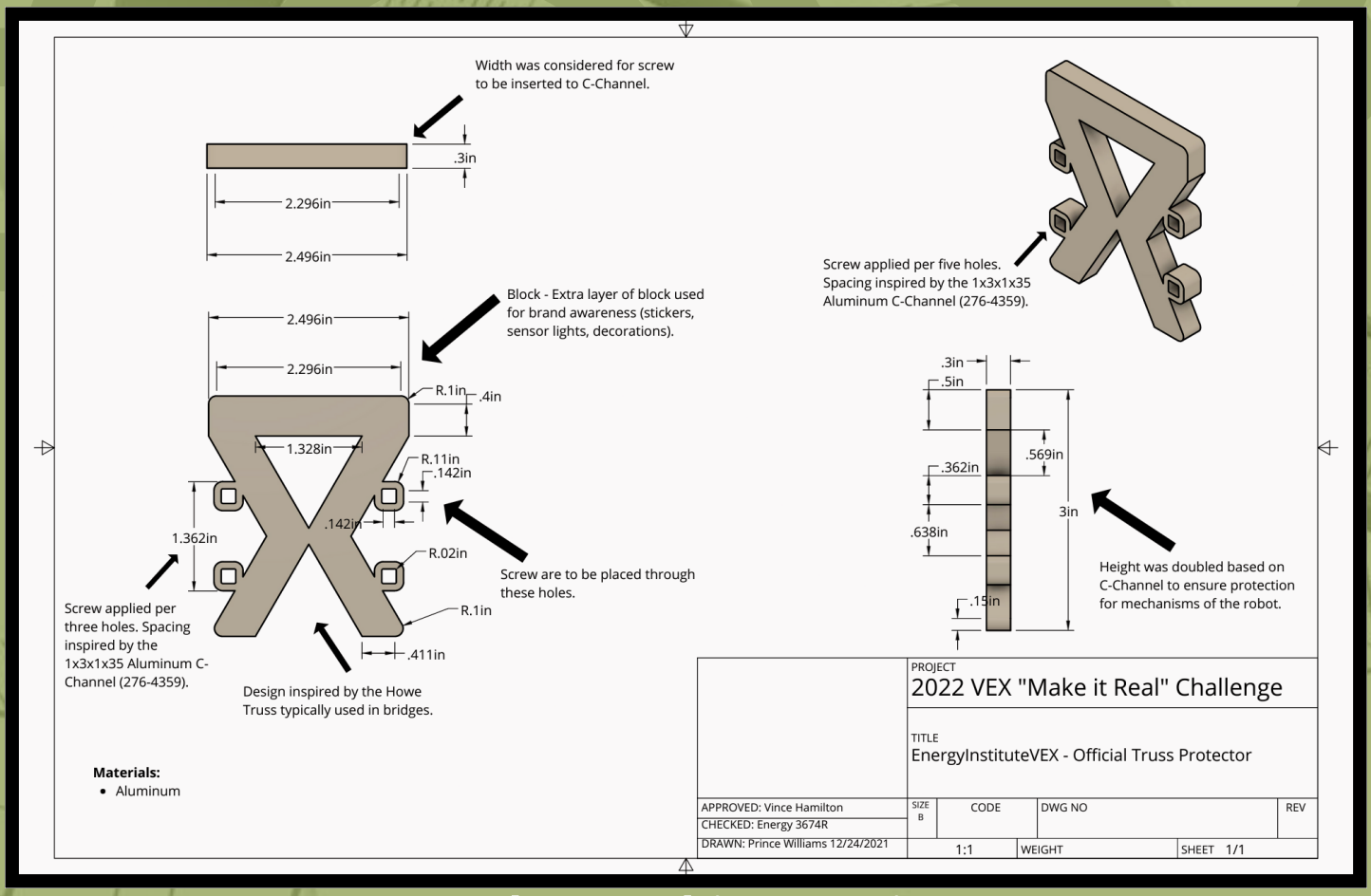
Views of Truss Protector



Isometric View



Orthographic Drawing

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Background Information

Overview -

A Truss Protector is a Truss-inspired mechanism that is used to protect a robot from damages and allow mechanisms to be protected. This is theoretically produced at a low cost and is offered for any VEX team in the world.

Features and Descriptions -

The protector comes in an x-shaped form (often use to construct Howe truss bridges) that eliminates any unfair advantage with robots. On the opposite of the x, there are four drilled holes that are pre-drilled to allow teams to screw the protectors in place. The spacing of the holes were inspired from the 1x3x1x35 Aluminum C-Channel (276-4359). The inner holes are distanced 1.182 inches in height, and distanced by 2.182 inches in feet. The distance of the height was determined per three holes, and the length is determined per five holes. Of course, this is compatible with other channels. On the top, there is a block layer that is used for brand customs including stickers, images, and decorations.

In theory, the protector is produced at a low cost, and all teams will be able to afford this part. This part was created as a result of robots, at times, clashing to one another, often damaging the robot functions. This can be problematic for the fairness of competition, especially for an organization that aspires to create a atmosphere of integrity and sportsmanship. It also can get problematic when teams try to gather information of how a particular function of robot works that can give them an unfair advantage, thus violating the team's confidentiality. With the Truss Protector, this reduces any chances of damaging the robot, aligning components to stay together, and disables the ability to record any information that the robotics choose not to disclose.

Software Features & Reflection

CAD Software - AUTODESK® FUSION 360™

Features Used:

- Sketch
- Extrusion
- Fillet

Reflection -

Based on the complexity of the model, I learned how to work around trial and error. At first, when I made the general shape, the holes would not be close to the x, making it difficult to cut holes through them. I tried to adjust the dimensions, only coming to realize that it would not cover the distance to make the approximate cut for the holes to easily be screwed. Therefore, I was about to scrap the design, but I slept on it and when I got up, I redrew the design, and used Offset Entity to make a bigger shape. This would allow me to eventually make the holes, therefore making it useful to screw unto the robot.

Overall, I think the whole concept of this experience was having patience. Always realizing that there is trial and error when it comes to CAD design, but always remembering to try new ways. I think this will come in handy for my next project when I go to execute a complex design. Maybe incorporate ways to create brain breaks to allow ample time to visualize different approaches to CAD'ing a complex design.