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I created the License Plate Holder because license plates are normally extremely hard to mount and take a long time to switch. They also take up lots of room and can be very tricky to mount in a visible place without interfering with other moving parts or making the robot out of size constraints. The Licence Plate Holder would allow for better use of space and time.

The beauty of the Licence Plate Holder is that it can fit almost anywhere on almost every robot design. The License Plate Holder would allow for the user to place a licence plate anywhere on their robot, serving as a sort of super-adapter. It can be screwed to a horizontal bar on a chassis, a vertical c channel on a flywheel, a horizontal lift bar, on lift towers (making the license plates look like little flags), and much more. With its 16 different attachment holes the Licence Plate Holder can hold licence plates so that they are visible in any position on virtually every robot. The License Plate Holder may hold up to two license plates thus conveniently storing one plate while the other plate is in use. The License Plate Holder makes switching license plates easier than ever. Simply switch your license plates between matches by sliding out the two licence plates in the License Plate Holder and sliding back the license plates with the appropriate colored license plate in the front so that it is visible. It does this while looking extremely sophisticated due to its elegant design and its extended team name and number on the front and embossed team number on the back.

I used **Autodesk Inventor Professional 2021** to create my new part. To create my new part I had to first create multiple smaller parts. I made the backplate of the Licence Plate Holder by clicking "Part" on the Inventor home screen. From there I made a 2D sketch on one of the planes provided. I sketched a rectangle with the appropriate width and length for the licence plate holder. I then extruded the rectangle to the right height. I made 7 more 2D sketches. On one of the cubes sides, I made circles with the appropriate diameter to let screws fit through it. I spaced them out so they would fit VEX c-channels using the "Dimension" function. Next I extruded the circles, but instead of selecting the add material option, like I had previously, I selected the subtract material option, which turned the circles into holes the perfect size and distance apart to let screws be placed through them and attached to a VEX c-channel. I saved the part. I then repeated this process of 2D drawing a box, extruding it, adding circles, extruding the circles to create holes, and saving the part for the rest of the panels/parts of the Licence Plate Holder. I created the bottom and the sides of the holder using this method. I used the same method minus the holes and circles for the two cubes/pillars that keep the license plates in place. I created another rectangular prism for the front to

add the words "Team 8838E Energy." To create the text I made a 2D sketch on the front of the rectangular prism using the "Text" function. Then I centered the text and enlarged it to the appropriate size and finished the sketch. I extruded the sketch to make the text pop out. I used a similar process of 2D sketching text to make a 8838E indent on the back of the back plate. After I created all the parts needed to assemble my final part I went back to the homepage of Inventor and opened an assembly tab. I added all the parts I had previously created to this assembly (duplicating the side panel and pillars/cubes for a left and right side) and started to put them together in the correct configuration. After I was done I merged all the parts and rendered it, leaving me with the final product, the Licence Plate Holder!

I learned A LOT from this project. I learned how to create a new part in Autodesk Inventor Professional 2021. I learned how to use the many different features in Inventor such as the 2D sketch function, extruding, shrink wrapping, making a 2D sketch on an object, and combining parts. I learned how to render objects in Inventor into images, and how to export objects into .obj files so I could 3D print them. In total I learned how to design, make, and export new parts in Autodesk Inventor. I will definitely use 3D design software in the future. In the very near future I will use it to play around with designing and inventing things, but will also use it for robotics. This software helps you plan out your robot design ahead of time if you are on a competitive robotics team. Also, during the pandemic everyone might not have access to parts, and 3D design is the closest thing to real life parts there is. I will probably use 3D design software in highschool and college for my classes and projects. It can help you visualize problems with your design, ultimately streamlining your work process and help you work faster to solve problems. These college/highschool courses will either require me to use and know how to use 3D design software or strongly recommend it. 3D design software will DEFINITELY help me in my career path as a Mechanical Engineer. I will also need it for performing my dream job as a Mechanical Engineer, as making mistakes and fixing design flaws is easier and cheaper in the virtual world than it is in the real world.