

39K Rest In Pieces

Make It Real Submission

1/12/2020

The VEX Adjustable Chain Tensioner

As teams utilize sprockets and chain to help power their drivetrain or other subsystems, unique and imperfect spacing due to design choices leads to the chain being loose. This results in a loss in the mechanical advantage (or, in layman's terms, efficiency) of the chained subsystem. It also poses the problem of sagging chain hitting or causing friction with other parts of the robot, or falling off completely. The VEX Adjustable Chain tensioner seeks to resolve this problem.

Integration into a robot design is simple. Just use any of the mounting holes to place the mechanism between two sprockets. The adjustable bottom plate allows for a range of distances for the tensioner to be mounted at. Because the chain runs over a sprocket, friction is kept to an absolute minimum while the chain remains tight.

For this project, we used Autodesk Inventor 2020 Build 310 Release 2020.2. Over the course of this project, we used several different commands from the inventor library to build our mechanism. Because the mechanism we designed was very different than any current VEX part, all of it except the sprocket had to be custom designed. One good example of this is the spring, which we utilized the coil feature to make. We also used the fillet feature on the hole in the top plate. Having the hole rounded on the inside reduces the amount of contact with the axle to a minimum, resulting in as little friction as possible. Another inventor feature we used often was the stress test. This allowed us to experiment with what materials to use, letting us produce the slimmest and lightest final product while keeping structural integrity.

From this project, we learned how to better maximize all of the features available in Inventor, including learning how to use the coil, stress test, and material features. We also learned how to better present our designs with annotated drawings and using ray tracing renders for a clean final presentation. In the future, we will be using Inventor as a step in the

design process of all of our robot's subsystems. The software helps us ensure all the subsystems work with each other and stays within all of the constraints that VEX sets out. Adding CAD as a step in our design process will save us time in the lab, as we will essentially have a blueprint to build from. It also saves resources because it allows us to catch mistakes earlier on before we physically build the robot. Learning to use this software now will help me later in my career as I want to go into engineering, and software such as Autodesk Inventor is used in those fields often as a platform for design and idea-sharing.