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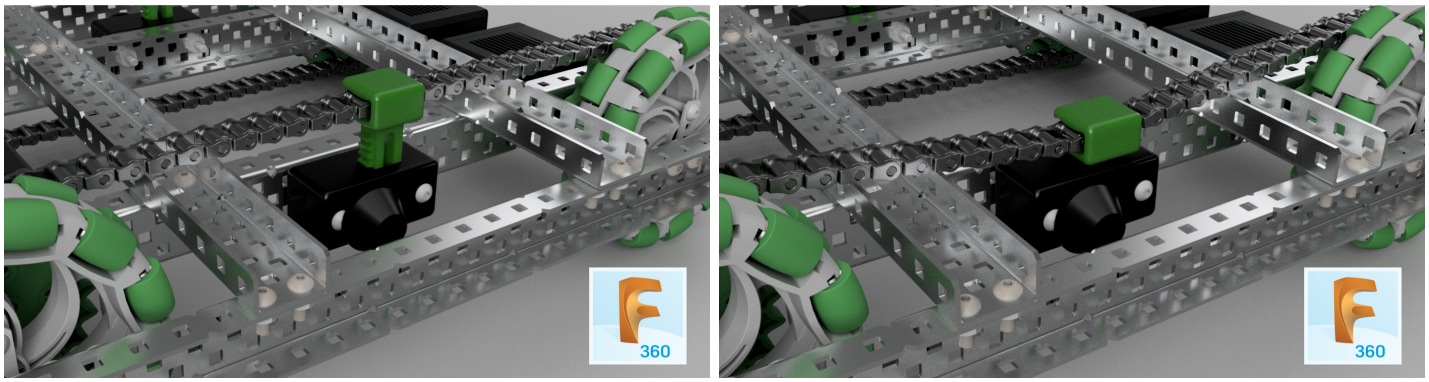
Adjustable Chain Tensor Kit

Project Description

Chains are a pivotal component of any robot in the VEX Robotics competition. From intakes to drive trains, chains are used to distribute torque around moving parts like gears and wheels. Without the utilization of an adequate chain tensioning system, there is a significant loss of power distribution efficiency. The VEX High Strength Chains tend to be easily detachable with usage and that can be unfavorable in the middle of a match. For this purpose, we designed an adjustable chain tensor which provides constant pressure on any chain installed in the robot. This consequently increases the power delivery efficiency and the rigidity of the chain, preventing it from breaking or detaching due to impacts or any other incidents that may occur.

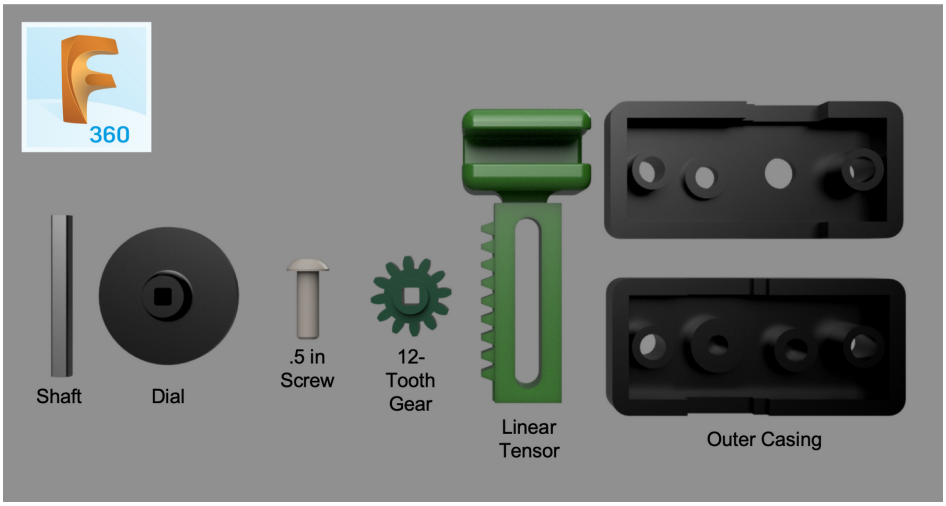


Given the trend of construction in the VEX Robotics Competition, chains are important for numerous mechanisms such as drive trains, lifts, and intakes. However, the more chain related parts the robot has, the higher the probability of one of those chains breaking. During a match, robots are expected to come in contact with the opposing alliance's robots. Therefore, impacts are frequent and the chains have to withstand variable tension, hence the reasoning of why chain tensors would greatly improve the integrity of the robot during matches.

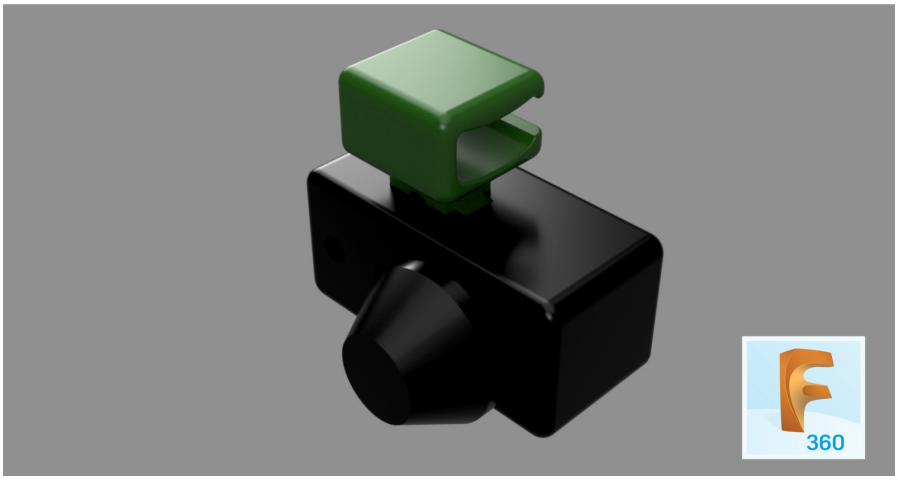
Our Adjustable Chain Tensor is a great addition for a VEX Robotics competition robot. Our product focuses on substituting various individual tensors with a single, modifiable tensor. The adjustability of the device is ideal for different applications in the robot and their distinctive levels of tension. Our Adjustable Chain Tensor is easy to attach, saves space and reduces the probability of failure in the chain.The component we devised for the Make it Real CAD Engineering challenge would allow us to tighten the chains utilized on any robot without having to remove or adjust the chain's length.

The device consists of 6 components:

- 1.2 in Shaft
- Hand-Adjustable Dial
- 0.5 in Screw
- 12-Tooth Gear
- Linear Tensioner
- Casing



The Casing was built to house the linear tensioner (with a 0.5 in screw) and the 12-tooth gear attached to the dial (by the 1.2 in shaft) together. Furthermore, it was designed to fit in any VEX Metal. By rotating the Hand-Adjustable Dial, which is connected to the 12-tooth gear, the Linear Tensor is extended or retracted to apply pressure to the desired chain. The Linear Tensor was designed to fit in any chain-driven component without having to remove the chain in the robot. Lastly, the Linear Tensor can be locked by tightening the 0.5 in screw.



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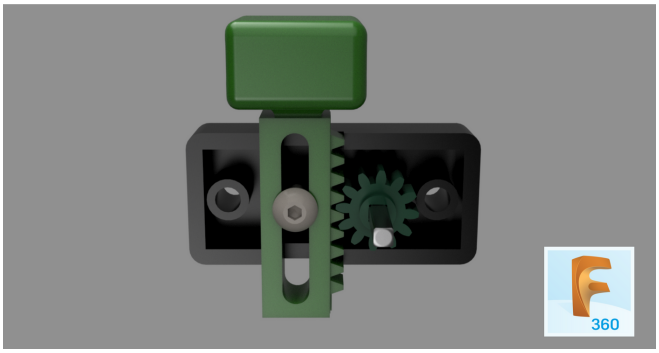
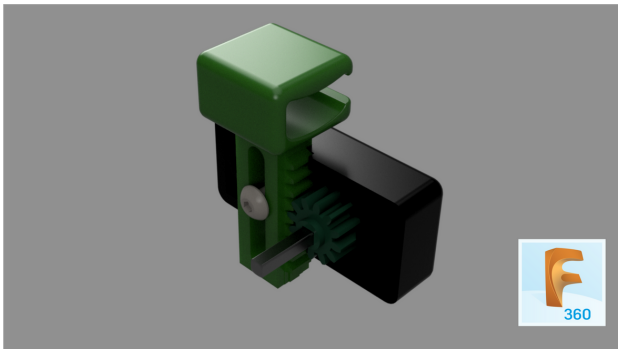
We utilized Fusion 360, version 2.0.7046 software to create a CAD of the new component. In order to make a proper 3D model of the component, we first had to think of the internal mechanisms capable of carrying out the intended functionality. For this purpose, it was decided that the interior would house a rack and pinion mechanism which would utilize the turning of the dial as the input. That action would rotate the gear, which would in turn slide the extending piece outward or inward, allowing it to tighten the chain. The exterior casing was designed with a box like shape that could house the internal components while not taking up space. Inside sockets structures were constructed on inside of the box, allowing it to be screwed on to the robot with ease.





When we were in the process of creating and designing our 3D part, teamwork became essential to our project. Working as a team was vital to our project because we combined the different ideas that each member contributed to create the best design we could develop. There's is no doubt that we will continue to use 3D design as it is an excellent method not only to create but also to model, build, and simulate. When we were designing, Fusion 360 had all the necessary tools for us to design and assemble a new component.

Besides using Fusion 360 for our design challenge, our robotics team has continuously worked with the software to model and simulate our robots for the competition. This has helped the team visualize what our robots would look like beforehand. If any changes are needed, we modify the design in the program without having to waste parts. Learning 3D design software will help us in the future as professional engineers. These types of programs are immensely useful for creating, modeling, and simulating assemblies. AON-Robotics plans to use the adjustable chain tensor mainly for the drive train. By adding sprockets next to the wheels, we managed to develop an all-wheel powered drive without adding motors to each individual wheel. The Adjustable Chain Tensor will help us tighten the chain in our drivetrains to improve the power delivery and dicrease the risk of failure of the chain mechanism.