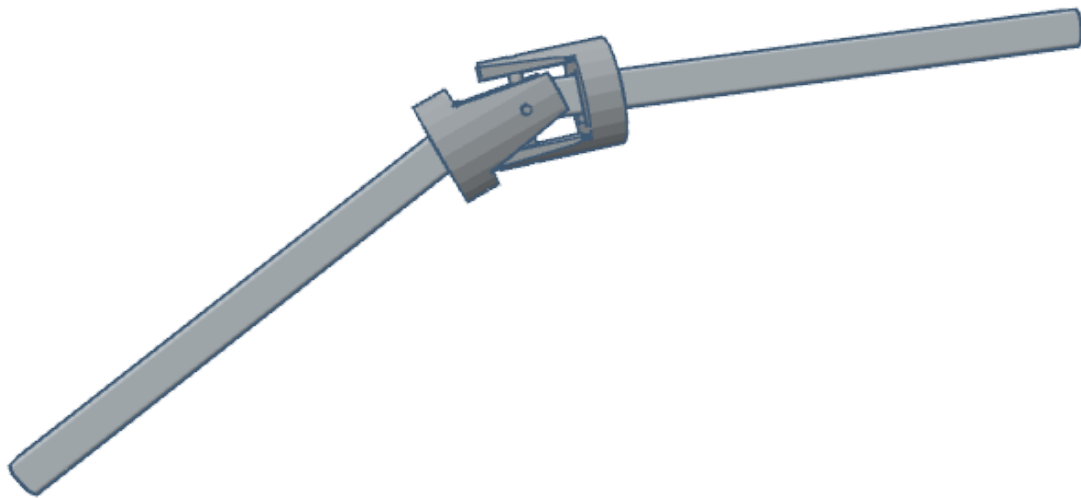


VRC Middle School - "Make It Real" CAD Engineering Online Challenge
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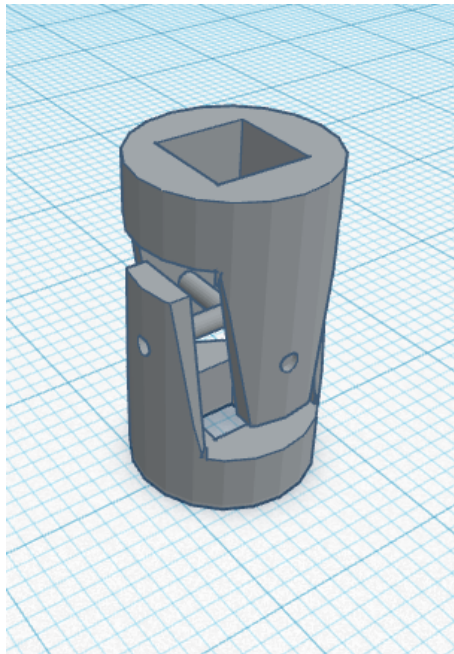
VEX Angled Axle Joint

Created by 10012W

Sean Chan-Sato, Lucan Chugani, Kobe Sam
Vancouver, Canada



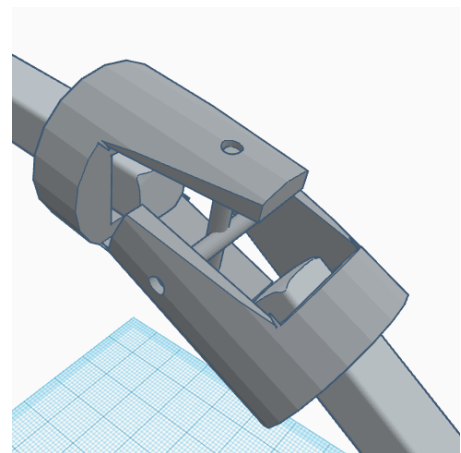
When we look at our robot, we realize how limited in capability the existing VRC axles are. They can only go at one angle and can only connect two points vertically or horizontally. This takes up lots of space and is not that flexible. This is when we came up with the angled axle joint.



This part would allow us to connect two axles together at a single point on an angle. This enables us to put axles in new places and can make them wind throughout our robot. By letting us move the force of a motor on an angle, it gives us the ability to place motors on the axles and connect it to the component. Additionally it enables us to angle axles to reach places we couldn't before.

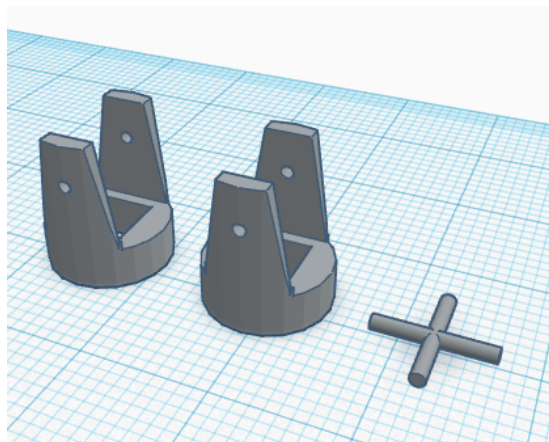
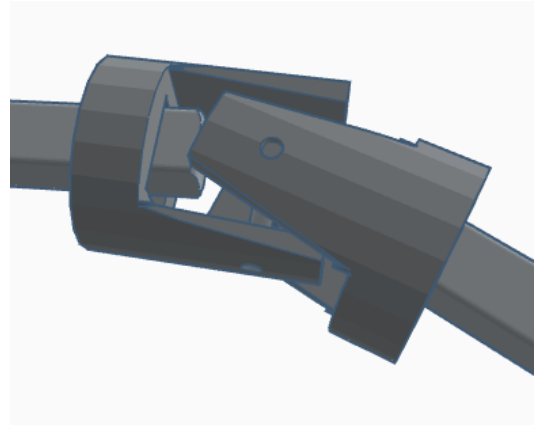
We were inspired by the axle joints on cars. By being able to change the angles of the axles it lets us make the robot much more compact. Additionally it enables the axles to bend which is a major advantage when you have suspension on vehicles. This gives access to the wheels while they are still being powered.

This can be used in VEX Robotics and enables you to attach an axle to a moving joint. Additionally it gives you the ability to make your robot much more compact by allowing the axles to move freely throughout the robot. If this axle joint were to be used in VEX, it would give lots of flexibility and would enable you to make new things that were not possible before. Additionally this simple part has high torque transmission efficiency ensuring that you don't lose much torque with less friction.



In real life, sometimes you may have two axles that are not perfectly aligned. The angled axle joint is a simple and easy solution to that problem. The simplicity of the angled axle joint also means that it can be easily taken apart and put together.

This mechanism works by having 3 parts. The X piece that acts as the centerpiece that holds everything together and the connectors which ensure for the axle to connect. By putting the X piece in the center of the two connectors, it allows the two axles to freely move on any angle.



When creating this model we used Autodesk Tinkercad 2022. When creating the connector part of the axle joint, we started with a cylinder but created hole objects to create the angles and the space for the X to go through. Additionally to create the space for the axle, we used another cube and set it to a hole at the right size to fit an axle. When creating the X, we grouped together 2 cylinders that would match the size of the hole.

We think that this creation would be incredibly useful in VEX as it could change the way that axles are used. By letting axles transmit power on angles, it allows for more compact robots and flexibility. We think that this could be a part that VEX manufactures in the future as we would find it incredibly useful on our robot. This project has taught us the ability of CAD and the limitless possibilities of ideas you can bring to a 3D scale. Throughout this project our team has learned many new skills in CAD, working together to discuss ideas, brainstorm and make a design. As careers in STEM continue to grow, these skills will become more and more important. By learning these basic skills at a young age, we are able to prepare ourselves for many future careers.