

Big E

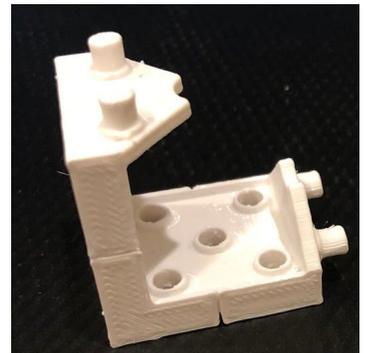
Presented for consideration in the VEX IQ Make it Real CAD online competition

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There are many pieces in a robotics kit. Some of them can connect other parts together. Most are variations of a part. A few of them only have one use, while others have more such as connecting and making structures. If you get creative, a part can be used for all functions. These parts all came from an idea and are made in certain ways. People may have also learned something while designing these parts. With all of these well-designed parts, why not add one more? Introducing the Corner Connector with multiple sides.

2 Sided Corner Connector

The 2 sided corner connector will have multiple functions. With its two sides, holes like 2x2 Beam, and pegs at the end, it can attach two beams at a 90-degree angle (shown to the left). It can also leave a gap between the ends of the beams where they meet if desired. A variation of this has, instead of holes of a 2x2 Beam, has holes like a Double 2x Wide, 2x2 Double Offset Corner Connector and is longer. This part can be used when a corner needs to be created, such as when building a chassis or when securing beams for multiple axles for compound gearing. The piece with sides with holes like a 2x2 Beam can be used to make an open structure.



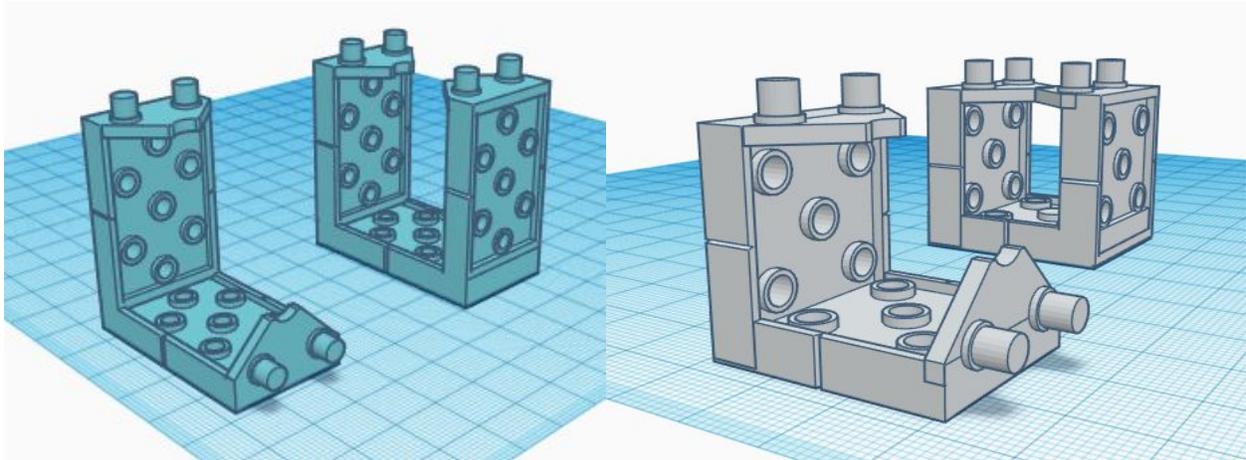
3 Sided Corner Connector

The 3 Sided Corner Connector is another kind of Corner Connector that is a variation of the 2 Sided Corner Connector. This time, there are three sides to the part. There are going to be the same two variations where there is one with holes of a 2x2 Beam (shown to the left) and one with holes of a Double 2x



Wide, 2x2 Double Offset Corner Connector on each side. The kind with holes of a 2x2 Beam will be able to create a closed structure. Both of these pieces will be able to attach three beams at 90-degree angles.

Both of these Corner Connectors can be used in almost any component of the robot. It can be used when building most chassis, for example in the classroom bundle where the chassis has a shape of a box. The 2 Sided Corner Connector can be used when connecting the back beam to where the wheels are connected. Another way it can be used is when two beams parallel to each other need to support each other, the 2 Sided Corner Connector with holes like Double 2x Wide, 2x2 Double Offset Corner Connector can attach these parallel beams. In the robot overall, it can reduce the amount of pieces needed to connect two or more beams at once.



Corner Connector Prototypes on TinkerCAD

In the blue parts pictured above:

Left - 2 Sided Corner Connector with holes corresponding to a Double 2x Wide, 2x2 Double Offset Corner Connector.

dimensions: 24.00 mm width
 47.90 mm length
 48.75 mm height

Right - 3 Sided Corner Connector with holes corresponding to a Double 2x Wide, 2x2 Double Offset Corner Connector.

dimensions: 24.00 mm width
 46.10 mm length
 48.75 mm height

In the white parts picture above:

Left - 2 Sided Corner Connector with holes corresponding to a 2x2 Beam

dimensions: 24.00 mm width
 34.80 mm length
 33.30 mm height

Right - 3 Sided Corner Connector with holes corresponding to a 2x2 Beam

dimensions: 24.00 mm width
 30.20 mm length
 33.30 mm height

How Our Custom Parts Were Made

These custom parts were created by taking precise measurements of existing parts and combining them into new functional parts. After duplicating the Vex IQ parts on Tinkercad, we rotated one of the corner connectors until they lined up at a 90 degree angle. Once we were satisfied with the part, we grouped the parts together and made negative impressions for the holes. The holes are in the correct placement to connect to VEX IQ parts using connector pins. The parts were created using Tinkercad version 1.3.



From this project, we learned that using 3D design softwares, we can make different parts or objects that would be useful for things other than Vex IQ as well. One of the examples we could use 3D designing for would be for making parts for RC cars. Our school has a hydrogen car team and they are permitted to design and use their own 3D printed parts. We assisted them with the part they needed. A way that the software can help a competitive robotics team would be by using it to create items for fundraisers we could sell in order to buy VEX parts or, if allowed by REC Foundation, we could custom print parts as needed for our robot. Knowing how to design using a CAD program could potentially lead to a career path selling custom items. Our team fundraiser this year is selling custom designed 3D printed cell phone holders.

We learned how to design custom parts on Tinkercad in our engineering class. We spoke with our coach's son who is a mechanical engineer and works for Epson Printers, Inc.. He told us how he uses 3D printing to prototype components so he can test their functionality before the manufacturing process. We want to be biomedical engineers and anticipate using 3D printing similar to how the engineer is using it at Epson.

Making this part will be very helpful for many robotics teams and will surely improve how a robot is made. It will allow the making of a robot to be less cluttered and be less complicated for those that need a part like this for their robot. The design is also simplistic so it wouldn't be complicated when made in a 3D design program such as Tinkercad. We hope that this component may someday be a standard VEX IQ part.