Flexible Pivot C-Channel Lock (FPCL)

Team Information:

- 97052A of Hagerty High School in Oviedo, Florida
- 3225 Lockwood Blvd Oviedo, FL 32765
- Team Member: Nikhil

Design:

- Many Robots retain a rigid figure by connecting their C-Channels in common angles such as 90 or 45 degrees:



 However, this limits their capabilities as they cannot effectively create an acute or obtuse angle without bending the C-Channel and affecting its integrity - Our intention for the design came from the idea that we should be able to place two connecting C-Channels on a robot in an awkward angle, distance, or a combination of both.

Solution:

- We Decided to Come up with an adjustable hinge that would rotate and lock in a certain rotation and position that would hold two C-Channels in place that did not have to be a 90 Degree Angle:



- The arms would contain teeth that would lock onto the adjustable rod to hold both plates of the model together:



- The rod would also allow a slight distance from each plate as it is longer then the length of the arms

Ease-Of-Use:

- It can be attached to a C-Channel by using traditional screws
- It is preferably attached to the end of the C-Channel to allow for efficient rotation

Function

- As stated before, it can lock two C-Channels in place at an uncommon angle while retaining integrity:



- The Teeth will also lock into place preventing any unwanted movement:



Examples: Obtuse Angle:



Acute Angle:



Flat 180 degrees:



Software:

- Created in Fusion 360

Features Used:

- Hole + Thread tool It allowed me to create screw holes and grooves so the plates can be attached to the C-Channel:
- I also liked the 'Chamfer tool as it made it more rigid and aesthetically pleasing:



- I like how you could do booleans with two shapes, it made it easier to create the example C-Channels:





- I finally Liked using the render workspace as you could make your model realistic and see what it would look like in real life:

Conclusion:

The team encouraged me to create a multipurpose part that can not only be easy to use, but effective in what it does. The FPCL creates choice while maintaining the simplicity of connecting two C-Channels. By attaching the FPCL between C-Channels the robot does not have to take a Rigid Shape and can have unstraight angles without sacrificing integrity. What I learned through creating the part is that something does not have to be overly complicated in order to solve a problem, it just needs to contain two abilities: It needs to be easy-to-use, and have the simplest possible solution to a problem. Earlier versions of the models included complex and unnecessary components that overly complicated the simple process. Was is impressive? Yes. But was it viable in actual use? No, their were to many moving parts that would guarantee a failure in use. Along with the complicated functions of the previous versions I also made it difficult to install. Instead of using traditional screws it would grip the C-Channel. Ease-of-use suffered there because I once again because it was unnecessarily complex. The final design did not include an fancy looks or multipurpose functions, instead it solved the problem in a basic way: It connected two C-Channels in a non-90 degree angle. Throughout its creation I learned It's important not to overestimate the solution to the problem because it creates undue work and an complicated mess of a solution.