

Team 3176 White Paper

Title: Hatch Intake	Author(s): Angelo Botha, Jacob Engel
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Abstract

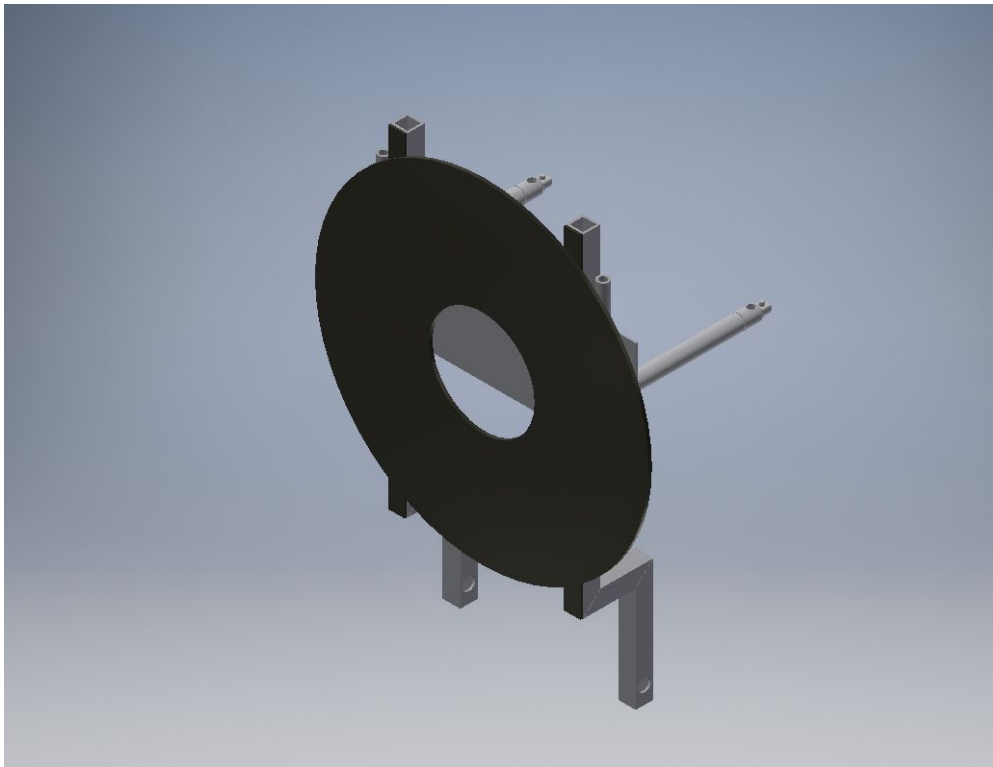
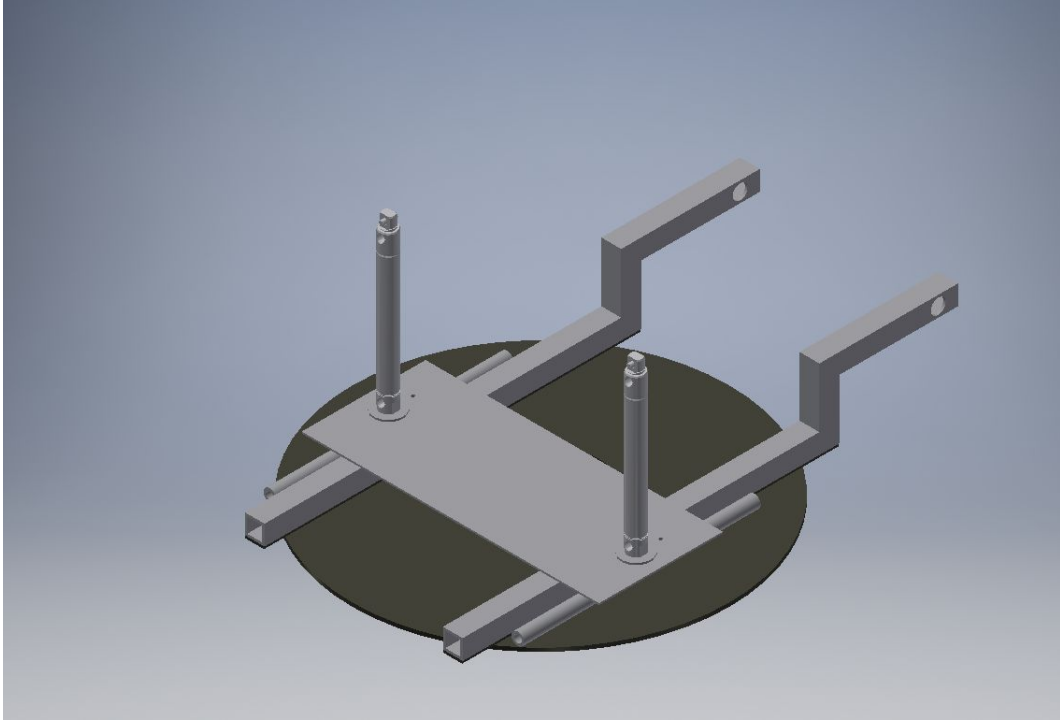
This paper is intended to provide insight and help for future students with designs and design ideas. This design was intended to pick up the Hatches from the FIRST Robotics 2019 game, however the principles and design methods used in this whitepaper are applicable for a variety of purposes.

Hatch Intake Design (CAD)

We used CAD (Computer Aided Design) to make these digital designs. This allows us to see what the design will look like, as well as edit dimensions and figure out what will work best, before we actually start prototyping and building. We needed to create a mechanism that would pick up hatches off the ground. The hatches look like this:



There is a long strip of velcro on the outer edge of the hatch, and our design utilized that, so that we had two shafts that had velcro on them, to connect with the velcro and pick up the hatch.



Hatch Intake Design (Real Life)



Once we had the hatch on, we needed a way of getting it off. This is where the pistons on the side of the arms come in. The pistons are triggered using pneumatics, that then push the hatch off of the velcro, at ~50 psi. There are cylinders perpendicular to the pistons, that allow for the pistons to push the velcro, without breaking the hatch, by spreading out the surface area. We tested the mechanism at multiple distances, heights, and angles to see the ability to get a hatch to stick. It worked well and it is a consistent hit.