# Extending Spacer

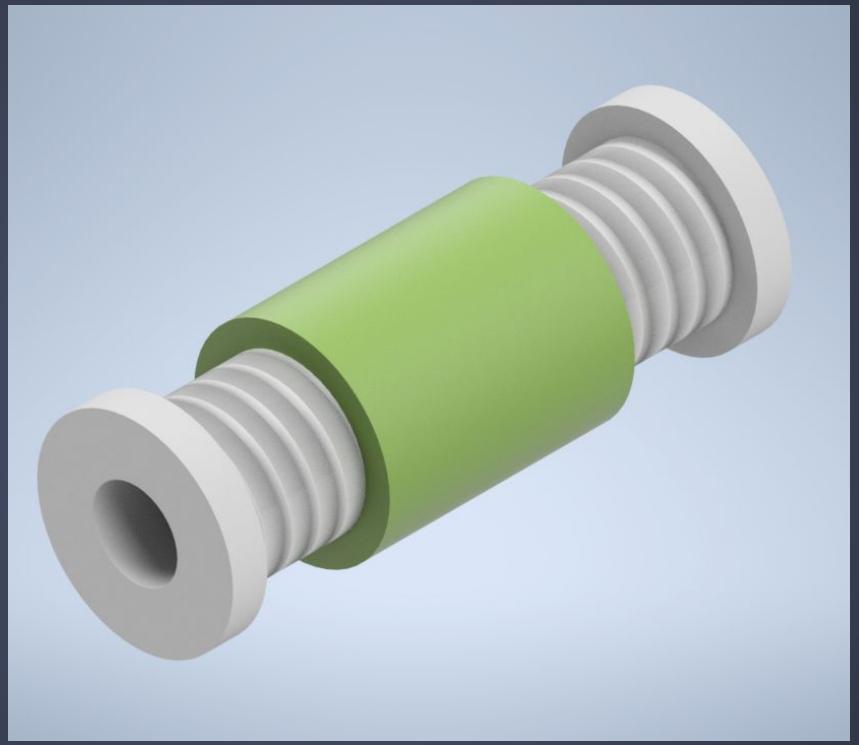
"Make it Real" CAD Engineering Challenge

# 1 Introduction

Multiple teams in VRC have had issues in their building relating to part management, specifically, with spacers. After numerous discussions with our team about a solution to this problem, we formulated and designed a part with the primary function of decreasing the number of spacers used and increasing teams' build efficiency. The extended spacer (Image 1) is a part designed to increase build efficiency by reducing the number of actions required to assemble and disassemble a robot. Instead of implementing five different spacers into the same area, one could use our part to save those five spacers for use in another vital area and reduce the time it takes to implement it into the robot.

# Image 1

Inventor screenshot showing extended spacer at full length



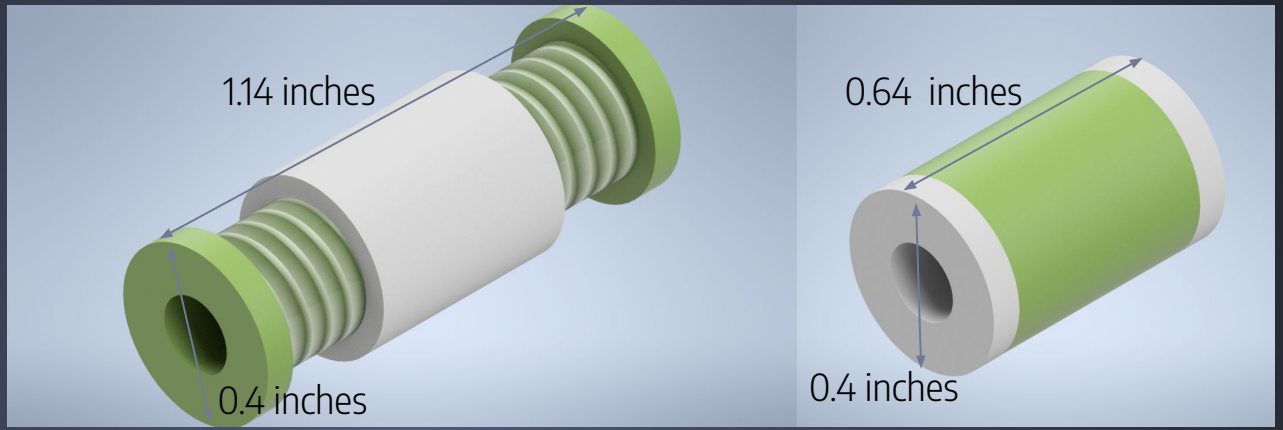
# 2 Role in Robot

# Function

The extending spacer creates an opportunity for fewer spacers to be used by directly changing its length to fit a mechanism. The spacer can go from .64 inches to 1.14 inches, giving it an extensive range of size. To increase and decrease the spacer's length, there are two screw-like parts (Image 3) on both sides that can go in and out to a point (Image 2/2.1). An extending spacer can be useful when having to lengthen the distance between gears. When making a cycler, you would have to space the gears far enough for an object to pass through. Instead of using multiple spacers for gear placement, you can use 1 for each side .

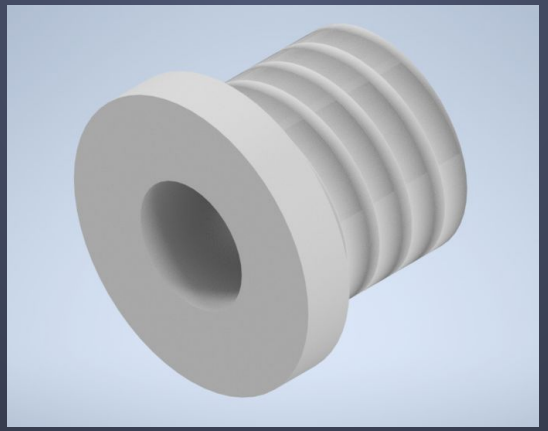
# Image 2/2.5

Renderings of the extended spacer at its maximum (left) and minimum (right) length.




# Image 3

Rendering of screw-like part that extends from the cylinder



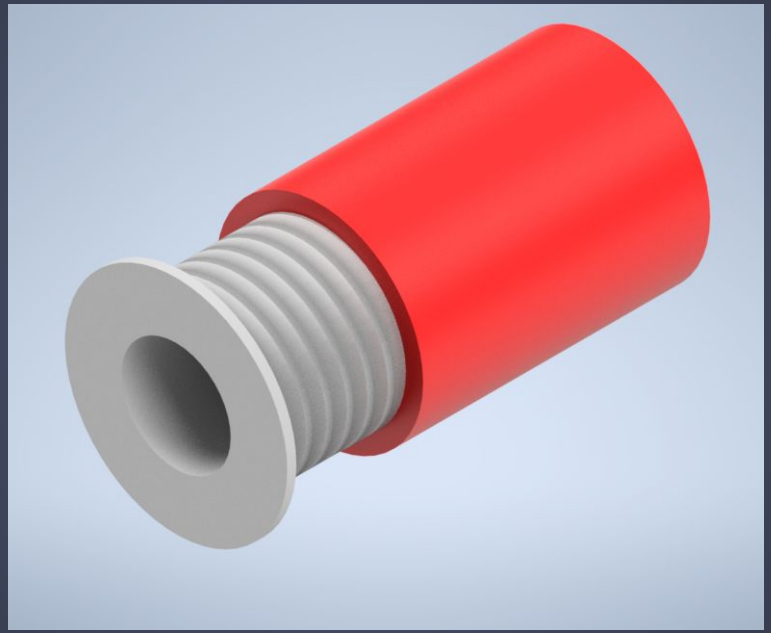
# 3 CAD Software

# Design

To create an extending spacer, multiple types of spacers and washers were referenced in Autodesk Inventor Professional 2021. These references allowed us to achieve a more significant amount of accuracy on our product. We had two design iterations until our outcome. In our first design (Image 4 ), we thought of using a threaded cylinder in conjunction with one screw-like part, so it would be able to extend inwards and outwards. Using only one screw caused instability since the threaded cylinder didn't have support on both sides. To fix this, in our next iteration, we added a second screw on the other side  to increase the foundational support and decrease the imbalance.

# Image 4

Rendering of the first iteration of design



# 3 Conclusion

# Conclusion

From this project, we learned how to make custom parts to fix any problem that we may encounter in the future. This is important because of how we are now able to speed up our design and building process. Team 8995M uses CAD right in conjunction with a design allowing us to create successful robots. Many of us in 8995M plan to be in the engineering field, meaning that learning CAD will present our ideas in a more fluid way. This software is a crucial part and will continue to open pathways for members across the community.