

# Modular Slip Gear

6891X

Timothy Orr

Faith Lutheran HS, Las Vegas, NV

The Modular Slip Gear is an attempt to solve a relatively common issue that occurs for teams trying to make punchers or other time-based mechanisms for their robot. A regular slip gear using VEX parts requires the team to file down a gear so that part of the surface is devoid of teeth, this means that when the gear turns to that point, the whole mechanism is allowed to move freely or “slip”. Two issues with this are that it renders the gear unusable for anything else afterward and the filing is often inaccurate, leading to a less than ideal timing for whatever the team may seek to create. The Modular Slip Gear resolves this issue by allowing sections of teeth to be added and removed from the main body of the gear as needed and can be put back in after. In this way, the same gear can be used multiple times for a variety of purposes rather than being used for only one specific mechanism.

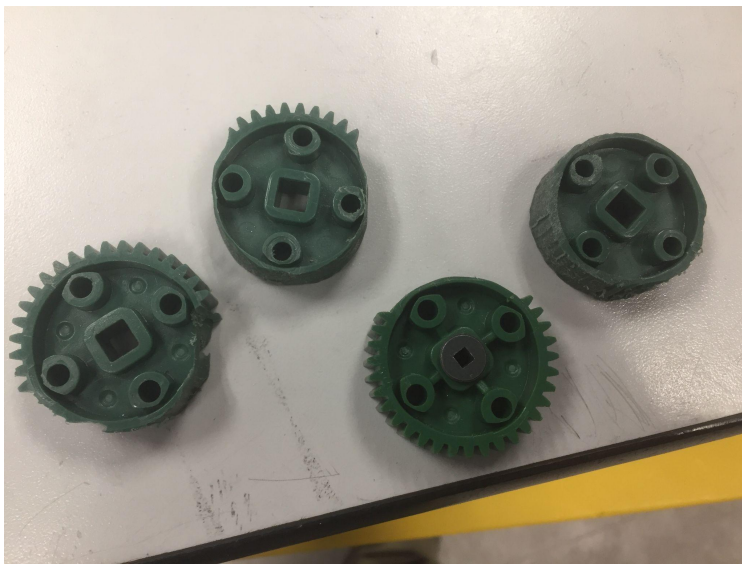


Fig.1 Gear filed to make slip gears

The gear itself was made in Fusion 360 and its general shape was made to mimic that of a regular 60T high strength gear to make it compatible with other vex gears and parts. The difference is that the gear teeth are split into 12 sections that can each be individually removed from the main body. The gear was then printed in a 3D resin printer, which uses UV light to harden a liquid resin in layers rather than placing lines of material. This creates a smoother

surface for a more accurate and stronger print. The resulting gear had to be printed twice as the first attempt did not fit together, it was discovered that the material expands slightly when it hardens so the model has to be made with edges slightly smaller than the desired result. The second printed model was what was used for testing in the attached videos.

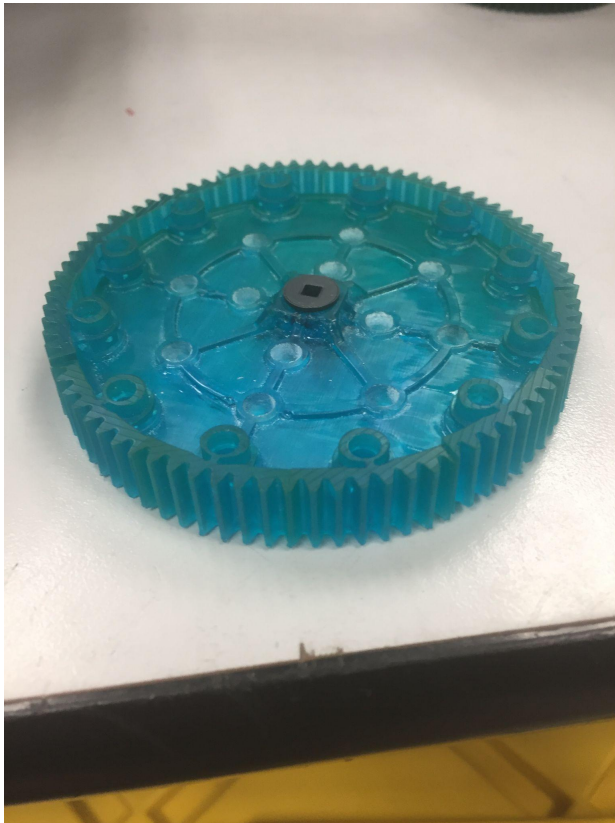


Fig 2. The completed Resin Gear

Some uses for the Modular Slip Gear include first and foremost the puncher mechanism, which is an alternative to the flywheel that allows a robot to punch small objects and make them fly short distances. This is accomplished with a slip gear attached to a rail that is held in tension with a rubber band and when the gear turns to the point where the rail reaches a slip, the rail is allowed to fly forward and hit whatever is in front of it. The toothed half of the gear rotates and connects with the teeth of the rail, pulling it back to relaunch. The slip gear would also be able to be used to make mechanical timing mechanisms, using different combinations of slip and no-

slip surfaces would allow a builder to make a mechanism that could, for example, turn a conveyer at stagnated, but regular intervals, giving space to an object loading mechanism and ensuring that the objects it moves don't all pile up out of the robot at once.

We would like to ask those in charge of the VEX rules and standards to consider this part for production even if it does not win the competition because it would make the lives of builders much easier and convenient.

#### Thanks

- To the Faith Lutheran Maker space for allowing us to use their 3D printers
- To the Autodesk Company for giving us the opportunity to compete in this event
- To our coach Mr. Kober for encouraging us to participate in more than just the robotics competitions