**Controls Cart Gear**

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The Controls Lab on the 7th floor of the EERC has almost 30 controls carts for educational purposes. These carts include gears of various sizes (SDP/SI Part A 1M 2MYZ05025A - 25 teeth, 3mm face width, 20° pressure angle, 13.5mm O.D., 6mm bore diameter, 7mm hub projection) and a rack and pinion, where the pinion gear is made of a nylon material and the rack is brass. The material selection is such that the smaller and less costly nylon gear will wear down instead of the rack when a student overshoots the system during a dynamic simulation. While the control cart is for educational uses, overshooting the system is a common occurrence and can add up fairly quickly when a single gear costs $2.19. This gear also takes some time to install because it attaches to the motor shaft (Micromo Part # 3.71: K288) using a setscrew. Mark Sloat (EE lab coordinator) is looking for a less costly option that is easier to replace. He would also like it to last as many cycles as possible.

The objective of the project was to decrease the cost and installation time. The team was successful in designing a gear that would take less time to install. This was done by changing the shape of the opening to match that of the shaft which was D-shaped. This caused the gear to use a slight press fit. With filament averaging $30.00/Kg the gears would cost slightly less than $0.03 each. Even if the team was to pay someone $15.00/hour to watch the process, the total cost of the gear would work out to $0.15 each. While the PLA the teams printers are able to print cause the gears’ longevity to decrease, the ease of changing the gear and the greatly decreased cost justify changing to the newly printed gear.