

## Non-Back Drivable Gearbox

## **Project Description**

We have been given a non-working non-retractable gear box and tasked with analyzing how it fails with what we can do to fix this problem. Our main aim is to first figure out the problem the design a new solution that uses the same properties as the given mechanics. The goal for the team is to run FEA and other gear software to analyze the stress and friction along on the gear.

## Design

The design of the gearbox are that of a fixed gear, driven gear, and two planetary gears. The fixed gear has two less teeth than the fixed 50 teeth vs the driven gear of 52 teeth. As power is supplied to the carrier, the planetary gears more around and as the power is cut off the gears lock with the fixed gear. Note that the sun gear cannot more the carrier, but the carrier can move the sun. gear.





### **Existing Process**

The current existing process of the design involves a non-back drivable gear box that mechanically locks without the use of friction. It is always in the locked position until an input is applied. **Unequal teeth** allow the balance gears, held by the **carrier(input)**, to move the **drive gear(output)** but restrict the output gear from "back driving" the balance gears.

# Possible Problems and Solutions

Possible problems with the design are that the holding mechanism is held by friction causing deformation on all the gears. A solution might be to increase the number of planetary gears, lowering the risk of failure, however more analysis will be needed on this topic.



# PROCESS: MACHINE TURN GEAR BLANK FOR A STANDARD 50 TOOTH, 20' PRESSURE ANGLE GEAR, AND INDEX THE GEAR BLANK FOR 50 EQUALLY SPACED GEAR CUTTER GROOVES TO THE DIMENSIONS INDICATED ABOVE.

# PROCESS: MACHINE TURN GEAR BLANK FOR A STANDARD 50 TOOTH, 20° PRESSURE ANGLE GEAR, AND INDEX THE GEAR BLANK FOR 52 EQUALLY SPACED GEAR CUTTER GROOVES TO THE DIMENSIONS INDICATED ABOVE. THE RESULTING GEAR WILL HAVE 52 NON-STANDARD TEETH WITH STANDARD INVOLUTE FACE PROFILES, AND CUTTER GAPS.

# Designs for Planet Gear 12 TEETH PITCH DIAMETER = 19.35 MM OUTSIDE DIAMETER = 21.70 CM CONTACT ANGLE = 20° ADDENDUM = 2.50 MM TOOTH SPACING = 5.07 MM DIAMETRAL PITCH = 62.01 (1/MM) DESIGN LASH (SLOP) = 0.04 MM OPTION #1 STRAIGHT TOOTH TP BOTH ENDS



# Semester Deliverables: CAD Drawings of Gearbox Ansys FEA Analysis for Gears Analysis Tables Prototype Test Results



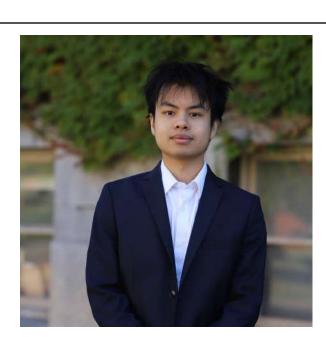
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