M1.05 – Team Argent

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Argent Automation

Objective

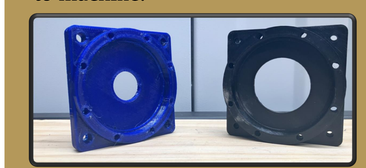
- Create a 3d printed prototype of each part that can be assembled.
- Develop proper manufacturing techniques for all the parts that we are required to machine.
- Machine all parts with designated material for final design.
- Assemble and test a fully functioning prototype.

Argent Automation

- Provides a high-performance gearbox with features such as zero backlash, high stiffness, self-braking, and energy savings.
- Target applications that require precise motion control.
- Based in Alabama and Maryland, changing the way your world rotates.

3d Printing and Prototyping

- We created 3D printed prototype of all the parts that we are required to machine.



- We used the Craftbot XL's in the makerspace to make the Index Plates, and housing with PETG filament.

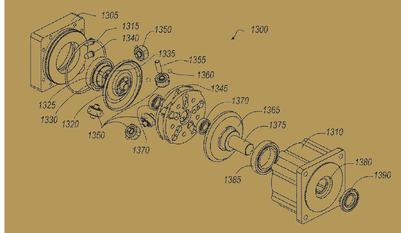
- Due to the intricacy of the input and output discs, we opted to use an "Elagoo Mars 2" resin printer with "Chitu Systems Conjure Tough ABS like Resin".

Product Design

U.S. 11,761,517

- The development of the Synchronic Drive gearbox addresses a critical market demand for enhanced transmission systems that offer superior performance and efficiency.
- The Synchronic drive acts as a speed reducer for with various potential applications such as Electronic Vehicles, Automatic Ground Vehicles, Robotic Arm Joints, and more.
- This gearbox is meant to be more efficient, lightweight, and smaller than other gearboxes using unique and complex geometries.

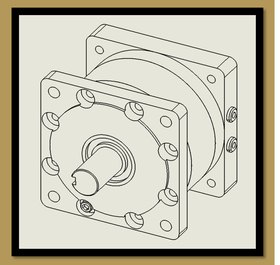
Items to be Manufactured



AFT Block, FWD Housing
Mounting points connecting the input motor to the output shaft respectively.

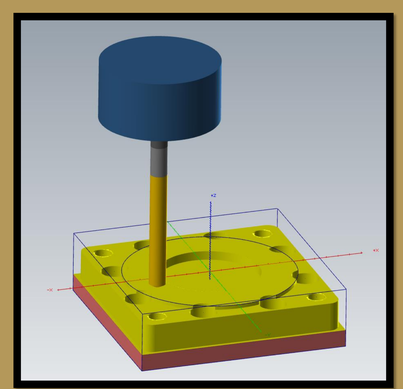
Index Plates
Midpoints that holds the needle nose bearings that connects the input and output discs and allows them to work in tandem.

Input and Output Discs
These components work in tandem to reduce the speed of the driving motor and convert it to torque



1st Semester Achievements

3d Printed Prototype



3-Axis Toolpaths Created

Over the course of the semester, we have managed to create a 3D printed prototype for every part that we will need to machine. This took time and fine tuning Due to the intricacy of each part, especially for the Input and output discs.

We have also generated all the toolpaths for the parts that will require 3-axis machining and have even made wooden prototypes of some of them.

Material Selection

- Prototyping Material Selection
  - PETG for FDM parts
  - Chitu Conjure Tough ABS like resign for sla parts
  - REN shape for tool path test
- Current Final Selection
  - 4140 Steel Input and Output disks due to high fatigue strength and abrasion resistance
  - 1018 Steel for Housing and Index Plates due to machinability and durability

Challenges

- Learning 5-axis CAM software for Input and Output disks
- Converting index plates to a 3d printable ready file due to its exported SolidWorks geometry being incompatible with CURA slicer
- Shipment issues from the bill of materials causing delay in final prototype assembly.
- Parts would break while milling out of softer materials like wood.

Next Semester

- Our next semester goals include 3 main steps:

1. Developing the toolpaths for the 5-axis parts (Input and output discs).

2. Manufacturing a fully functional prototype out of metal.

3. Possibly evaluate other material options for lighter and cheaper substitutions in the case that the strength of any material is unnecessary.

- This will be a difficult but extremely rewarding process that we hope will benefit Argent Automations