

**MTE 322 Project 1**

Prepared for:

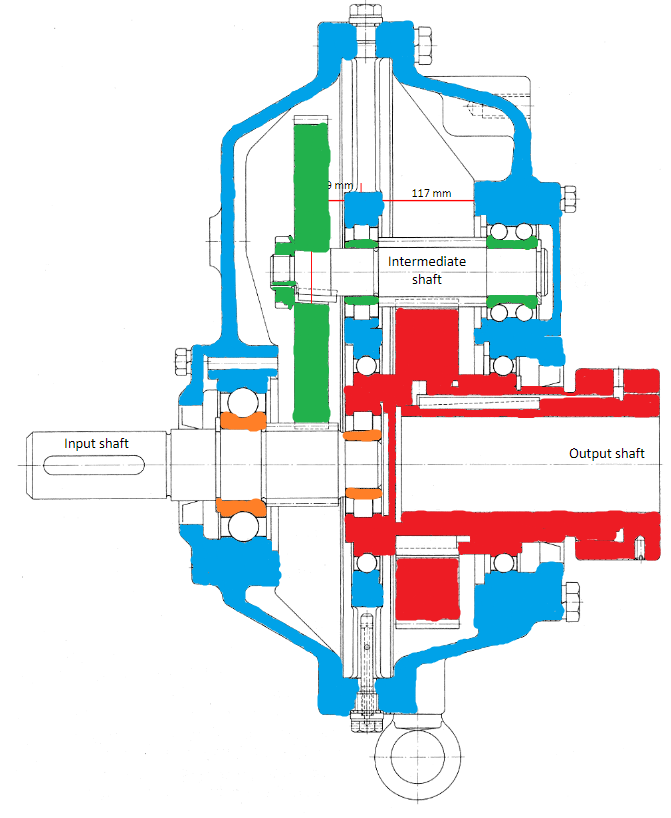
MTE 322 – Electromechanical Machine Design

By:

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# Coloring Page

The gear train in **Figure 1.1** is colored in with four distinct colors: blue, green, red, and orange. Each color represents a different speed that the part is rotating at, with blue being the housing of the gear train, thus being stationary.



**Figure 1.1:** Gear train with colors representing different speeds (blue is stationary)

# Assembly Model and Procedure

## Cross Section and Model

**Figure 2.1:** Cross section of the shaft and housing

|  |  |
| --- | --- |
| **#** | **Part** |
| 1 | Shaft Bushing A |
| 2 | Housing Cover A |
| 3 | Bearing A |
| 4 | Shaft |
| 5 | Housing |
| 6 | Bearing B |
| 7 | Housing Cover B |
| 8 | Shaft Bushing B |

**Figure 2.2:** Exploded view of the shaft and housing with labelled parts

## Procedure

1. Press-fit bearing A [3] onto the left side of the shaft [4]

2. Mount the housing [5] onto the shaft [4]

3. Slide in bearing B [6] onto the right side of the shaft [4]

4. Slide in housing cover A [2] into the housing [5] and around the shaft [4] on the left

5. Slide in shaft bushing A [1] into the housing [5] and around the shaft [4] on the left

6. Slide in housing cover B [7] into the housing [5] and around the shaft [4] on the right

7. Slide in shaft bushing B [8] into the housing [5] and around the shaft [4] on the right

# Free Body Diagram and Calculations

## Free Body Diagram

## Calculations

The reduction ratio is:

The input and output torques are:

The pinion and gear forces applied on the intermediate shaft are:

On the x-y plane, the forces applied in the y-direction on bearing A and bearing B are:

On the x-z plane, the forces applied in the z-direction on bearing A and bearing B are: