Overview

Project Outline
- **Our Task**
  - Design and manufacture single seat all-terrain vehicle
  - 4-wheel drive
  - Must fit SAE guidelines described in rule book
  - Can not modify motor
- **Competition:**
  - Static & Dynamic Events
  - Must pass technical inspection
  - Sled pull
  - Rock crawl
  - Maneuverability
  - 4-hour endurance race

Drivetrain

**Fully Custom Gear Box:**
- Manufactured components:
  - Case end plates (CNC Mill)
  - Hexagonal mid case plates (cut and welded)
  - Input, output, and idler shafts (Mill & Lathe)
  - Bearing housing (Manual Mill)
  - Output shaft adapters (Mill & Lathe)
- Bought Components:
  - Gears (Misumi)
  - Bearings (Misumi / McMaster Carr)
  - Oil Seals (Misumi / McMaster Carr)
  - Oil Plug
  - Pressure Relief plug

Suspension & Steering

**Design Goals:**
- Track width: 64”
- Wheel-base: 80”
- Ride height: 15”

**Design Results:**
- Track width = 62”
- Wheel-base = 72”
- Ride height = 12”

**Roll Cage & Safety:**
- Driver Model Shown (see image)
- Driver model needs to fit inside roll cage
- If a roll was to happen drive need to be contained.
- Driver needs to be able to exit vehicle in 3 sec.

Finite Element Analysis:
- Front & rear control arms:
- Front, rear, side, and fall impact tests
- Coarse, medium, & fine mesh
- Tested worst case scenario: 5000 lbf

Simulations:
Front, rear, and side impacts and torsion

Frame

**Primary & Secondary Members:**
- **Primary Member (Black)**
  - 1.25in diameter
  - 0.065in wall thickness
- **Secondary Member (Grey)**
  - 1.00in diameter
  - 0.065 wall thickness

Rack and Pinion Offset:
- The front differential is running through the middle of the vehicle; therefore, we had to move the rack and pinion off to the right side of the differential.
- By doing this we had to create an extension for the left side.

Roll Cage & Safety:
- Driver Model Shown (see image)
- Driver model needs to fit inside roll cage
- If a roll was to happen drive need to be contained.
- Driver needs to be able to exit vehicle in 3 sec.

Mounting Members:
- **Seat**
- **Engine**
- **Gear Box**

SAE Baja Collegiate Design Series
Competition Date: May 4, 2023
Location: Oshkosh, Wisconsin