

4WD Drivetrain of a Mini Baja Vehicle

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Abstract:

The Baja SAE student engineering competition has been dominated year after year with two-wheel drive off-road vehicles, and the rules have changed to encourage innovation and competition. As the SAE rules state:

"The ATV market has almost completely moved away from 2-Wheel Drive models, and Baja SAE is changing to reflect that. Starting with the 2021 season, all wheels must be capable of being driven." - 2020/2021 Baja SAE Rule Book

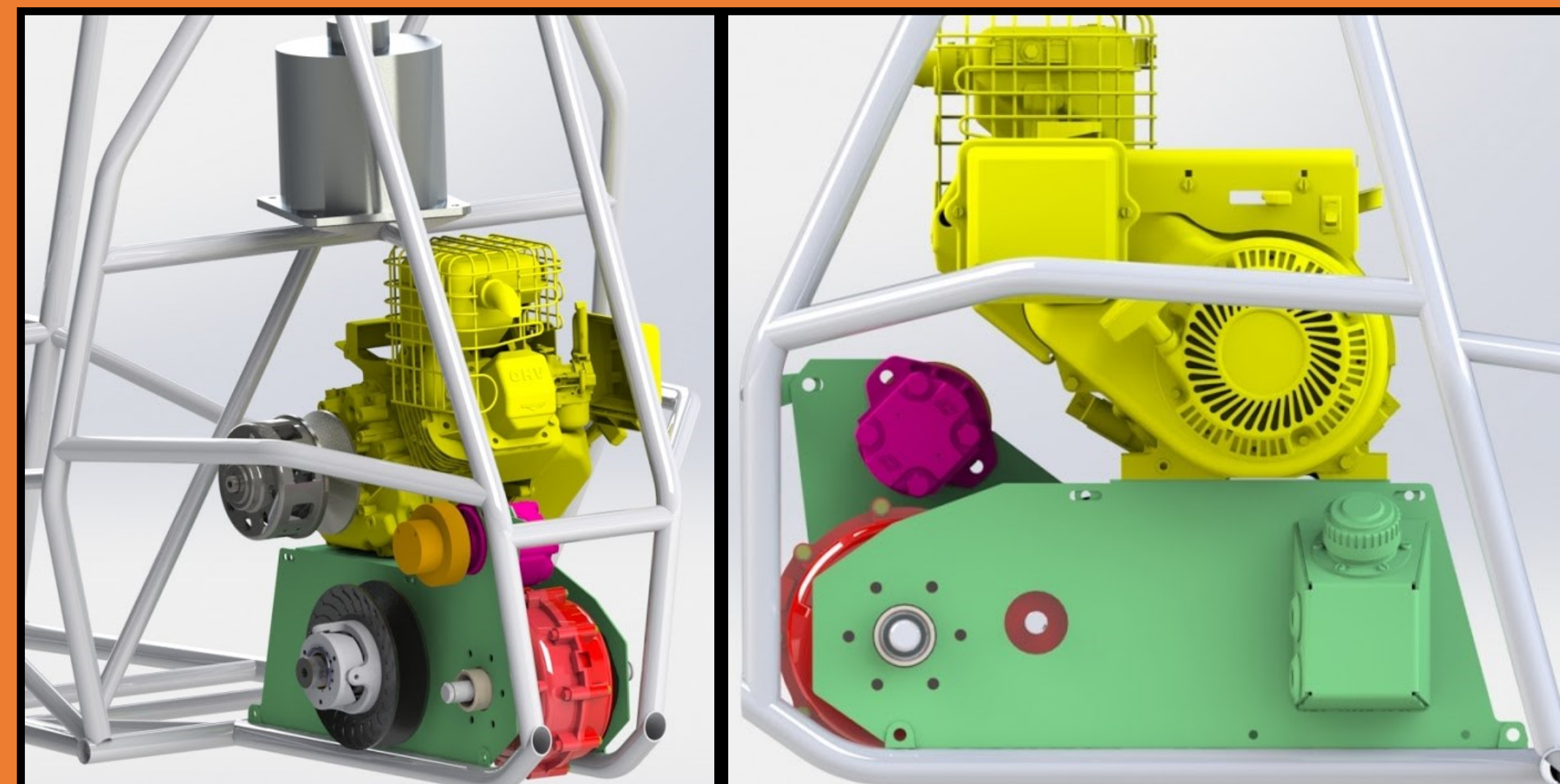
The U of R Cougar Racing team is taking on this challenge by developing a four-wheel-drive system to fit in an existing 2WD Baja frame that was built in 2019. The proposed solution is to implement a hydraulically driven front differential to power the front wheels while retaining the previous mechanical rear-wheel drive system.

Objectives:

- . System integrated into existing Baja frame
- . Balance between 2WD and 4WD performance
- . Safety
- . Compliance with SAE rules

Analysis/Activities:

- . Calculations: Available torque, tractive analysis, rolling resistance, aerodynamic drag.
- . Suspension and Steering Design
- . 3D Modeling
- . Cost Analysis



Hybrid Mechanical-Hydraulic 4WD:

Rear System:

- . Engine: Briggs & Stratton 10hp
- . Hydraulic Pump: Parker PGP 511 6CC
- . Transaxle: Dana Spicer H12 FNR
- . Clutch: 3D Motorsports

Front System:

- . Hydraulic Motor: Parker TB0036 36CC
- . Differential: Polaris Sportsman 570 Front

