



N F P A

Fluid Power

=VEHICLE

Challenge



NFPA
Education and
Technology
Foundation

**FINAL PRESENTATION &
DESIGN REVIEW**
Penn State University
Jude Liu
April 6



Introductions



Travis White
Mechanical Engineering

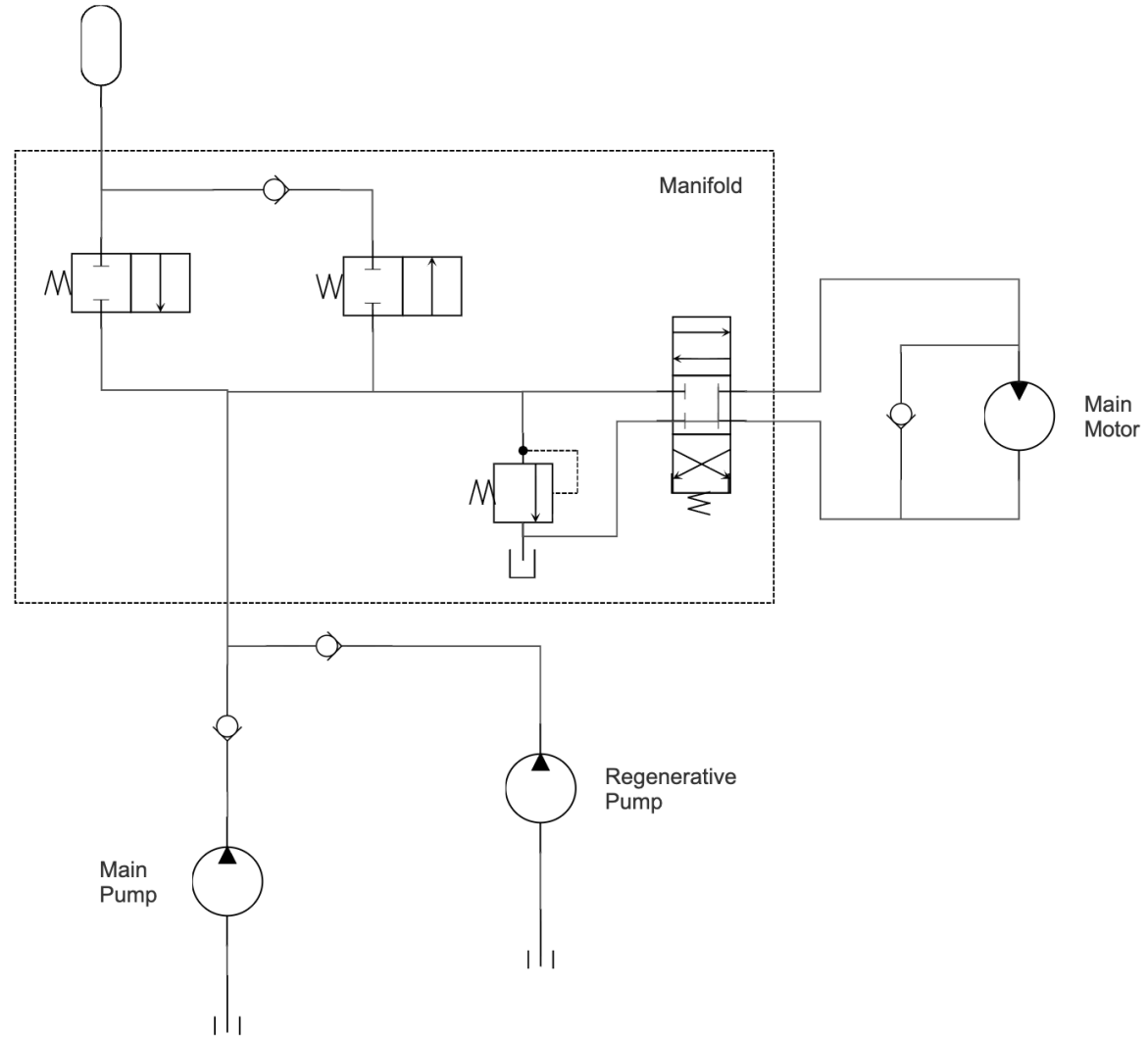


Brenden Stambaugh
Mechanical Engineering



Erik Kressler
Agricultural Engineering

Hydraulic Circuit



A chain-drive provides the most efficient power transfer from pedals to the hydraulic pump.



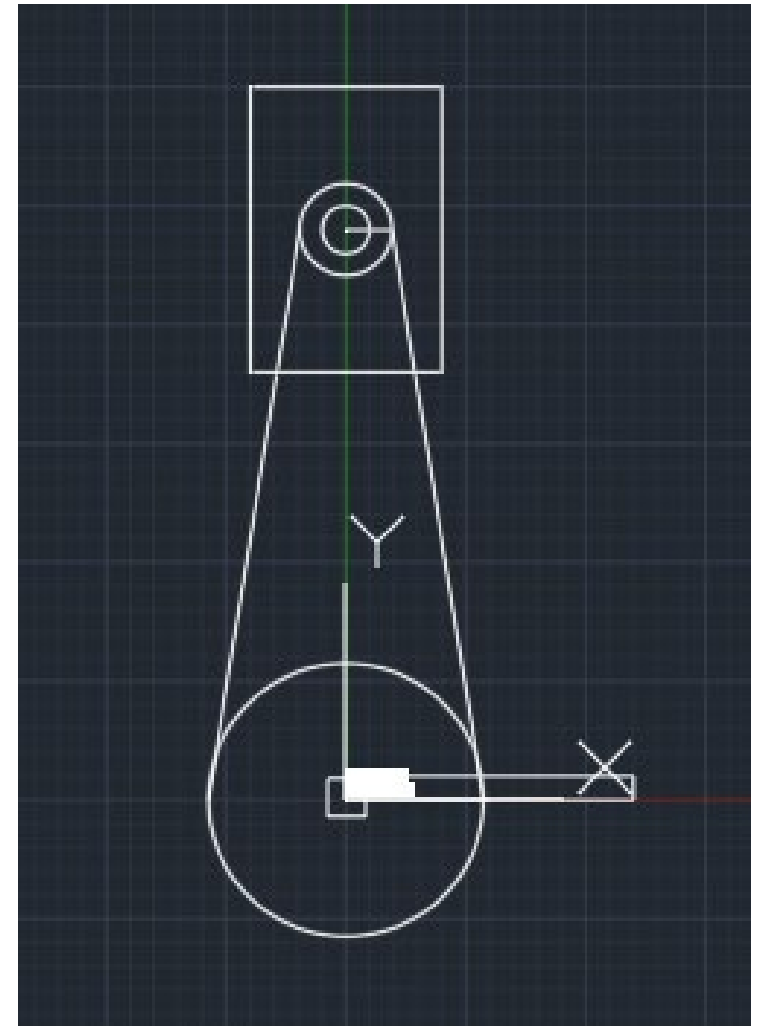
36 tooth drive sprocket, 8 tooth driven sprocket

4.5 Gear Ratio

High efficiency (98%)

Minimal slip compared to belts

Easily adjustable gear ratio (swap sprockets)



Using the existing cassette allows the hydraulic motor to deliver efficient, shiftable power to the rear wheel.



Proven drivetrain increases overall reliability

High efficiency chain reduces power losses

Gear shifting provides mechanical advantage across speeds

Low gears improve starts; high gears enable top speed

Wheel rotation can efficiently drive the regen pump using a pulley-clutch mechanism.



Belt drive provides high efficiency

Simple mechanical layout reduces complexity

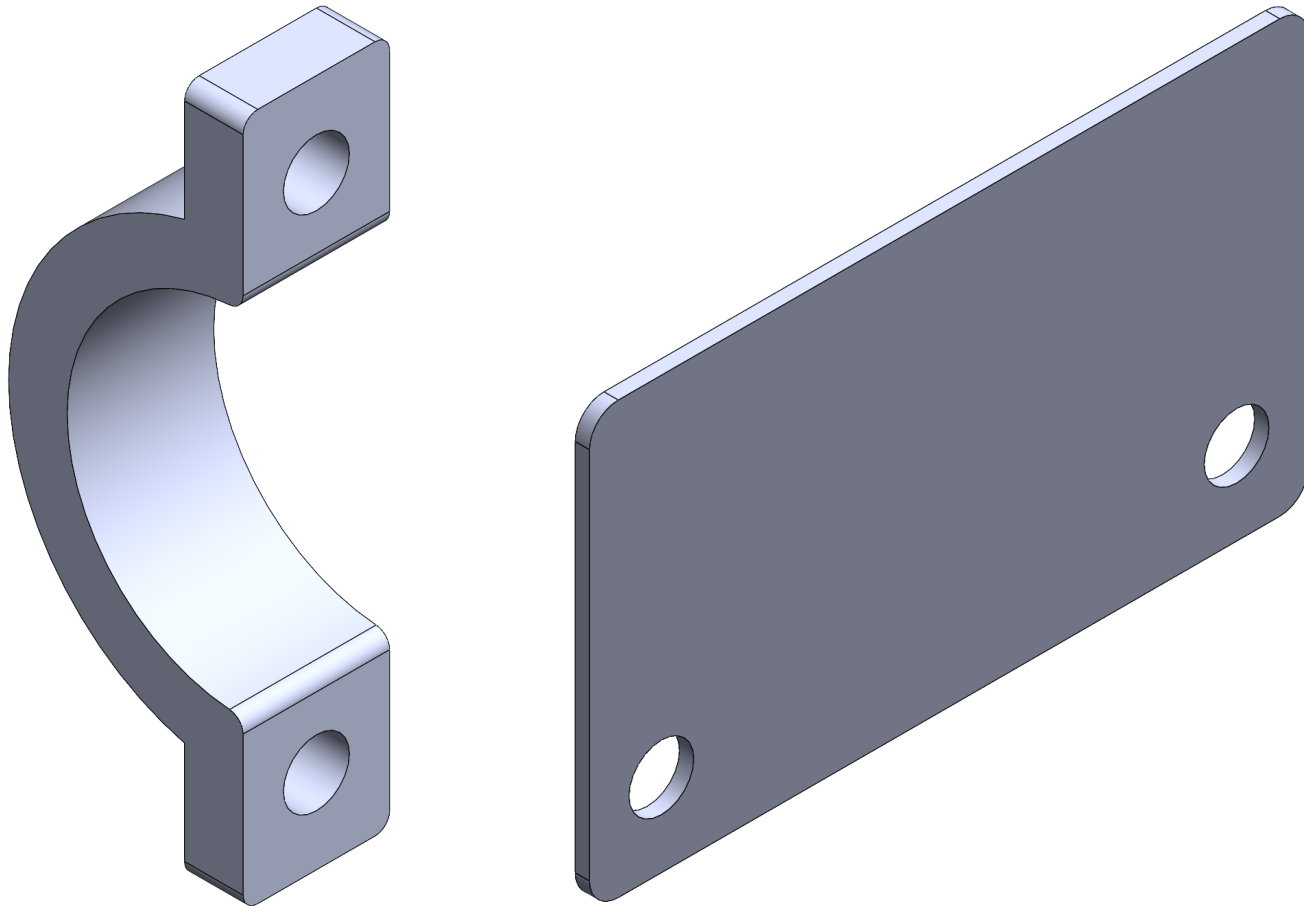
Pulley system integrates cleanly with a clutch

Enables controlled engagement of the regen pump

Additive Manufacturing



Mount for Buttons on Handlebars



Rapid prototyping enabled quick iteration for optimal button reach

Custom-fit clamp geometry prevents slip and reduces vibration

Lightweight, durable design suited for hydraulic system loads

Additive Manufacturing



Allow for easy control switching through functions

Normally off switches ensure valves are closed when not in use

Self setting switches allow for personalized configuration for efficient controls and comfort





Required Final Slide

- Start ordering/gathering needed materials early as possible (order before winter break).
- Construct a large, eager team from the beginning to design and construct the bike.
- Set weekly meeting times to construct the bike.
- Divide task based on teammates strengths.
- Set small deadlines/milestones to stay on track.