NFPA
Education and
Technology
Foundation

FINAL PRESENTATION & DESIGN REVIEW

Loyola Marymount University
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Team Introductions

Traeger Harrison
Hydraulics

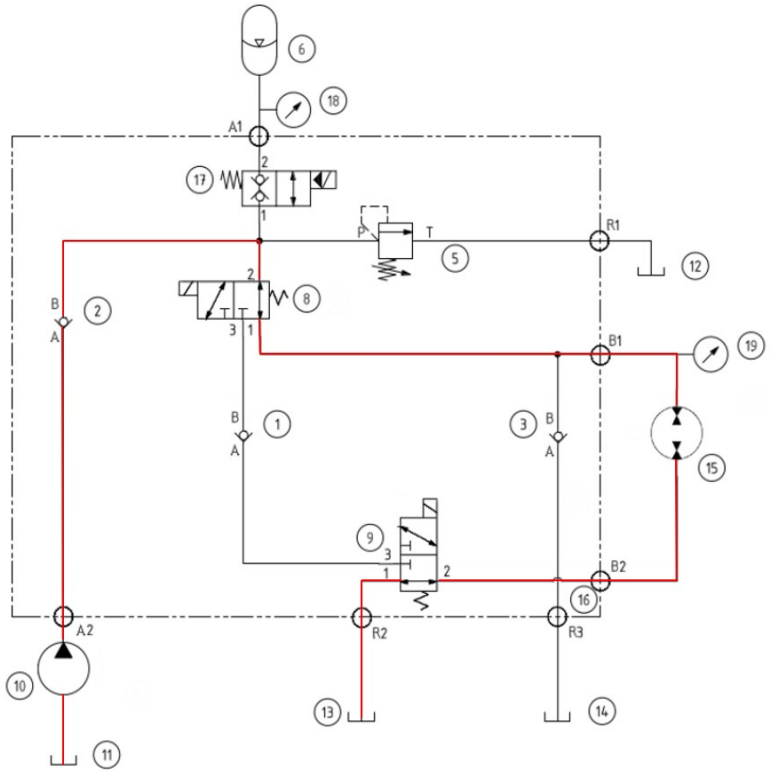
Charlie Hill
Project Lead &
Electronics

Noah Striker
Hydraulics

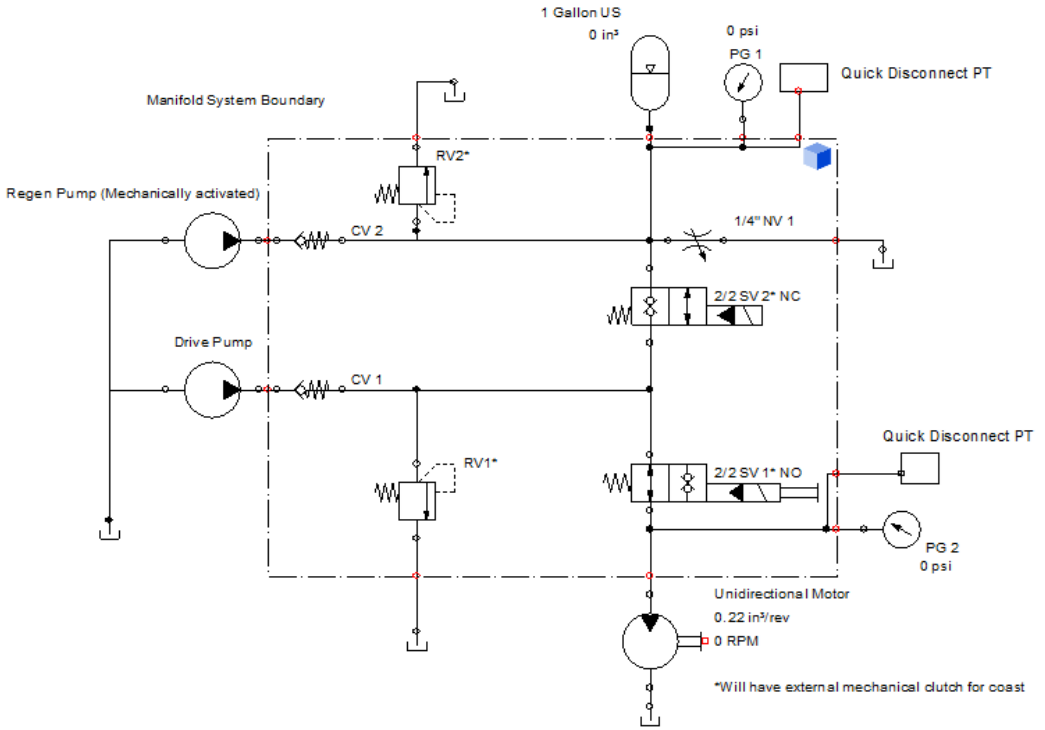
Daniel Pedler
Mech

Sarah Leka
Mech

Hydraulic Circuit



Previous Team
(2022-2023)



This year

- Added Regen Pump
- Used unidirectional motor
- Simplified circuit

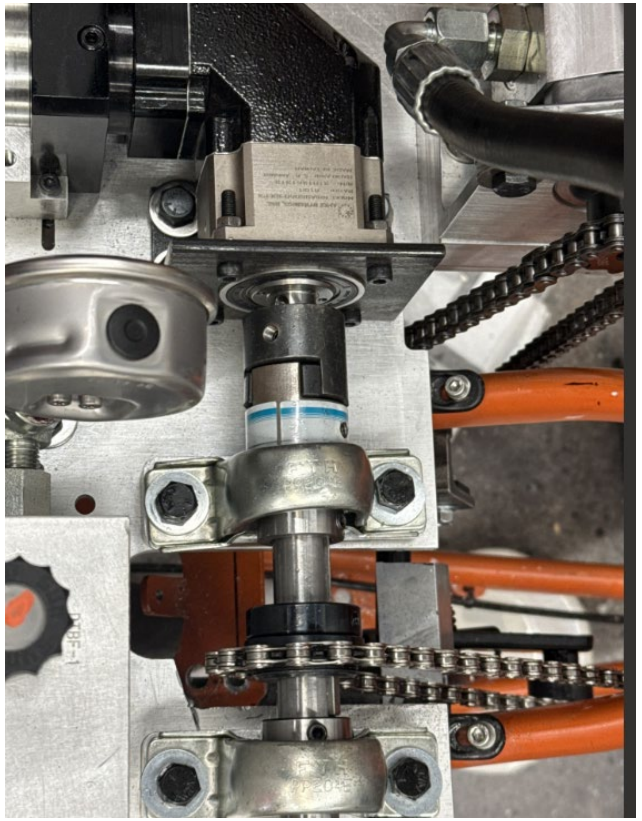
Back Plate Assembly

- Hosing done by Alternative Hose Inc.
- Reuse of old reservoir
- Components were mounted inline to ensure balanced riding

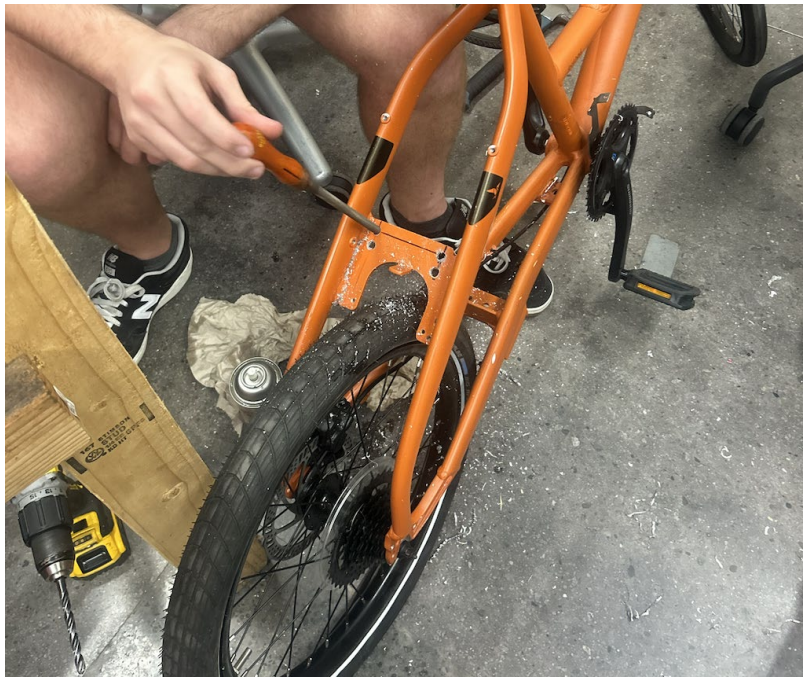
Front Drivetrain

- Selected a low-displacement micro piston pump for high-RPM efficiency

- Front drivetrain designed to achieve 30:1 gear ratio between pedal to pump for sufficient hydraulic pressure generation

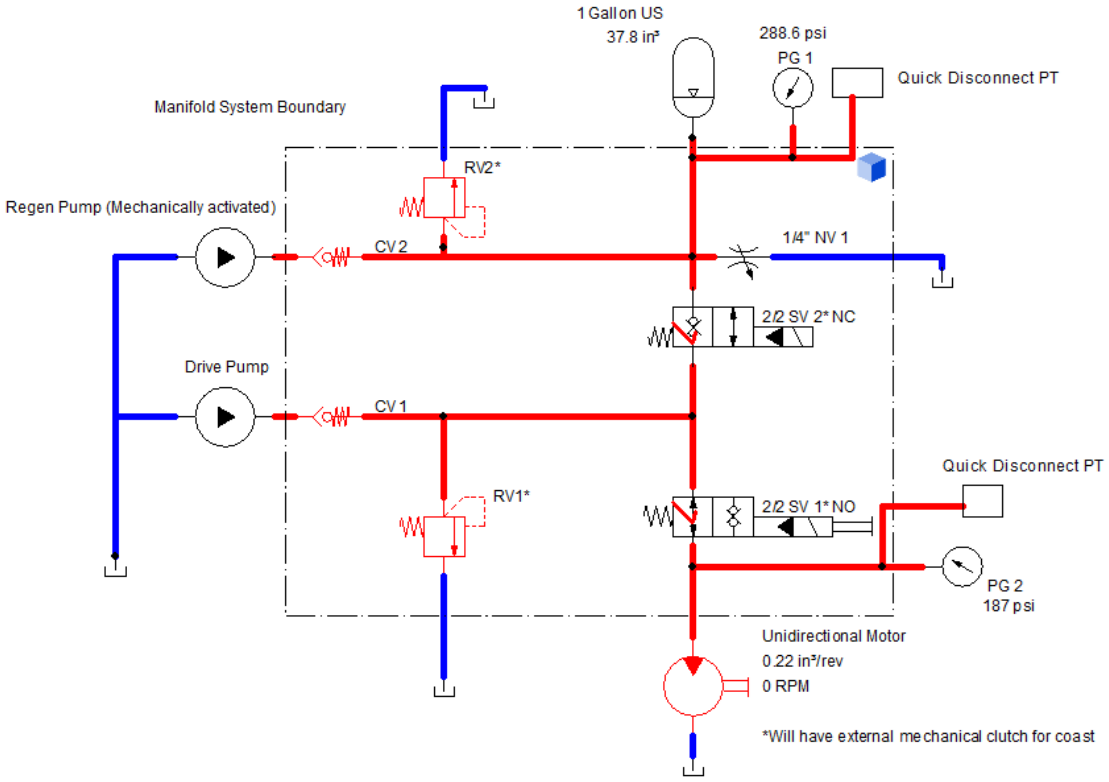


Rear Drivetrain



- Final gear reductions: 12T → 25T (motor to jackshaft), 15T → cassette

Regen Mode



- Used linear actuator to activate regen mechanism
- Circuit stays in drive mode
  - no additional power required

Testing & Troubleshooting

- Hydraulic
  - Multiple components failed or were not capable of performing their duty.
  - Needle Valve loosened, providing difficulty with pressure build up. This error was identified and fixed, allowing the accumulator to charge up to 3000 psi in less than 15 minutes.
- Mechanical
  - Vehicle chains were cut down and tensioners were adjusted to better route chains.
  - Bearing mount holes were moved back to ensure room for flexible couplings
  - Reservoir and accumulator mounting was adjusted to better fit and fasten components.
- Electrical
  - While prototyping, vibrations caused more issues than expected.

Final Vehicle

- Proof of working vehicle was submitted on time
- All fittings and valves were torqued to spec
- Added chain guards based on Ernie Parker's feedback to meet requirements before shipping

Lessons Learned

- The design and build process requires multiple iterations.
- Greater consideration for varying body sizes and leg lengths in design
- Order parts earlier
  - more emphasis on validation of ordered parts
    - Regen pump and motor
- Ensure part compatibility
    - Drive pump to gearbox
- Know when spending extra money is worth it