

N F P A

Fluid Power

VEHICLE

Challenge

FINAL PRESENTATION

Michigan Technological University

Jony Ramos

Tony Wacek

Tommy Fisher

John Waller

David Wanless

4/13/2023



NFPA
Education and
Technology
Foundation



Michigan Tech

Team Introduction



Team Advisor: David Wanless

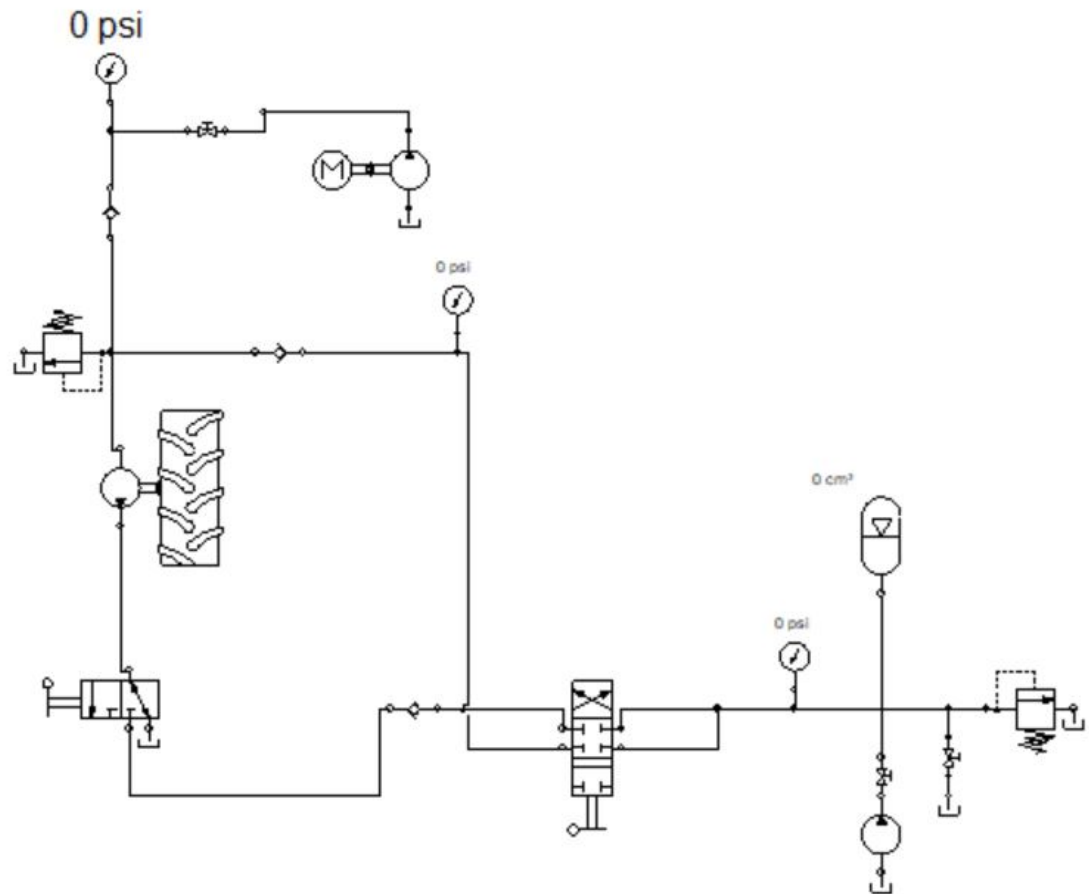
Team Mentor: Grant Noll

Team Members: Tony Wacek Tommy Fisher
John Waller Jony Ramos



Previous Competitions

- Last years team created the circuit below and they implemented the manifold to run their system.

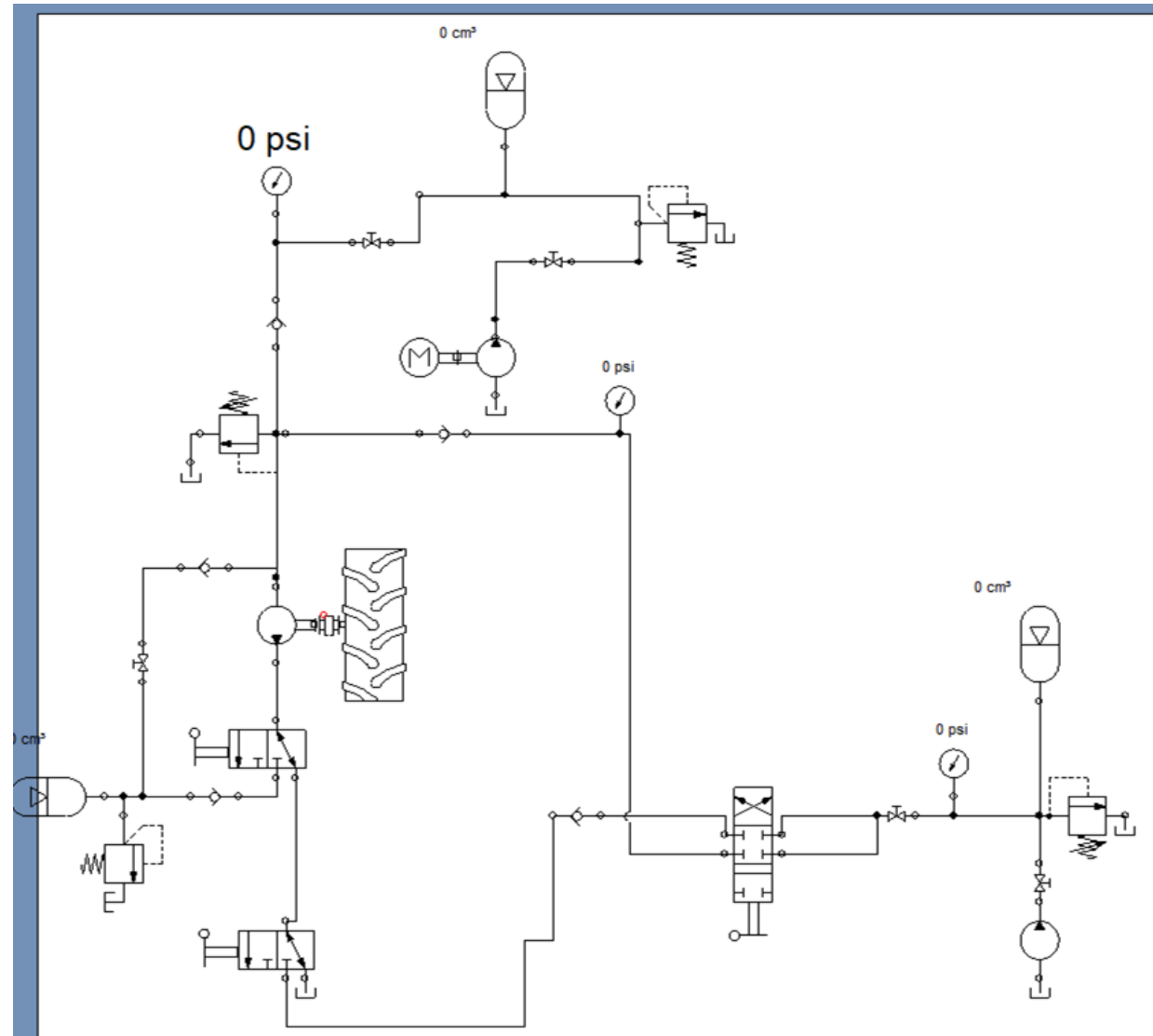


Approach/Design Objectives

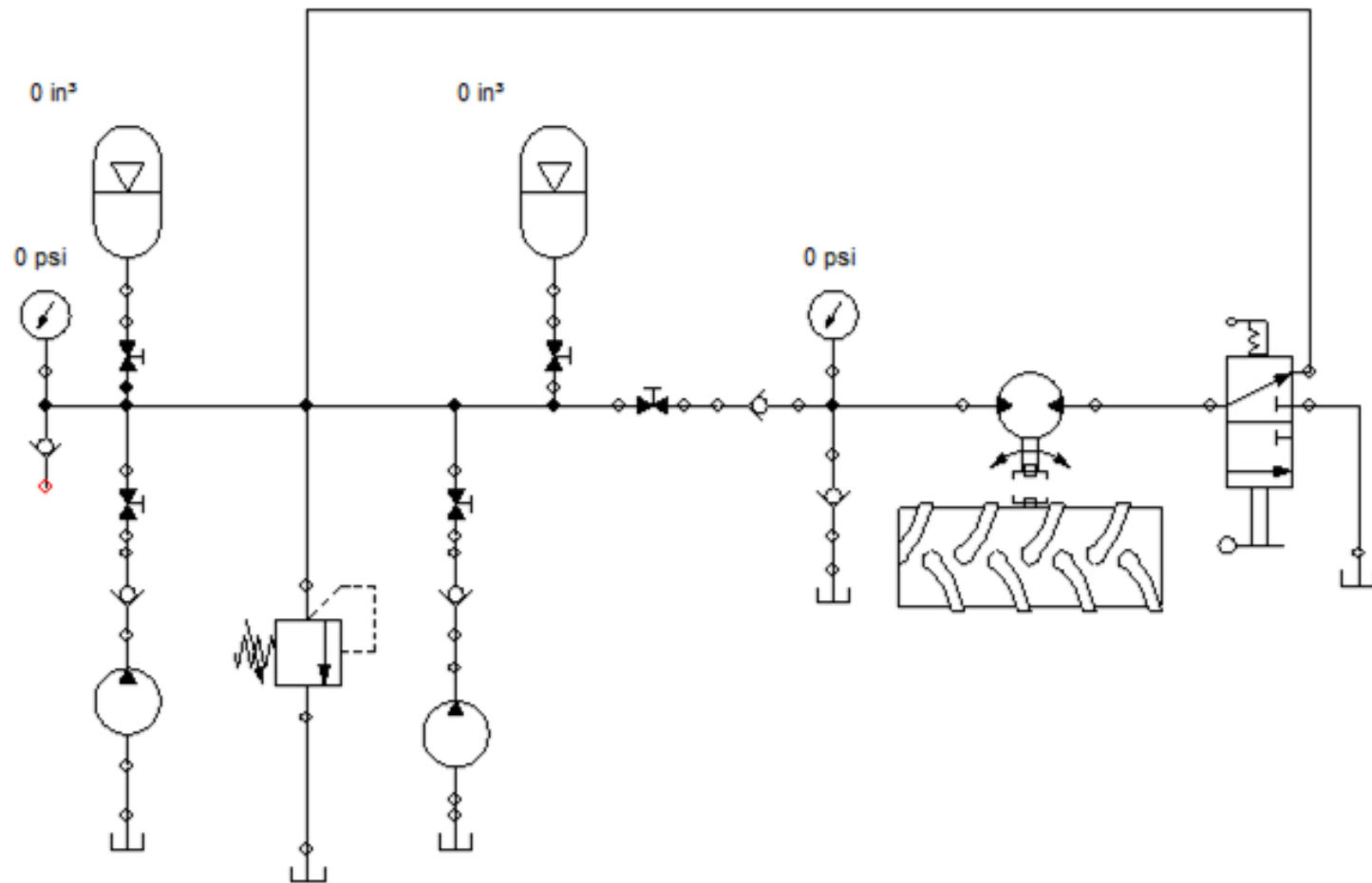
- For this project we each decided to consider one race separately and create a circuit based on the requirements of each challenge. We then combined the circuits into one.
- Moving forward we will need to optimise the combined circuit for a more efficient, competitive, and easy to use bike.
- We wanted to implement a clutch system to use in the endurance race.
- We also had to figure out where to put the shut off valves that would be easier to use.
- We added a second accumulator

Midway Summary

- Met with mentor to review circuit design
- Sent design to Ernie for optimization



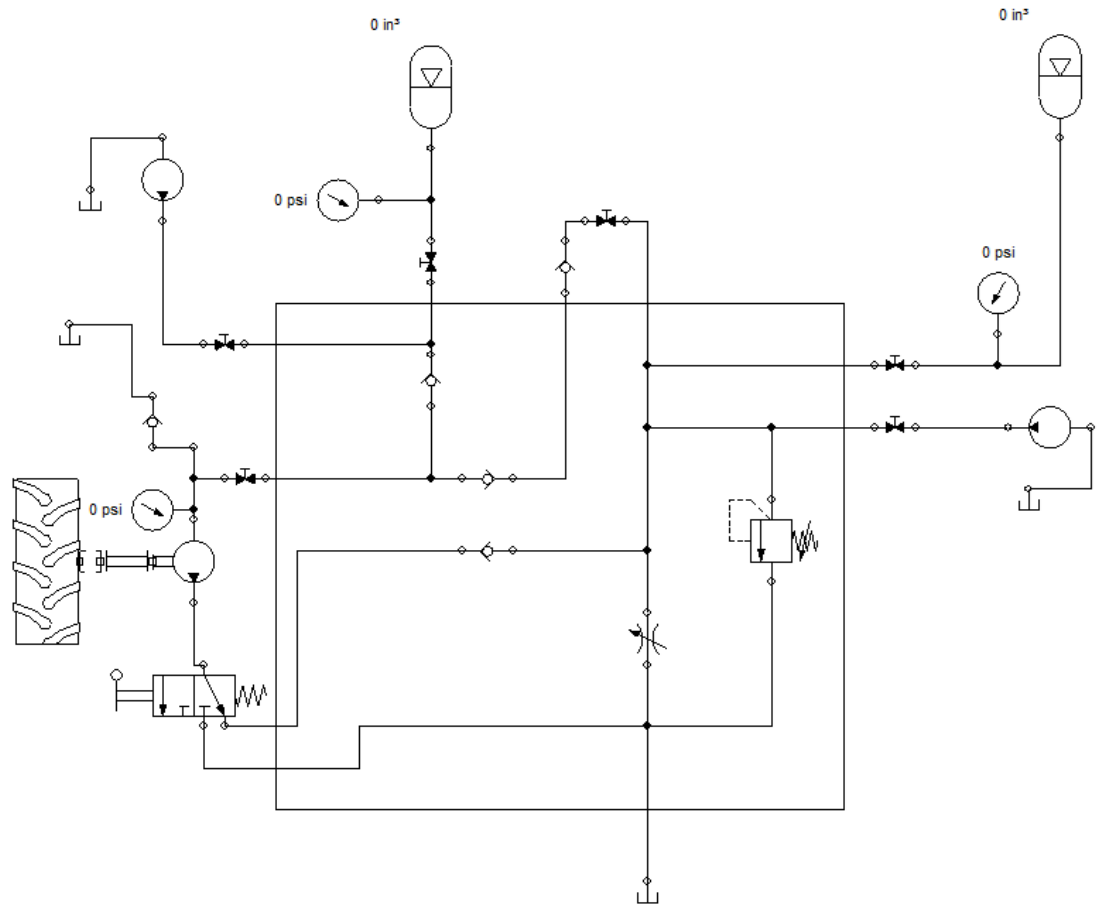
Revised Circuit



Manifold Implementation

Implementation of our circuit

Design into the already existing manifold



Work Began...

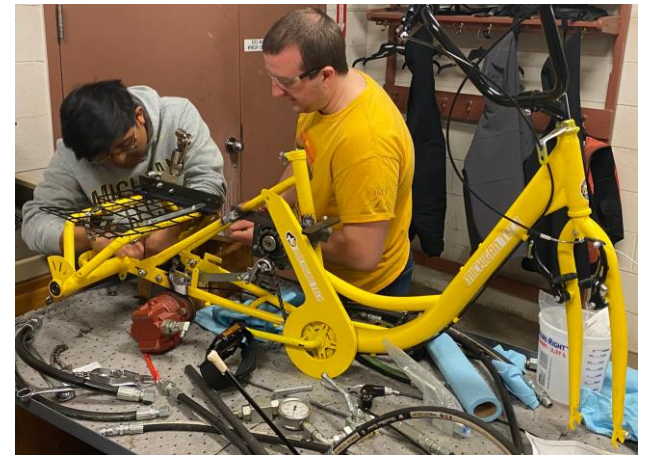
With the manifold schematic established, work on the bike began.

We survived the blizzard



Vehicle Construction

- Innovations and ideas begin



N F P A
Fluid Power
VEHICLE
Challenge

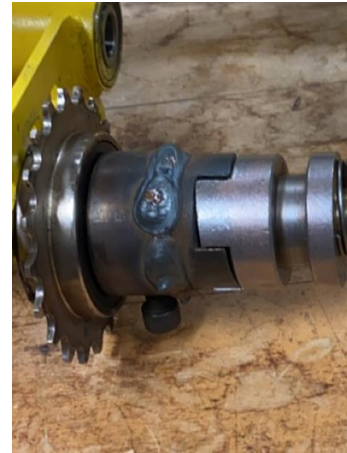
Clutch

- Idea of installing a dog clutch on the bike
- Creating our key
- Milling our engage/disengage system
- Final product



Welding

- Took up different welding projects
 - Welding clutch to our power gear
 - Welding bearing piece on bike
 - Welding a support for the left side of the bike
 - Welding our clutch mechanism



Vehicle Construction



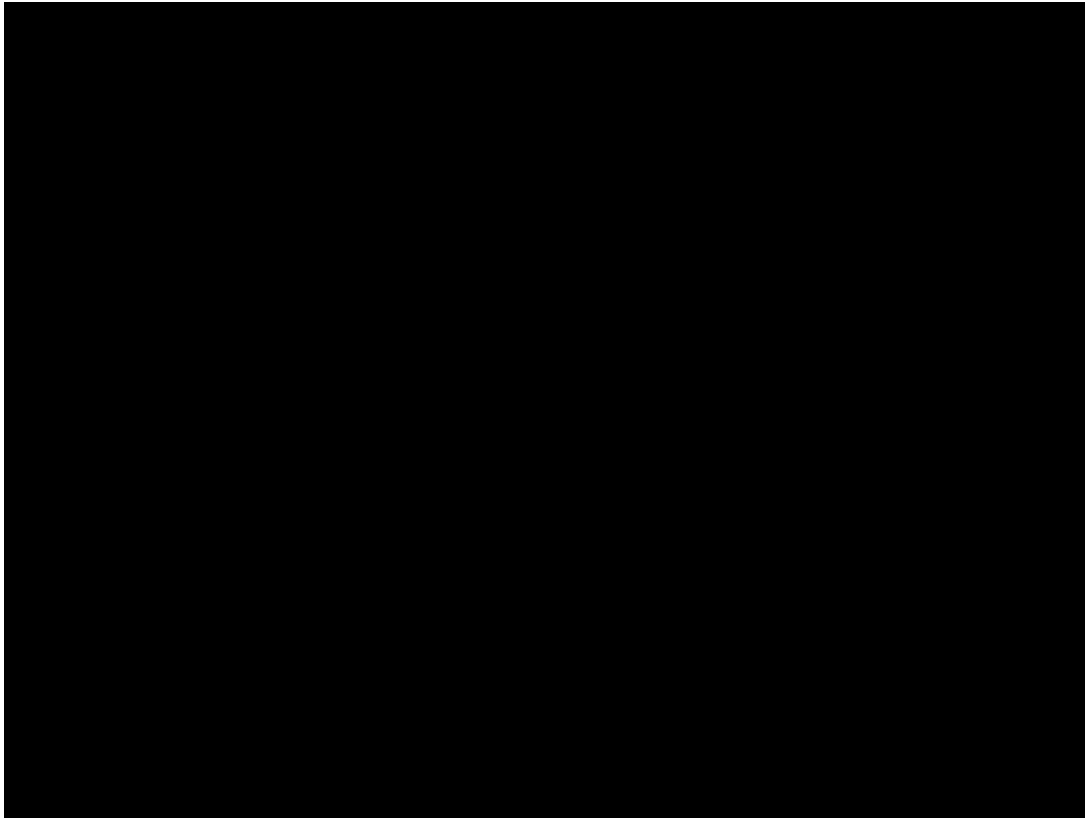
- The finalizing stages of our bike



Testing



- Proof of Working Vehicle
 - walk through functions of vehicle and verify proper function
- Test reliability of construction
 - endurance testing to find weak points
 - Ensure operator ease of use
- Make adjustments where necessary
 - Redesign or implement solutions to unforeseen design flaws

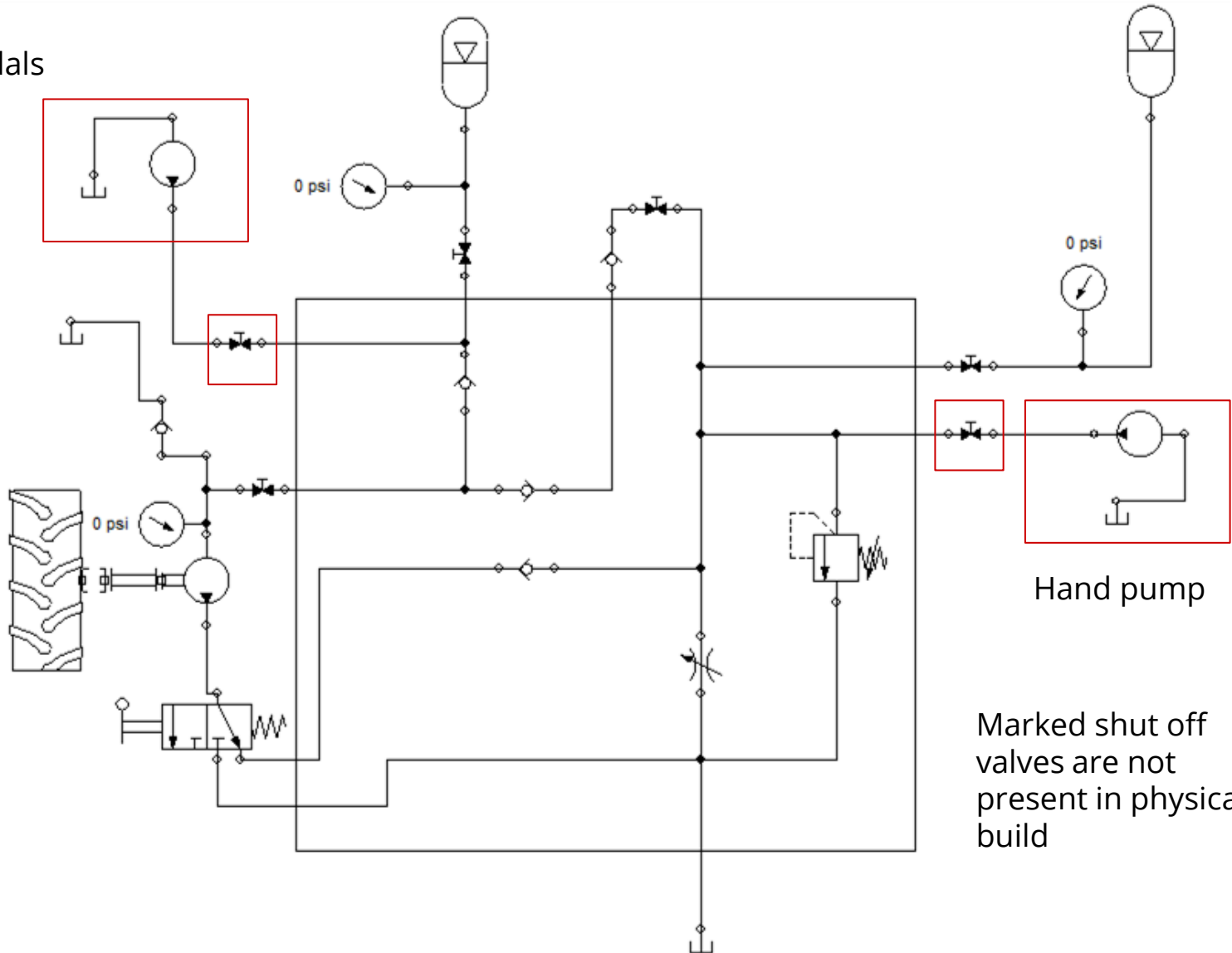


Final Project



Full circuit

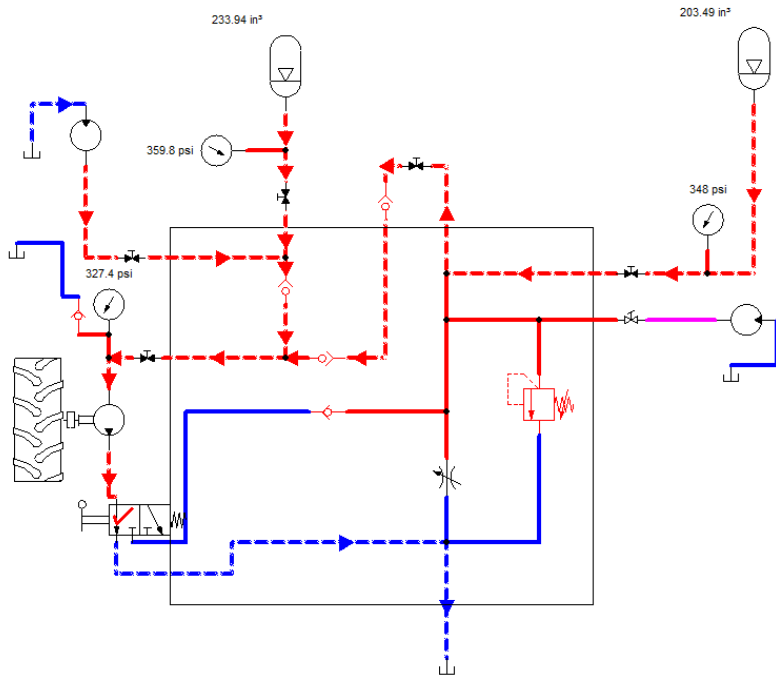
Pedals



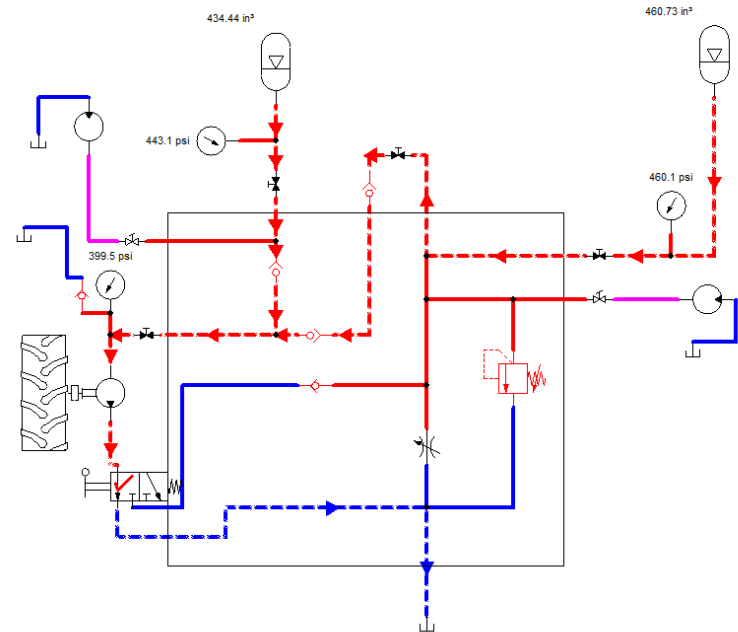
Hand pump

Marked shut off
valves are not
present in physical
build

Our races in the circuit



Sprint race



Efficiency race

Lessons Learned

- Clutch arrangement
- Welding (we had a plethora of welding to do)
- Frame rearrangement
 - Cut axle support
 - We need to fit clutch, not enough space
 - Welding bearing support back on
- Milling a keyhole on our sleeve
- Adding the second accumulator
 - Reorganizing the hoses together
- Starting earlier to working on the bike
 - Researching information was key
 - Ordering parts sooner
 - Second accumulator had some issues

Questions?