NFPA Fluid Power VEHICLE Challenge

NFPA Education and Technology Foundation

FINAL PRESENTATION
University of Cincinnati
Muthar Al-ubaidi
4/11/19

Informational Only
Delete for Final Presentation

- Refer to the FPVC assessment rubric for specifics.
- All team members are expected to contribute during the presentation.
- The Final Presentation is expected to be of high quality, well-rehearsed, touching on the **high level** aspects of the project. Avoid getting too far "into the weeds".
- Length: Strictly adhere to a 15 minute presentation. Judges will allow for 5 minutes of Q&A but no more than 20 minutes will be allotted for the presentation.

FINAL PRESENTATION	Poor	Moderate	Good	Very Good	Excellent
Summary of midway presentation is succinct and well organized.	1	2	3	4	5
Vehicle construction was completed on-time and performed mostly by the team members.	1	2	3	4	5
Vehicle testing was performed and improvements were made based on results.	1	2	3	4	5
Final vehicle brought to competition appears reliable, safe and of quality craftsmanship.	1	2	3	4	5
Lessons learned are clearly stated and appropriate to the design/build experience described.	1	2	3	4	5
Presentation is completed on time and demonstrates good team synergy.	1	2	3	4	5

Photo of Vehicle

Team Introductions

- Team Introductions (include photo)

Mick Morris -Team lead

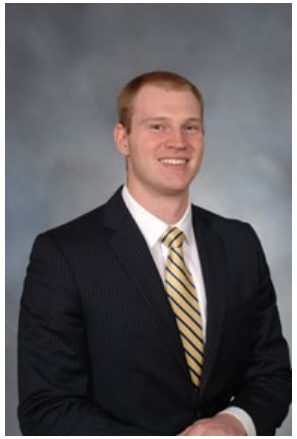
Gabrielle Tisch

Jordan Holmes

Muthar Al-Ubaidi, PhD Team Advisor

Alison Moore

Brandon Potter



Taylor Gelhausen

Agenda

1. Summary of Midway Presentation
2. Vehicle Construction
3. Vehicle Testing
4. Final Vehicle Brought to Competition
5. Conclusion & Lessons Learned

Agenda information

- **Summary of Midway presentation**
  - Note: Do not spend too much time on this section
  - Design objectives
  - Vehicle design
  - Fluid power circuit design
  - Selection of hardware
  - Results and incorporation of analyses (e.g., finite element analysis)
- **Vehicle construction**
  - completed on-time and performed mostly by the team members
  - *list through major designed components
- **Vehicle testing**
  - Was performed and improvements were made based on results
- **Final vehicle brought to the competition**
  - Appears reliable, safe and of quality craftsmanship
- **Lessons learned**
  - Are clearly stated and appropriate to the design/build experience described
- **Presentation**
  - Completed on time and demonstrates good team synergy

*A YouTube link of the any video(s) must be included in the speaker notes.

Problem Statement & Objectives

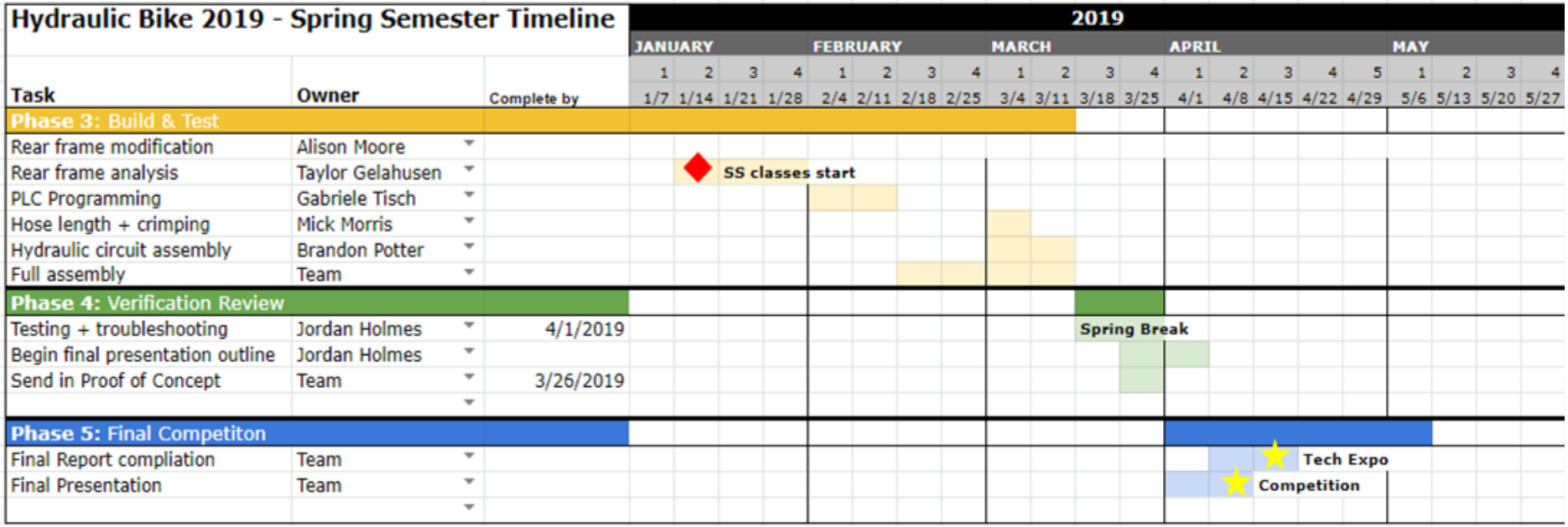
Design

- Efficient hydraulic circuit
- Unique design

Overall

- master new concepts
- practice applications

Timeline


Hydraulic Bike 2019 - Spring Semester Timeline
2019
JANUARY
FEBRUARY
MARCH
APRIL
MAY
Task
Owner
Complete by
1/7 1/14 1/21 1/28 2/4 2/11 2/18 2/25 3/4 3/11 3/18 3/25 4/1 4/8 4/15 4/22 4/29 5/6 5/13 5/20 5/27
Phase 3: Build & Test
Rear frame modification
Alison Moore
Rear frame analysis
Taylor Gelahusen
SS classes start
PLC Programming
Gabriele Tisch
Hose length + crimping
Mick Morris
Hydraulic circuit assembly
Brandon Potter
Full assembly
Team
Phase 4: Verification Review
Testing + troubleshooting
Jordan Holmes
4/1/2019
Spring Break
Begin final presentation outline
Jordan Holmes
Send in Proof of Concept
Team
3/26/2019
Phase 5: Final Competiton
Final Report compliation
Team
Tech Expo
Final Presentation
Team
Competition

Hydraulic Circuit Design

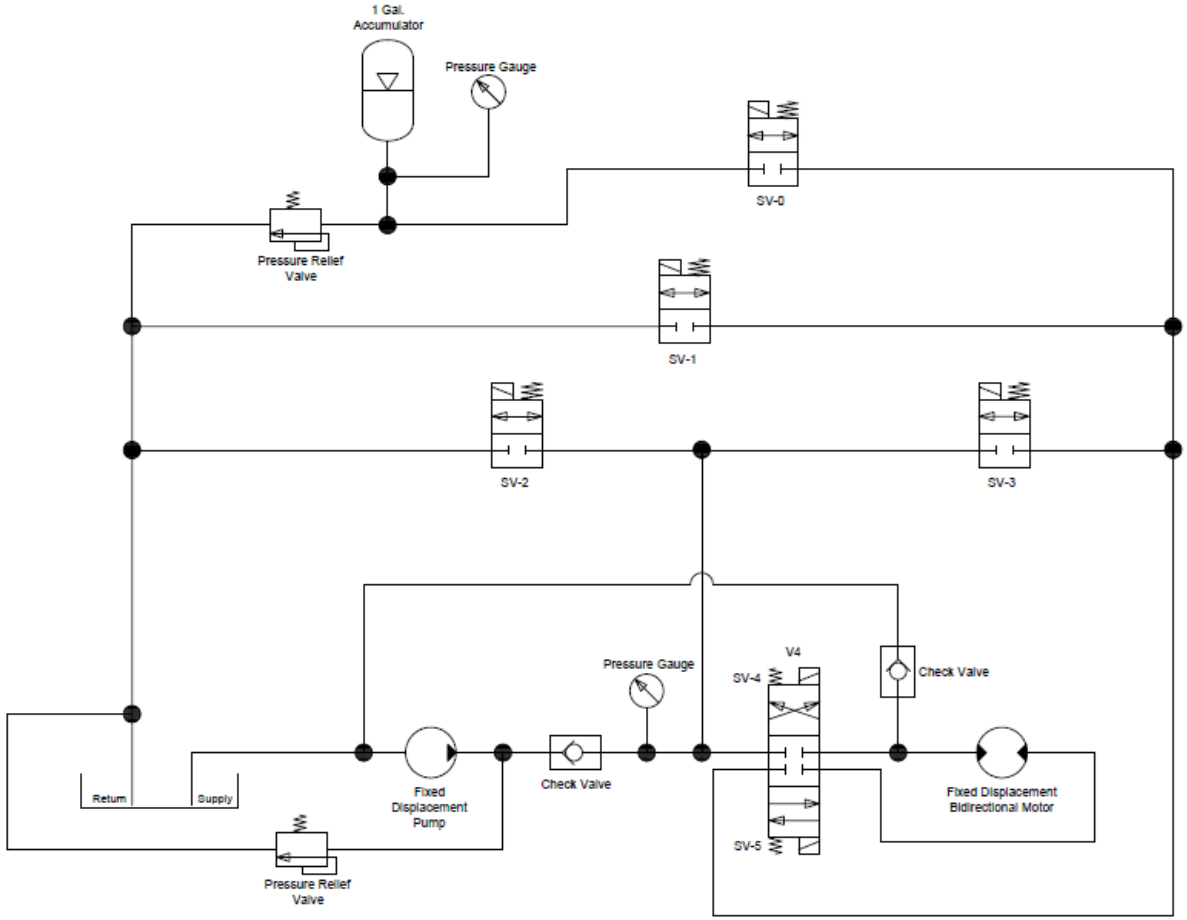
V0 - 2 Pos 2 Way

V1 - 2 Pos 2 Way

V2 - 2 Pos 2 Way

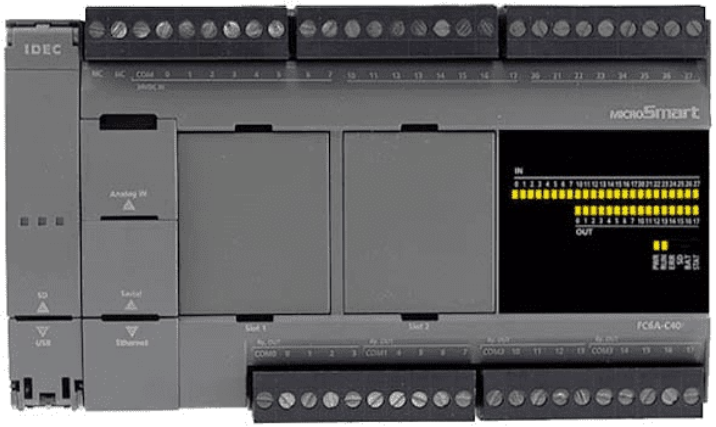
V3 - 2 Pos 2 Way

V4 - 3 Pos 4 Way



PLC Selection Option 1

IDEC FC6A-C40R1DE



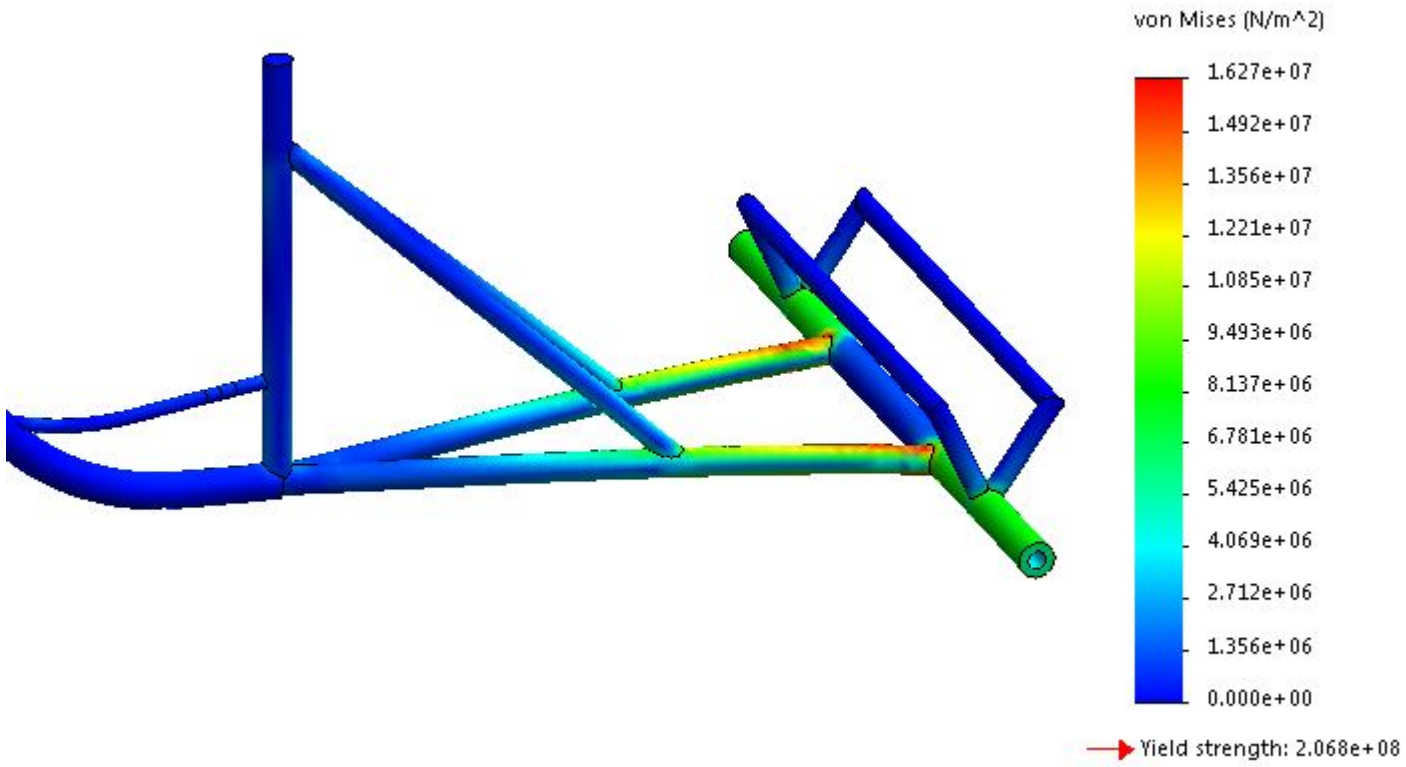
Pros

- Easy to program
- Rider could control solenoids using buttons or switches mounted near the handlebars
  - Buttons would need some sort of user feedback, possibly use LED illuminated pushbuttons

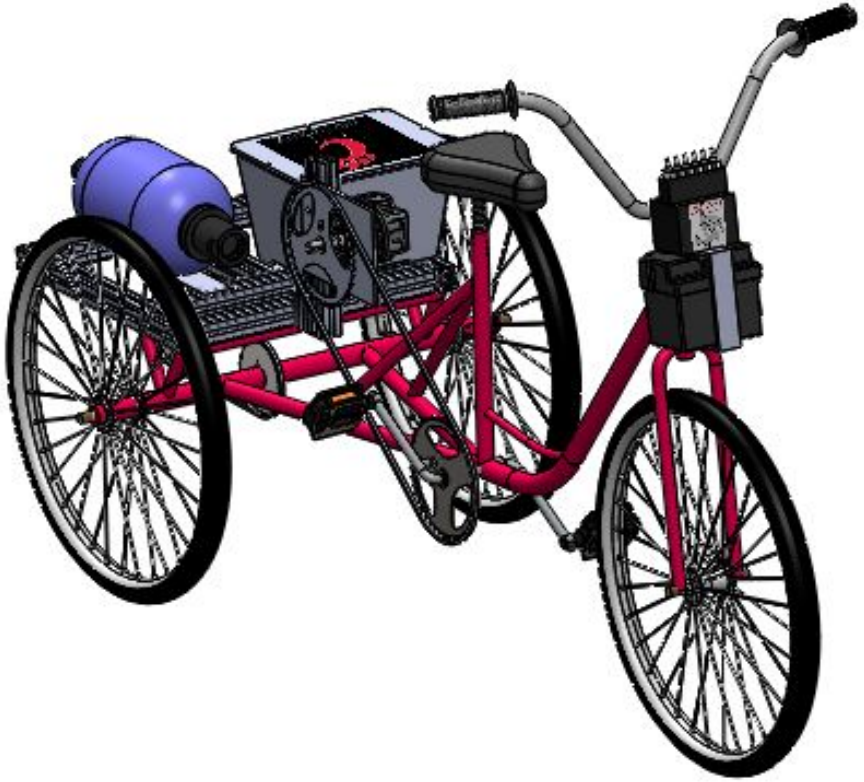
Cons

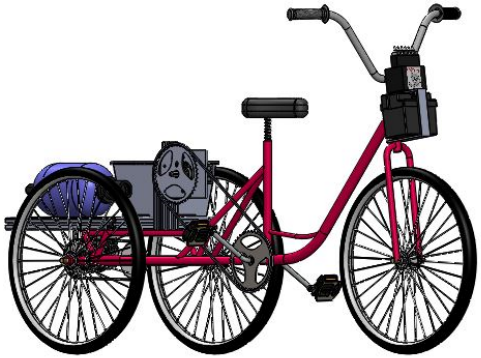
- Expensive
- Bulky
- Must be covered

Frame Analysis



Model





Vehicle Construction

Vehicle Testing

PLC

- setup using a small battery and one solenoid
- based on valve locations, laid out the correct wire lengths
- all controls in one central location

Gear Testing

Gear Testing Continued

Riding Bike in Lot

Final Vehicle

Lessons Learned

- **Calculations:** Starting torque needed to get moving was somewhat overlooked in the beginning when choosing what gear ratio to use.
- **Design:** Create multiple concepts, discuss best options
- **Communication:** more is better than less