

Semi-Automated Shock Fill Device

Cane Creek Cycling Components

PROBLEM STATEMENT

- Cane Creek Cycling fills their mountain bike rear shocks with nitrogen gas. The nitrogen is transferred to the shock using a needle. Exposed needles can cause injuries if not handled with care. The team was tasked with creating a device that fills the shocks with an unexposed needle to eliminate the possibility of operators injuring themselves on the filling process. An image of the previous fill device with exposed needle can be seen below.

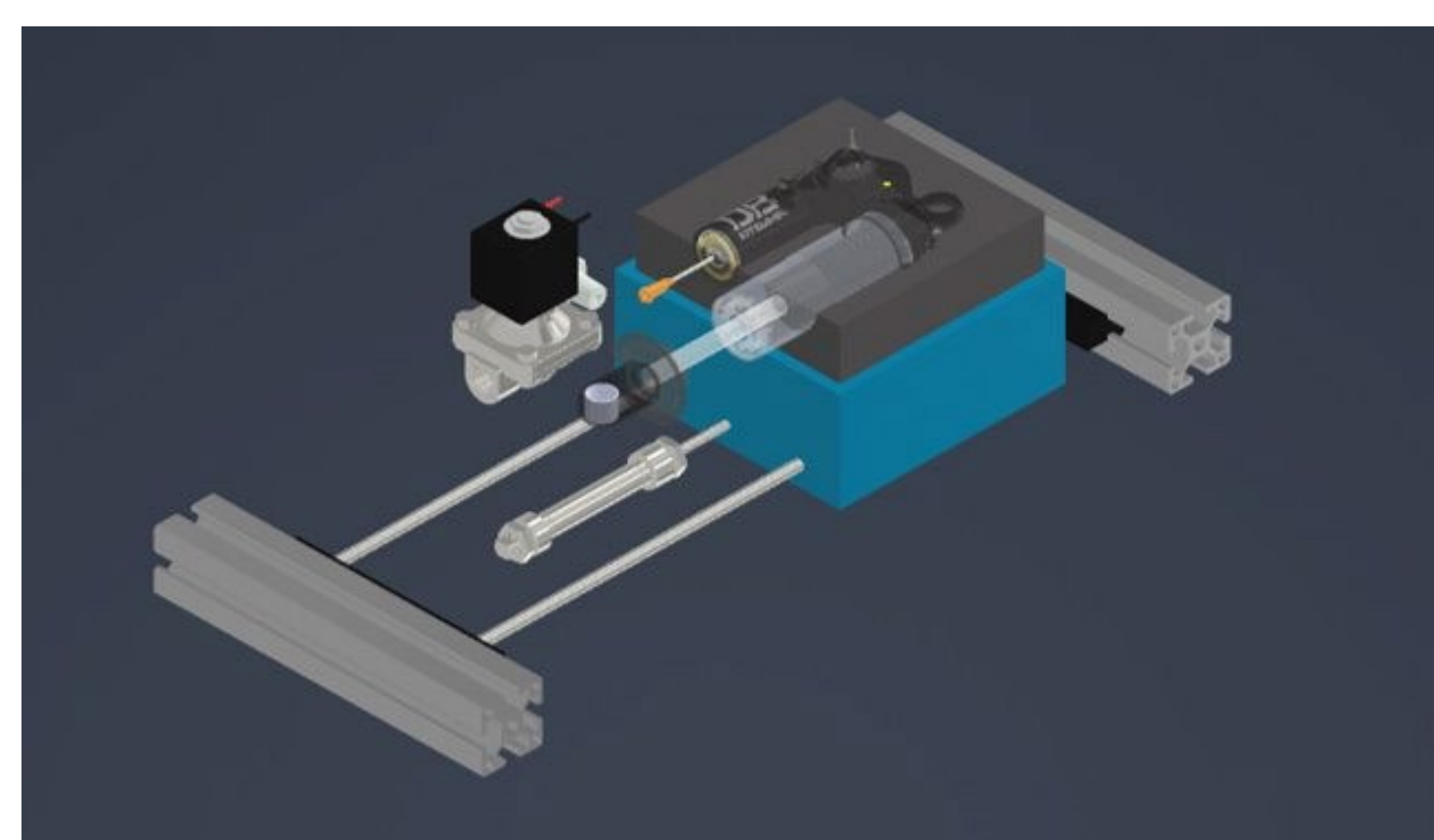


REQUIREMENTS

#	Description
1	Device must not have exposed needle
2	Device must have interchangeable inserts to accommodate different shock designs
3	Minimal gas leak on insertion, fill, and removal
4	Device must fit in 2' x 2' x 2' footprint
5	Device must have adjustable bump stop

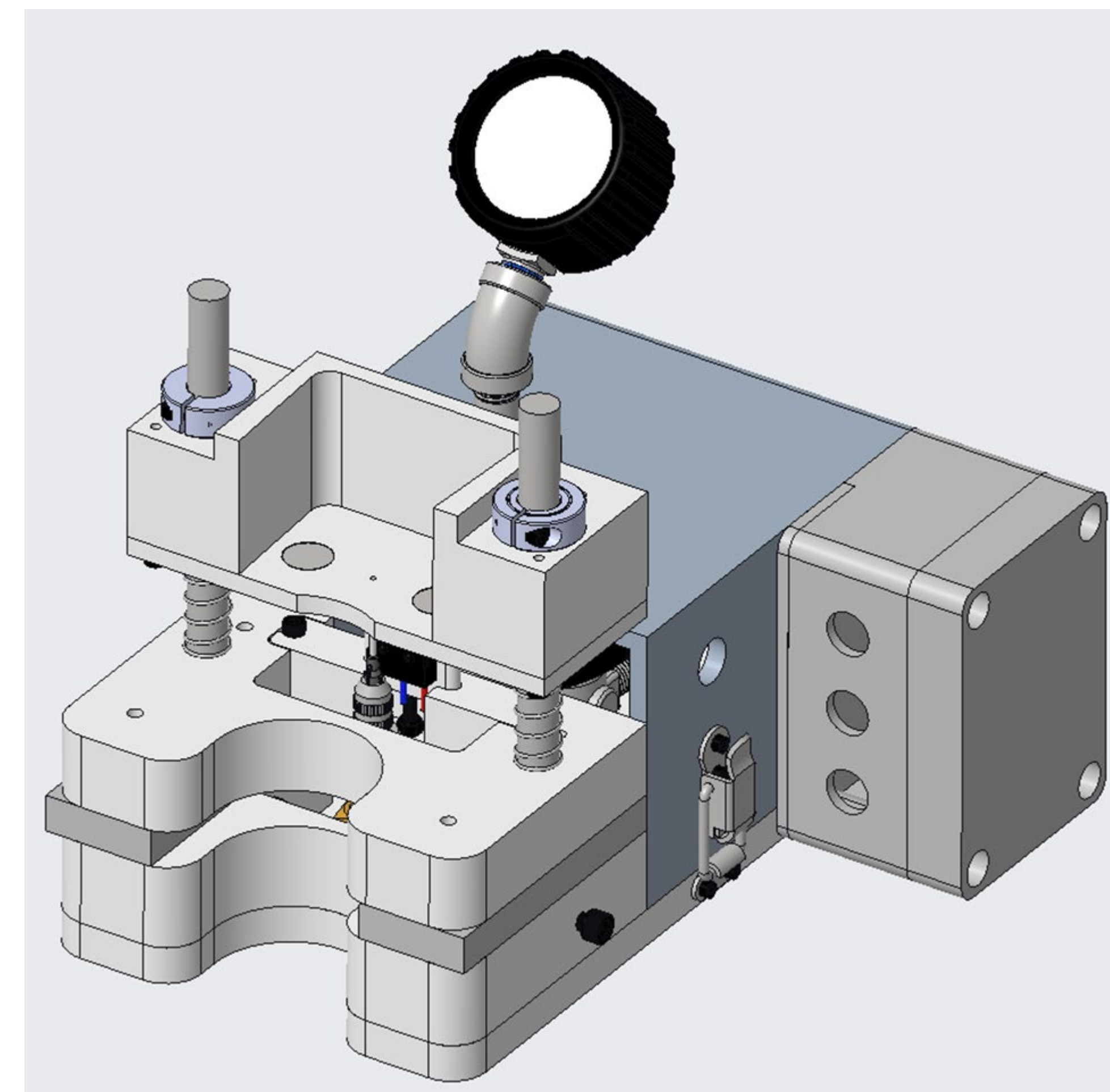
CONCEPTS

- Began with a design that incorporated pneumatic actuators that would actuate a shock mold to engage with the needle. Using an industrial Arduino microcontroller to control the system, the device would eliminate the human in the operation of filling the shocks.

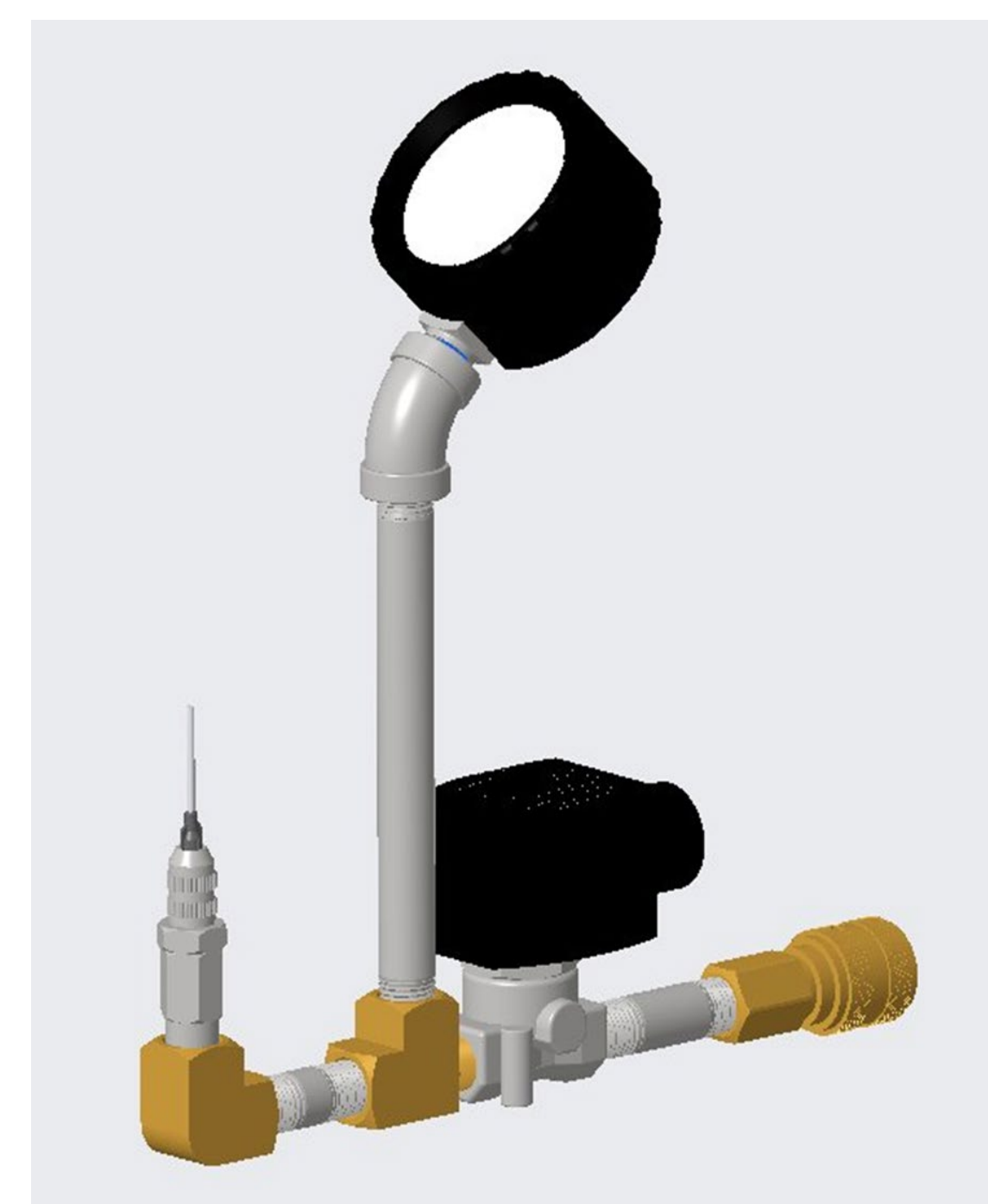


FINAL DESIGN, APPROACH, PLAN

- Device that is actuated by human operator.
- Uses guide rails and bearings to translate vertically. Springs return top carrier to resting position.
- Top carrier engages momentary switch when operator applies downward force to activate a solenoid valve and allow nitrogen to flow through plumbing. Switch mounted on an adjustable carrier to accommodate different shock needle insertion depths.
- Pressure gauge reading tells operators when to disengage switch by removing force from device.
- Needle rests in carrier when not actuated and is encased by shock reservoir when actuated to ensure no time of exposure.
- Final Assembly of project in CAD

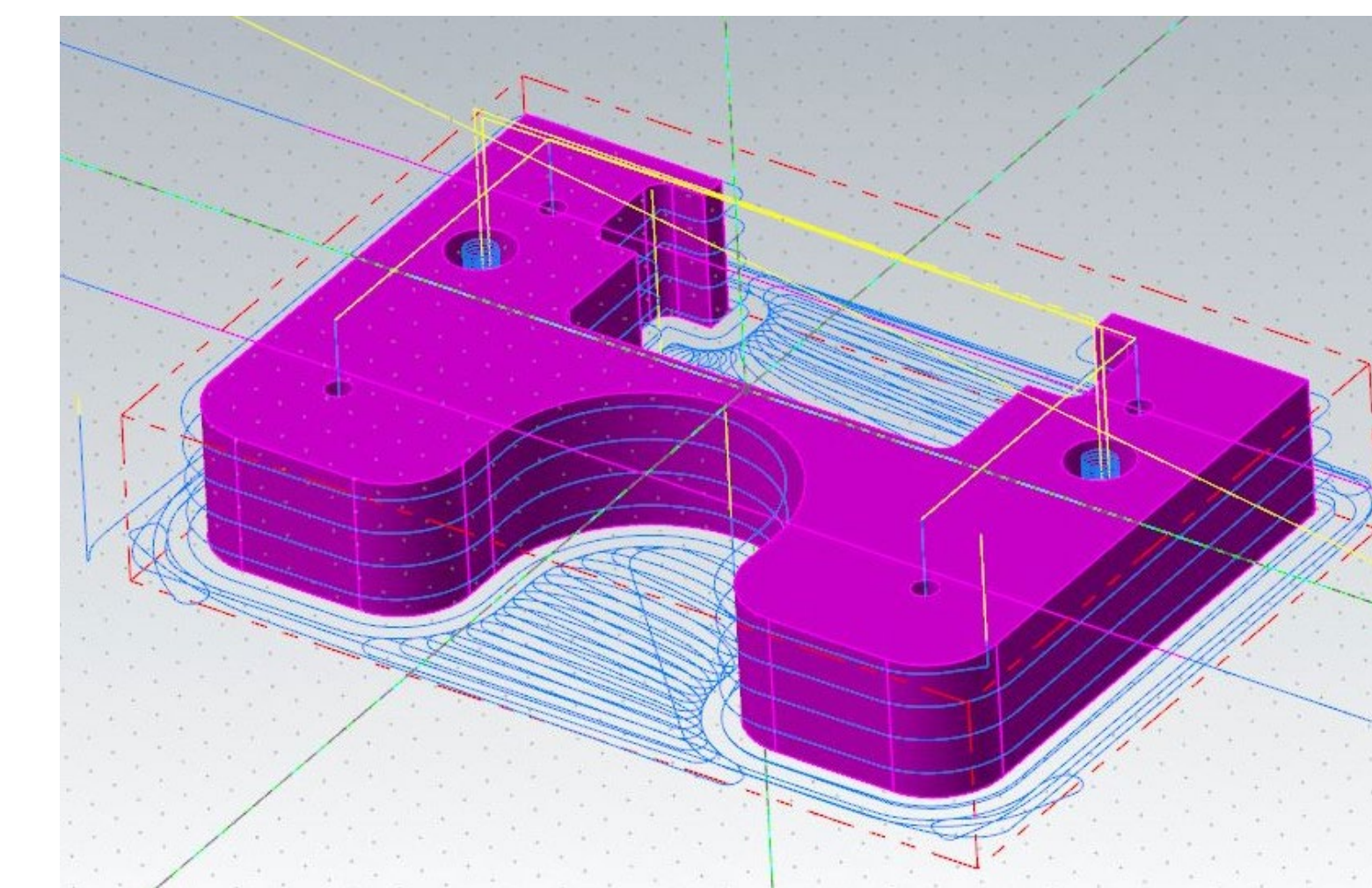
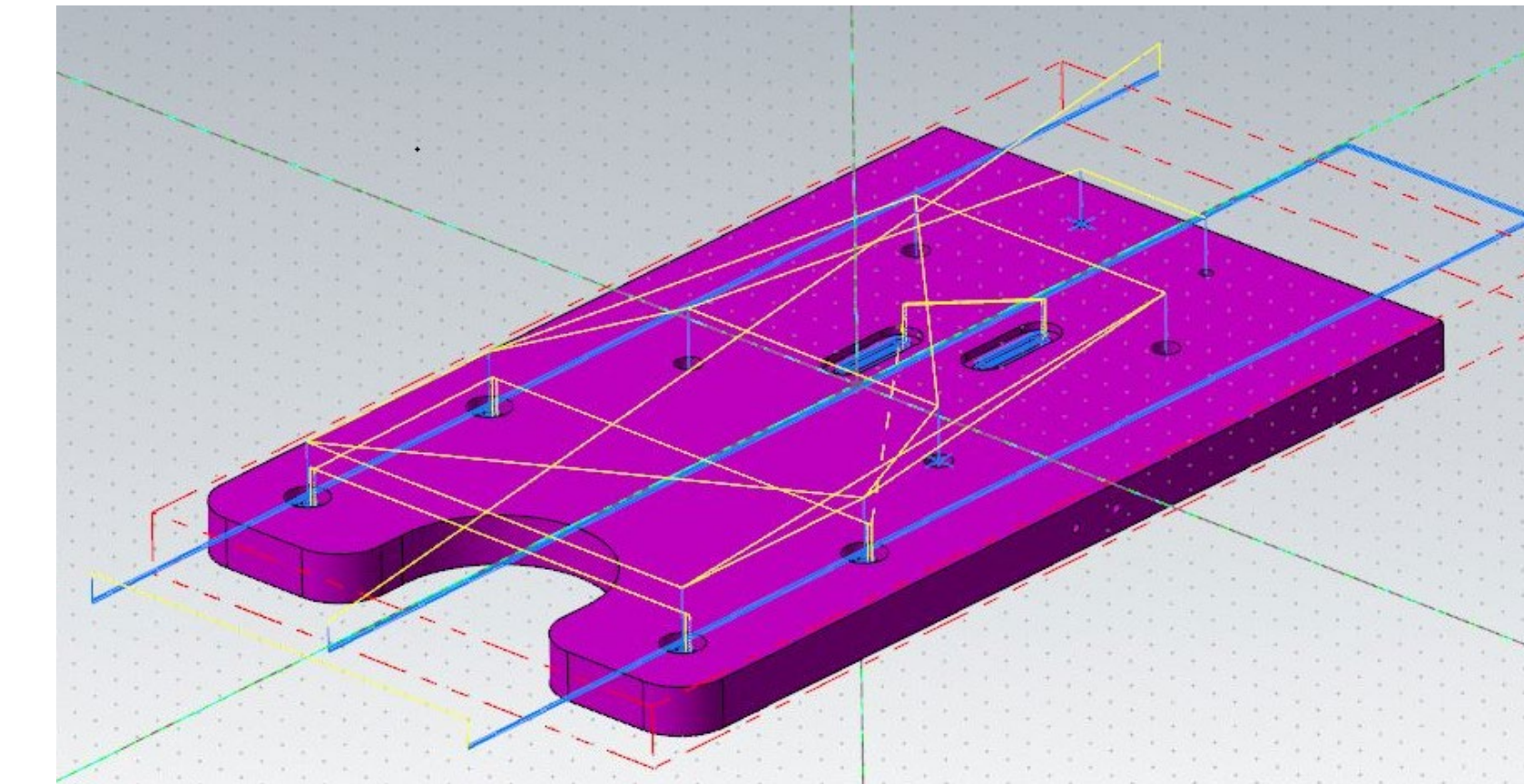


- Plumbing assembly inside cover



RESULTS

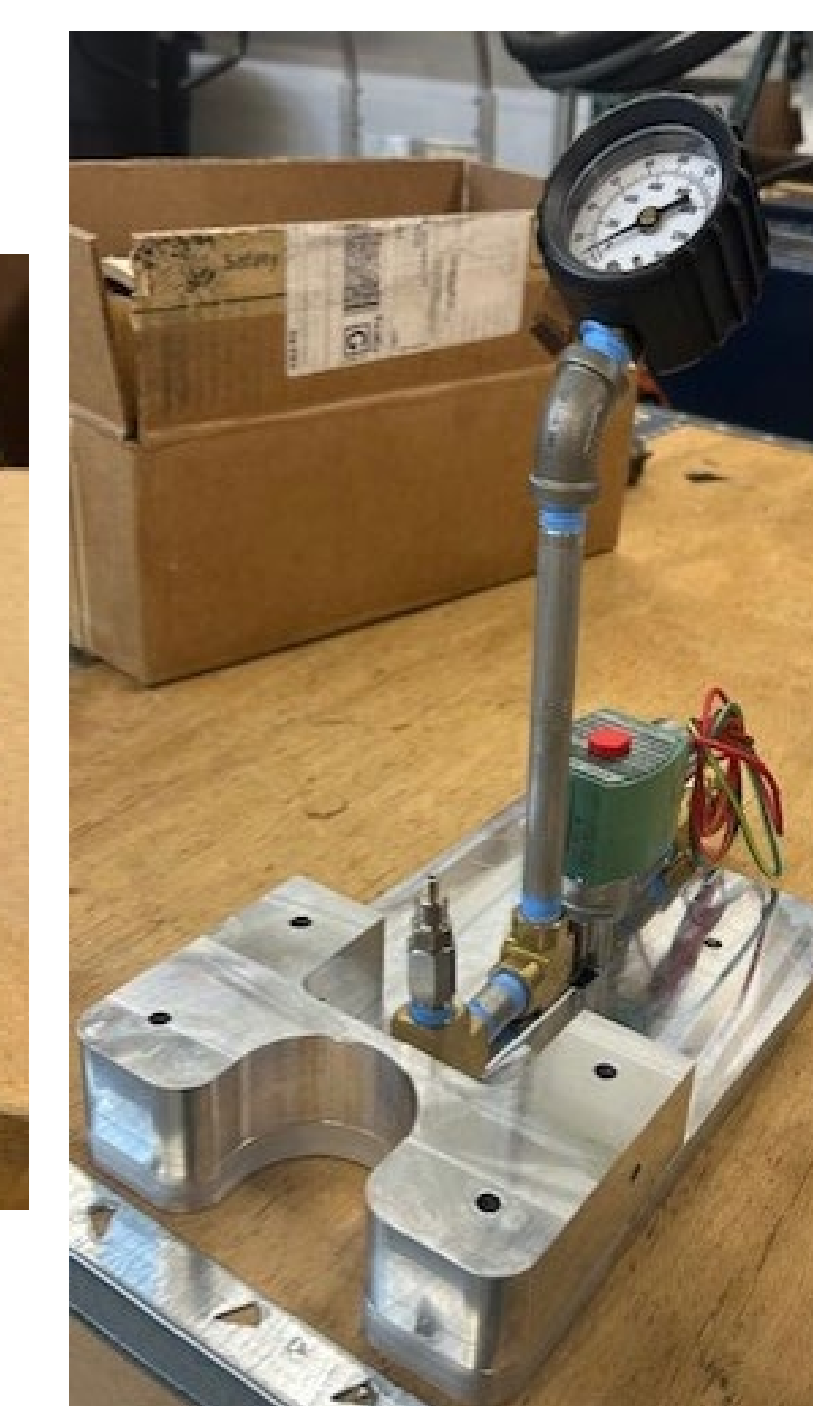
- Mastercam completed for all parts



- 3/8 parts milled from aluminum
- Base Plate and Carrier Plate



- Base 1 and Plumbing assembly



SUMMARY AND CONCLUSIONS

- In conclusion, the team was able to meet several requirements given by the sponsor with the work that was completed
- Unfortunately, the project was not fully completed but the team is proud of their work, solution, and skills learned while completing this project
- Each member learned valuable lessons in multiple different disciplines that will prove useful during their careers
- The team would like to extend their appreciation to all the engineers at Cane Creek Cycling for their time and assistance throughout the project
- The team wishes the best to the people who will continue this project after graduation

FUTURE WORK

- All future work for the project will be fabrication of the device
- All design work is complete and all Mastercam files are complete
- Parts that still need to be milled include Base 2, Base 3, Switch Bracket, Switch Adjuster, Carrier, and Carrier Plate 2
- Once milling is complete, the device can be assembled
- Once full assembly is complete, device should be tested with air line before operation with nitrogen

TEAM & ACKNOWLEDGEMENTS

- Andrew Smith - Mechanical Engineer
- Evan Allen - Mechanical Engineer
- Matthew Hockey - Engineering Technology
- Dr. Scott Pierce - Faculty Mentor
- Lev Wechsler - Engineer (Sponsor)
- Jay John - Engineer (Sponsor)
- Reed Mann - Engineer (Sponsor)
- Brandon Blakely - Engineer (Sponsor)

