



4/21/2026 - Meeting Mins & Proof of Work Done

Attendance

Instructions

Fill in all the names of the team members, advisors, & sponsors. This includes people from other departments if applicable and if there are Non-Sr Design Students that regularly attend, please include them as well. Finally include any guests that attend the meeting.

- ✓ Al-Belen
- ✓ Dr. Zhang
- ✓ Aren Greenwood
- ✓ Nathan Pajerski
- ✓ Daniel Tucker
- ✓ Rabin Ojode

Criteria for Success & Deliverables

Instructions

Review the Criteria for Success & Deliverables to check off any that are complete and to keep them fresh in the team's minds during the meeting.



Criteria for Success Table

	☰ Criteria for Success	☰ Measurement	📌 Progress
1	Produce thrust	Maximize amount of thrust-needs to be approved faculty advisor	Completed
2	Capture & Recompress Gas	Secondary Container able to capture and retain at least 95% of the gas over one thrust and compression cycle. (Subject to change due to physics restrictions)	In progress
3	Develop and test cycle system	Manufacture and test system for at least 5 cycles	In progress
4	Mathematical validation of Proof of Concept	Fluid Dynamic proof of equation-needs to be approved faculty advisor	Invalid
5	Optimize thrust to weight ratio	use materials that result in a higher thrust to weight ratio	Completed



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Proof of Work Done

Instructions

Fill in the items asked for, for each team member. If this is a multi-disciplinary team include sections for all students.

Daniel Tucker

✔ Description of Work Done

Performed a full report review against rubric requirements and developed a structured update plan, including adding missing sections (analysis, testing, operations) and integrating final design, test procedure, and build documentation. Provided a new spring technical report to the team shared file page.

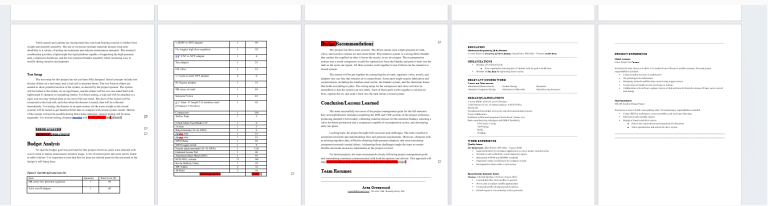
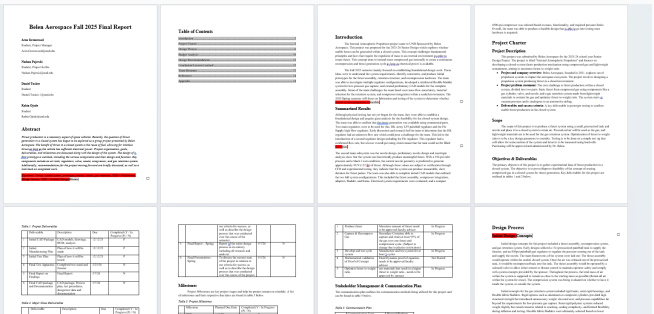
Which Criteria for Success that the work pertains to.

Mathematical validation of Proof of Concept

List anything that is blocking the completion of tasks from the previous Sprint.

None

Image of Proof of Work Done



References

[1] BK Army "Performance Series - LPI Regulator 250PSI-300PSI - Black" Accessed December 9, 2023. <https://www.bkarmy.com/products/lpi-regulator-250psi-300psi-black>

[2] Fto Supply "High Flow Adjustable Pressure Regulator Assembly - (0-47Psi) Nitrous Oxide" Accessed December 9, 2023. <https://www.ftosupply.com/products/high-flow-adjustable-pressure-regulator-assembly-0-47psi-ny-nitrous-oxide>

[3] BK Army "N2O3 300PSI Adjustable Compressed Air Tank - Black" Accessed December 9, 2023. <https://www.bkarmy.com/products/n2o3-300psi-adjustable-compressed-air-tank-black>

[4] V-S Solid "High Pressure Solenoid Valve - 1/8" 12V DC Brass 50 Bar, 100-150 High-Pressure Solenoid Valve, Normally Closed" Accessed December 9, 2023. <https://www.v-solid.com/products/high-pressure-solenoid-valve-1-8-12v-dc-brass-50-bar-100-high-pressure-solenoid-valve-normally-closed/>

[5] Anderson J. 2017. *Fundamentals of Aerodynamics*, Sixth Edition, McGraw-Hill, NY.

[6] GEEKSVIX Store "Variable PCF Air Compressor, 4500PSI/300MPa Water & Oil-Free, 12V DC/110V AC Dual Power with Power Connector, Built-in Cooling Fan, High Pressure Air Pump for Airsoft, Paintball Tank" Accessed December 10, 2023. <https://www.geeksvix.com/products/variable-pcf-air-compressor-4500psi-300mpa-water-oil-free-12v-dc-110v-ac-dual-power-with-power-connector-built-in-cooling-fan-high-pressure-air-pump-for-airsoft-paintball-tank>

[7] <https://www.bkarmy.com/products/lpi-regulator-250psi-300psi-black>

Appendix

Figure 8: Exit velocity and mass flow rate calculations

Test Setup

The test setup for this project has not yet been fully designed. Initial concepts include low friction sliders on a test stand, and a load cell to measure thrust. The low friction sliders are needed to show potential motion of the system, as desired by the project sponsor. The system will be bolted to the sliders via its rigid frame, and the sliders will be on a test stand built with lightweight U channels or something similar. For thrust testing, a load cell will be attached to a rigid, non-moving vertical plate at one end of the test stand. The door of the system will be connected to the load cell, such that when the thruster is tested, data will be collected immediately. For testing, the thruster in an open system (of the same weight as the closed system) will be tested to get baseline thrust data to compare with closed system results. Motion of the system will not be possible during thrust data collection; motion testing will be done separately. For motion testing, distance travelled will be the primary data collected.

ERROR ANALYSIS

PRODUCT OPERATIONS

Budget Analysis

No specific budget goal was provided for this project; however, parts were selected with cost in mind to reduce unnecessary resource usage. A list of current parts and costs can be found in table 6 below. It is important to note that this list does not include parts for the test stand as the design is still being done.

Table 6: Current part and cost list

Item	Quantity	Total Cost (\$)
HK army low pressure regulator	1	40
ASA on/off adapter	1	40

Tucker, Daniel A (USA)

Additional figures and system diagrams will be added to improve clarity, including a test setup diagram, system flow path schematic, and subsystem integration visuals. All figures

Reply

Tucker, Daniel A (USA)

A Results and Data Analysis section will be added to document experimental outputs from system testing. This section will include force-versus-time data, pressure

Reply

Tucker, Daniel A (USA)

A measurement uncertainty and error analysis subsection will be added to identify sources of experimental variability. This will include load cell accuracy, rail friction, hose reaction

Reply

Tucker, Daniel A (USA)

A Product Operations section will be added to describe system functionality, including operating procedures, safety considerations,

Reply

Belen Aerospace 2025-2026 > Reports

Name	Modified	Modified By	+ Add column
Spring2026_BelenAerospace_Final_Report...	A few seconds ago	Tucker, Daniel	
Belen Aerospace test procedure and build ...	March 27	Tucker, Daniel	

✓ Description of Work Done

Completed the structure and adhesion of the retention system. Also made a new retention system with a better sealing method. Also made a crude control board to better house wires and switches

Which Criteria for Success that the work pertains to.

all

List anything that is blocking the completion of tasks from the previous Sprint.

nothing

Image of Proof of Work Done



✓ Description of Work Done

Continued working in person to prepare for testing and troubleshoot any issues that arise.

Which Criteria for Success that the work pertains to.

Produce thrust, test system

List anything that is blocking the completion of tasks from the previous Sprint.

n/a

Image of Proof of Work Done



Rabin Ojode

✓ Description of Work Done

Conducted research to best analyze and present the open/closed system data

Which Criteria for Success that the work pertains to.

Not assigned

List anything that is blocking the completion of tasks from the previous Sprint.

Might need more data points for comparison and graphs

Image of Proof of Work Done

Master Data Table (per test run)									
Test ID	Canister Pressure (Pa)	Theoretical Thrust (N)	Measured Thrust w/ Retention (N)	Measured Thrust w/o Retention (N)	Displacement (m)	Retention Pressure at Steady State (Pa)	Prototype Mass (kg)	System Volume (m³)	Notes

Team Scrum Board

Instructions

1. Update the tasks from the Previous Sprint to show either, Ready for Review or Blocked.
2. Update the Tasks from the Previous Sprint based on what was discussed during the review of Proof of Work Done.
3. Prioritize the Backlog (Work Breakdown Structure) based on the current state of the Project.
4. Add any new items to the Backlog (Work Breakdown Structure) based on the current state of the Project.
5. Move Tasks that will be completed in the upcoming Sprint to the Current Sprint
6. Assign Team Members to Tasks and add due dates.



Microsoft Planner

<https://tasks.office.com/ec37a091-b9a6-47e5-98d0-903d4a419203/en-us/Home/Planner/#/plantaskboard?groupId=8d4df933-21b1-4c47-bafd-e7a217f98275&pla...>

Meeting Notes



Instructions

1. Add the following to the Top of the Call Out Box below: "Meeting Date = " and "Notes"
2. Enter the Meeting date after the "=" sign.
3. Enter Meeting Notes under the "Notes:" section
4. After the Meeting is concluded, save this page as a PDF.
5. Send the PDF to the Team's Advisors (Faculty & Sponsor) asking for Meeting Minutes Approval.
6. Post the PDF of the Meeting Minutes and a PDF of the email chain with the Advisor's Approval to the applicable Meeting Minutes Assignment.



Meeting Date = 4/21/2026

The team discussed issues that arose from the previous weeks testing. One main issue is it is suspected that the high flow regulator is choking the flow due to an internal orifice that appears smaller than the throats of the nozzles. This was unforeseen, as the specified flowrates of the regulator exceeded design conditions. The proposed solution is to test the tank with no regulator at all, filling the tank to only around 250psi. Steady work towards preparing the closed system testing continues. Career expo is next week, and the team is working to finish things up before then. A start on the final report is beginning. The final presentation was scheduled for Tuesday May 5th at 2:00 PM.

Milestones

+ Add task

CEM Expo

4/28

GA

OR

PN

+1

Finish Open System Testing

4/24

PN

GA

Start Closed System Testing

4/24

PN

GA

Completed tasks4

Current Sprint

+ Add task

Clean up and Return Borrowed Parts

4/30

GA

PN

Plot Open System Test Data

4/28

GA

OR

PN

Data Collection

4/27

PN

GA

OR

+1

Completed tasks32

Blocked

+ Add task

Completed tasks2

Ready for Review

+ Add task

Weekly Tag Up

5/4

PN

GA

OR

+1