



Project Team Charter

ME476C: Capstone I

Signature Cover Page

Each team member will copy the following statement in their own handwriting (LEGIBLY) in one of the designated areas below:

I agree to do an equal amount of work in the team. I understand that my grade will reflect my effort in the team.

Print Name:

Signature:

I agree to do an equal amount of work in the team. I understand that my grade will reflect my effort in the team.

Shannon Comstock

Shannon Comstock

team.

Print Name:

Signature:

I agree to do an equal amount of work in the team. I understand that my grade will reflect my effort in the team.

Remington Dasher

Remington Dasher

Print Name: Andrew King

Signature: *Andrew King*

I agree to do an equal amount of work in the team. I understand that my grade will reflect my effort in the team.

Print Name: Grace Morris

Signature: *Grace Morris*

I agree to do an equal amount of work in the team.

I understand that my grade will reflect my effort in the team.

To: Dr. David Willy

From: *The Rocket Project Team – Shannon Comstock, Remington Dasher, Andrew King, Grace Morris*

Date: *September 8, 2023*

Re: *Team Charter*

1. Team Purpose

The team's purpose is to effectively work together to create a well-designed propulsion system for a level 2 rocket. Each team member has a passion for the aerospace field, making us a very driven team for this problem statement, and more versed in the field than other engineers. The purposes of this team include efficiently designing, prototyping, testing, and launching a rocket using the propulsion system the team designed. Each team member has been designated four roles (two primary and two secondary), such that each team member has an equal contribution to the project. The team roles were also assigned based on experience in that certain field, making the team's functionality the most efficient and supporting the best outcome of the project.

Stakeholders of this project include Dr. Carson Pete, the NAU Rocket Club, and Dr. Willy. When the team is able to find funding to increase the budget of the project by at least 10%, then this member or members will become stakeholders. Their expectations for the team include detailed calculations for each aspect of the design, various forms of testing to ensure that the design is fully functional as the requirements state, and that the team will work efficiently and professionally together.

2. Team Goals

The team's project goal is to design, test, and optimize a propulsion system for a level 2 high-power rocket. To aid in our development of the rocket motor, we will also be making a test stand to gather thrust data. The test stand will be designed to withstand rocket motors with an impulse of less than 5120 newton-seconds. The propellant will be a unique Ammonium Perchlorate Composite Propellant (APCP).

We will begin by developing a subscale rocket motor that is 28-38mm in diameter. This subscale rocket must be tested, and confirmed to be compliant with Tripoli Rocketry Association (TRA) safety standards. Then the motor will be scaled up to 75mm in diameter. The final design will be tested and launched in February-March, 2024 with the objective of reaching a max altitude of 10-15 km above ground level.

The team is aiming to create a safe and reliable design that is of high quality. In order to keep the process efficient, we will do weekly check-ins outside of class and make sure that a fair distribution of work is being delegated between team members. We are all going to put in the effort required to receive the course grade, A.

3. Team Member Personalities/Roles/Responsibilities

Team Personalities:

Shannon Comstock: I took the 16 personalities quiz and found that I was “ENFJ-T” which they define as “inspiring optimists, ready to take action”. It followed this by stating that I am 81% extroverted, 66% intuitive, 60% feeling (valuing emotional expression, empathy, and driving towards social harmony), and 67% judging (decisive, thorough, and highly organized). This feels very accurate for how I view my personality. I tend to enjoy leading, being organized/prepared, and growing with others around me.

Remington Dasher: When I took the 16 personalities quiz, I found that I was “ENTP-T”. I learned that I was 88% extroverted which thinking about it, makes sense. I tend to be the vocal one, which can help with various aspects of the group. This result told me that I make decisions based on intuition over feeling, which I think has helped me in multiple important situations, but could also be responsible for some of my potential downfalls.

Grace Morris: When I took the 16 personalities quiz I got an “ISTP-T” result. This means I am introverted which is pretty obvious to people who know me. This result also means I tend to rely very little on feeling and intuition which means I need specific reasons and justification for things I do or decide. Overall I tend to be a perfectionist and put a lot of energy into constantly improving little things.

Andrew King: I took the 16 personalities quiz and found that I am “INTP-T”. This means that I tend to show introverted traits. I tend to rely on logic rather than emotion but don’t rely exclusively on one or the other. Although I am introverted, I like to challenge myself and practice my leadership skills.

Role Title	Role Description
Project Manager	Manages tasks, develops overall schedule, runs meetings, reviews individual contributions, provides safe and welcoming team environment, does NOT make all decisions (rather facilitates discussion of the team to arrive at team decisions)
Logistics Manager	Documents meeting minutes, manages facility and resource usage.
Club Liaison	Primary point of contact for the NAU Rocket Club, manages most external communication.
Financial Manager	Oversees all purchases, main contact with the Front office for budget management, monitors and records all purchases for budget tracking, and updates the Bill of Materials



Test Engineer	Oversees experimental design and testing, plans testing procedures, acquires necessary equipment for testing, runs all tests for team
Manufacturing Engineer	Coordinates fabrication of design (does NOT do all manufacturing themselves), reviews design at all steps, ensures design can be manufactured, finds outsourcing opportunities manufacturing can't be done in-house, develops schedule of manufacturing
CAD Manager	Coordinates and oversees CAD development throughout project, creates protocol for revision management, manages CAD files, ensures CAD model matches physical design, does NOT do entire CAD package themselves
Safety Manager	Develops and edits safety checklists for tests and flights. Ensures that all team members are following the safety protocol properly and at all times.
Nozzle Design Lead	Technical role responsible for leading and managing the nozzle sub-system.
Propellant Design Lead	Technical role responsible for leading and managing the propellant sub-system.
Website Developer	Technical role responsible for managing and creating the team website.

Shannon Roles:

Project Manager (**Primary**)

Safety Manager (**Secondary**)

Financial Manager (**Primary**)

CAD Manager (**Secondary**)

Manufacturing Engineer (**Primary**)

Remington Roles:

Nozzle Design Lead (**Secondary**)

Propellant Design Lead (**Secondary**)

Website Developer (**Secondary**)

Test Engineer (**Primary**)

CAD Manager (**Primary**)

Andrew Roles:

Club Liaison (**Primary**)

Nozzle Design Lead (**Primary**)

Website Developer (**Primary**)

Test Engineer (**Secondary**)

CAD Manager (**Secondary**)

Logistics Manager (**Secondary**)

Grace Roles:

Safety Lead (**Primary**)

Propellent Design Lead (**Primary**)

Financial Manager (**Secondary**)

CAD Manager (**Secondary**)

Manufacturing Engineer (**Secondary**)

Logistics Manager (**Primary**)

4. Ground Rules

Each teammate has given the rest of the team their schedule which we used to determine the best meeting times. This semester, we luckily have almost the entire day on Friday in order to meet, plan, and work on our project. Official times are currently flexible, but Fridays shall be reserved for team meetings

In addition to the Friday meetings, we have Mondays available for meeting with the instructor and ourselves. We plan to have a Sunday meeting to ensure that all team members are on the same page with each other and the current progress of the project. These meetings will likely be shorter than the specified window. Below are the days and known times of face-to-face meetings planned per week. Note that Zoom/Teams calls can and will be planned for longer assignments or when more than half the team is unable to meet in person.

Monday – 5:30pm - 8:00pm – (Room 321, Building 69)

Friday – 12:30pm - 1:30pm (or longer if need be) – (Somewhere in Building 69)

Sunday – 3:00pm - 5:00pm – (Somewhere in Building 69 or Digital)

Before meetings each team member is responsible for familiarizing themselves with the task to be discussed/accomplished. Additionally, each team member is expected to have completed the tasks that were assigned to them in the previous meeting. All discussions are expected to be held in a calm and respectful manner.



Big decisions will NOT be made without the approval of the majority of the team. Prior to giving approval these decisions should be fleshed out and discussed such that all team members understand what the decision will entail. If the team has a 50/50 split and no decision can be reached through discussion then, the decision will default to the primary lead who is most responsible for that area or the team lead if there is no relevant primary lead.

Tasks are expected to be distributed in a roughly equal manner. However, this may vary and team members are expected to communicate with each other about the appropriateness of their workload so that adjustments can be made as necessary.

If a team member is not pulling their weight or meeting the expectations set in this document, they will be given a friendly reminder to adhere to the established rules. If this reminder is not followed, the team will hold a team meeting in order to further remind them of the team's ethics and requirements. Lastly, if a team member does not change their behavior after both of these interventions, then the team will refer to the "Peer Feedback" and reflect their behavior there. This could hurt the grade of the team member in question.

This document should be a living document, meaning that the contents of this paper can and will be amended to reflect the teams' direction and goals. In order to amend this document, the WHOLE team must approve the changes.

5. Potential Barriers and Coping Strategies

A difference in opinion is not only a natural part of teamwork, but it's an integral part of the decision-making process. A primary potential barrier is this difference in opinion, but as laid out in section four, these situations have guidelines on how to move on from this barrier. If a team member has trouble with an assigned task or role, it is the team member's responsibility to raise this issue to the rest of the team so that the team can work around it. There will be times when a team member needs to reach out to other members about their work and ask for ideas on how to go about an issue, as this is an important part of teamwork. It is important to the team dynamic that everyone is open and honest with each other in order to produce a product that satisfies the customer's requirements.

Because we are all fourth-year engineering students, we are all mature enough to not only respect the project at hand but to respect each other as colleagues and people. There have been issues with our past teams. Some of us have had people who have just never shown up, and others where the people in the team did not pull anywhere close to their weight. This issue was touched on in section four, but not in specifics of team dynamic issues. If there is an issue of teammates not showing up or not pulling any weight, we have decided to go straight to the instructor. We see this as a measure we won't ever have to fall to, but if this occurs, this will be the result.

This project is the culmination of four years of extremely hard work. This being said, it is imperative that this project is done well and in its entirety. Differences in opinions within a team are a normal and important part of the team dynamic, but when these differences turn into



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conflicts, it is necessary that these differences are dealt with immediately. As mature individuals who have put years of hard work and dedication into this major, it is the belief of the team that these issues can be dealt with appropriately and respectfully as it is for the benefit of the project.