UKSEDS COMPETITIONS

NATIONAL ROCKETRY CHAMPIONSHIP 2024-25

RULE BOOK

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Roxel
Propulsion systems

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MRC Midland Rocketry Club

Full Flavour Behaviour

ROCKETS & THINGS

WIZARD ROCKETS

UNITED KINGDOM ROCKETRY ASSOCIATION

Document Information

Written By	Responsibility
Tom Snelling	National Rocketry Championship Team Lead
Verified By	**Responsibility**
David Reid	UKSEDS Competitions Vice Team Lead
Approved By	**Responsibility**
Joshua Finn	UKSEDS Competitions Team Lead

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1. Overview

Introducing the 2024-25 UKSEDS National Rocketry Championship (NRC). This year's competition has been designed with a systems engineering theme simulating how projects are often managed in the space industry.

"The Customer" has provided you with a Mission Requirements Document. This document provides you with a list of their payload's requirements and it is your job to design a launch vehicle to meet them. As you will also come to find in industry, it may not be possible to satisfy all of these requirements. Some of them may conflict, some of them may be stronger requirements than others. It is your job as the launch vehicle provider to navigate these challenges.

In industry, when we design something for space, everything should be traceable back to a standard. Common examples of this are the European Space Agency's European Cooperation for Space Standardization (ECSS), NASA's General Environmental Verification Specification (GEVS) or the International Standards Organization (ISO). Standards are widely accepted guidelines that standardise how things should be designed or carried out. There are standards for the margin to use on a mass budget, how to carry out structural finite element modelling or the type of environmental tests to carry out on your equipment. There are quite literally standards for almost everything in the space industry and this practice is carried over to many other industries such as the automotive, nuclear and even non-engineering industries such as healthcare. For this competition, UKSEDS have provided you with a standards document of your own called the Technical Specification. This document contains its own requirements and is tailored to launch vehicles. You will need to also consider all of these requirements and design to them. You will then have to provide evidence of meeting the requirements through the competition's deliverables.

Once your team has designed a launch vehicle, you will then get to test it (to verify it meets all of the requirements!) and launch it along with all of the other teams on the competition day. Pictures from last year's competition day can be found here.

2. Registration

Teams are capped to a maximum of 15 members. All members of the team must be eligible for UKSEDS membership. More information about membership eligibility and registration (it's free!) can be found here.

Whilst individual entries to the competition are not prohibited, we would encourage you to join a team for all of the additional benefits that they bring. Plus this helps you access the team-related marks and reduces the marking for our volunteers! If you need help finding a team, get in touch with us at rocketry@ukseds.org and we will do our best to pair you up with a local team.

Teams wishing to enter the competition must register. As always throughout the competition, please direct any enquiries to rocketry@ukseds.org. Please note, that due to substantial issues with motor supply in the UK over the last few years, all motors for the competition shall be ordered by UKSEDS on behalf of the teams. A non-refundable entry fee will be taken at registration. This will cover the cost of 1 motor per team and "The Customer's" payload which will be made available to teams on the competition day.

2.1. Help From Outside Of Your Team

To ensure fair competition for all teams, the following table gives guidance on what is and is not allowed in terms of outside help.

Allowed	Not Allowed
Creation of hardware by third parties to student's design specification.	Creation of software by third parties to student's design specification.
Mentorship from outside of your team, eg. academic supervisor or committee member, nudging your team in the right direction.	Mentorship from outside of your team, eg. academic supervisor or committee member, telling your team what to do or managing the project.
Industry sponsorship.	Commercial off-the-shelf rocket kit.

3. Key Dates

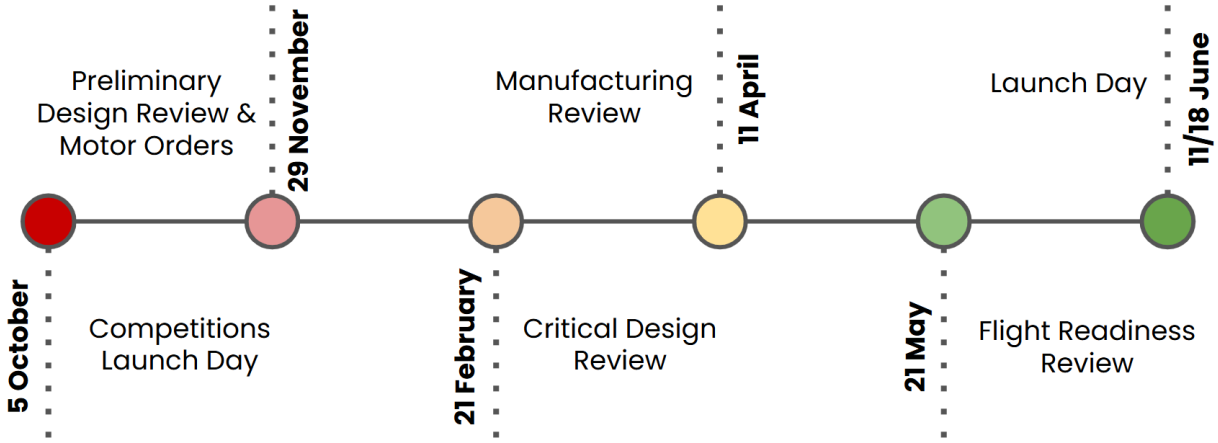

Figure 1: Key dates

4. Scoring Criteria

Teams will be scored in two main areas:

- Deliverables
- Competition day

There is an even split in the marks between the two meaning that a team's overall mark is dependent on their work throughout the year as well as the competition day. The winning team is likely to excel in both areas.

4.1. Scoring Breakdown Table

Criteria	Points
Deliverables	500
Preliminary Design Review	200
Critical Design Review	200
Manufacturing Review	100
Competition day	500
Team's preparedness	25
Customer Payload integration	25

Target altitude	200
Recovery system deployment	50
Successful recovery with minimal damage*	50
Rideshare payload data	100
Rideshare payload innovation	50
Total	**1000**

* Minimal damage shall be defined as being able to be flown again on the same day with minor repairs and effectively 'motor ready'.

4.2. Preliminary Design Review

Criteria	Percentage
Quality of launch vehicle design	20
Communication of design	20
Simulation data	20
Quality of rideshare payload design	10
Systems engineering	10
Project management	10
Testing	5
Media	5
Total	**100**

4.3. Critical Design Review

Criteria	Percentage
Quality of launch vehicle design	15
Communication of design	15

Simulation data	15
Quality of rideshare payload design	10
Systems engineering	10
Project management	10
Manufacturing techniques	10
Testing	10
Media	5
Total	**100**

4.4. Manufacturing Review

Criteria	Percentage
Quality of launch vehicle manufacture	20
Communication of manufacture	15
Testing	15
Media	15
Quality of rideshare payload manufacture	10
Systems engineering	10
Project management	10
Simulation data	5
Total	**100**

4.5. Altitude Marks

A graph showing the distribution of marks vs altitude can be found below. Please note, heavy penalisation shall occur above 3000ft as this is the dual-deployment limit. As the Notice To Airmen (NOTAM) limit for Midlands Rocketry Club is 3500ft, a mark of 0 shall be given to any teams that breach this.

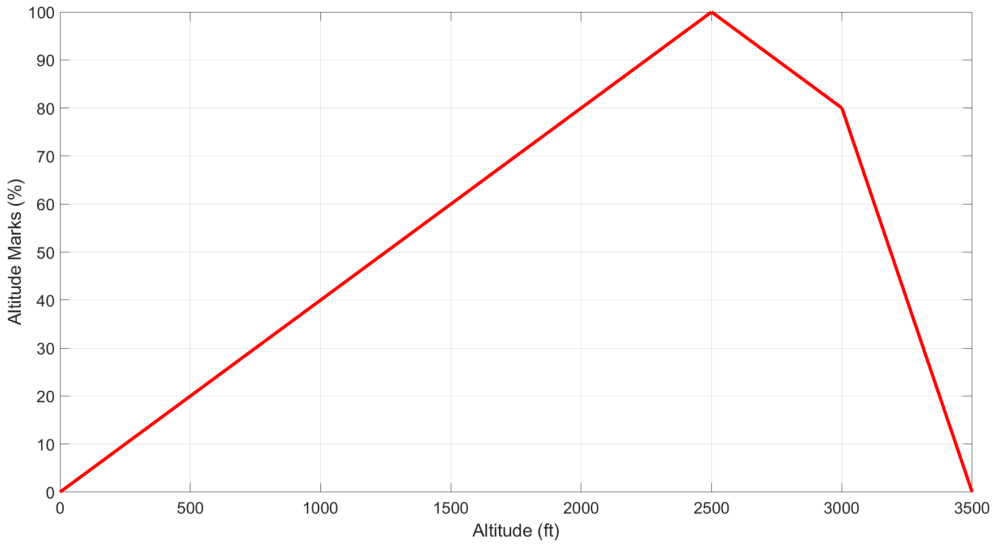

Figure 2: Altitude vs Marks distribution

5. Deliverables

5.1. Submissions

All deliverables should be submitted through the submission points on the NRC website found here. Teams should follow instructions on the specific deliverable upload points and will be reminded by email when the submission dates are close.

5.2. Templates

All deliverables come with accompanying templates that must be used and can be found here. These templates may be added to but the topics covered within the templates are a minimum of what should be included. Teams must stick within the time or page limits stated in the templates otherwise they will be penalised.

5.3. Deliverable Formats

The deliverables shall be in the following format:

- Preliminary Design Review
  - 10-minute recorded presentation
- Critical Design Review
  - Written Document, maximum of 30 pages
- Manufacturing Report
  - 10-minute recorded presentation
- Flight Readiness Review
  - Unrecorded presentation, no slide limit

6. Rules

The UKSEDS National Rocketry Championship is organised in the spirit of healthy competition. Rules have been drawn up to maintain a high standard of safety and fairness for all participants.

1. This competition is open to all UK Students for the Exploration and Development of Space branches. Other teams wishing to participate are welcome but must get consent by emailing rocketry@ukseds.org.
2. All rocketry activities must abide by the United Kingdom Rocketry Association (UKRA) Safety Code, which can be found here.
3. Submissions should be the team's own work and any plagiarism will not be tolerated.
4. All teams and launches must abide by local laws and CAA regulations for unmanned rocket launches. Safety must take the highest priority in launch preparations and flight operations. UKSEDS retains no responsibility for the launch rules and regulations that the competing teams shall be required to follow.
5. All teams must listen to and respect the competition volunteers and RSO on the competition day. Their say is final.
6. All launches must be performed entirely through the motor's own power. No speciality launch systems (i.e., Rockoon, projectile launching) are permitted.
7. All rockets must be successfully recovered with minimal damage. Minimal damage shall be defined as being able to be flown again and effectively 'motor ready'. The team and the certifying person (RSO) must document successful recovery.