

# UKRoC Rules 2022

- SAFETY:** All rockets must be built and flown in accordance with the UKRoC Best Practices document. Rockets flown at the National Finals must have previously flown safely and successfully. Rockets will be inspected before launch and observed during flight by a UKRoC official, whose judgment about the safety of the flight and with these rules will be final. Teams are encouraged to consult with designated UKRoC officials well before the fly-off to resolve any questions about design, safety, or these rules.
- TEAMS:** The application for a team must come from a single school or a single non-profit youth or educational organization. There is no limit to the number of teams that may be entered from any single school or organization, but no more than three teams containing students who attend the same school or who are members of the same organization, regardless of whether the teams are sponsored by that school or organization, can be invited to attend the National Finals. Team members must be students who are aged 11 to 18 on 1 January of the year of the National Finals and may not be acting in any staff capacity at the school. Teams may have members from other schools or other organizations and may obtain financing from any source, not limited to their sponsoring organization. Teams must be supervised by an adult approved by the head of the sponsoring school, or by an officially-appointed adult leader of their sponsoring organization. Minimum team size is three students and the maximum is six students. Each student member must make a significant contribution to the designing, building, and/or launching of the team's entry. No part of any of these activities for a rocket used in a qualification flight or at the Finals may be done by any adult, by a company (except by the sale of standard off-the-shelf components available to the general public, but not kits or designs for the event), or by any person not a student on that team. No student may be on more than one team. The supervising teacher/adult may supervise more than one team.
- ROCKET SAFETY:** Rockets must be powered only by commercially-made model rocket motors of "F" or lower power class that are listed on the UKRoC Approved Motor List posted on the UKRoC website. Any number of motors may be used, but the motors used must not contain a combined total of more than 80 Newton-seconds of total impulse based on the total impulse ratings in the UKRoC list. Motors must be retained in the rocket during flight and at ejection by a positive mechanical means (clip, hook, screw-on cap, etc.) and **not** retained simply by friction fit in the motor mounting tube. Rockets must not contain any pyrotechnic charges except those provided as part of the basic commercially-made rocket motor used for the flight, and these must be used only in the manner prescribed in the instructions for that motor.
- PAYLOAD:** The egg(s) and altimeter must be removed from the rocket at the end of a qualification or finals flight in the presence of an authorised person or designated UKRoC official and presented to that person, who will inspect the egg(s) for damage after removal and will read the altimeter score. All coatings, padding, or other materials used to protect the egg(s) must be removed by the team prior to this inspection and in the presence of a designated UKRoC official. Any external damage to the egg(s) noted after the flight and removal from the rocket by the team is disqualifying.
- DURATION SCORING:** The duration score for each flight shall be based on total flight duration of the portion of the rocket containing the egg(s), measured from first motion at lift off from the launch pad until the moment that the first part of the rocket touches the ground (or a tree) or until it can no longer be seen due to distance or to an obstacle. Times must be measured independently by two UKRoC approved observers using separate electronic stopwatches that are accurate to 0.01 seconds. The official duration will be the average of the two times, rounded to the nearest 0.01

second, with .005 seconds being rounded up to the next highest 0.01 seconds. If one stopwatch malfunctions, the remaining single time will be used.

6. **ALTITUDE SCORING:** Rockets must contain one and only one electronic altimeter of the specific commercial types approved for use in the UKRoC event. These types are the Perfectflite APRA, Pnut, or Firefly. The altimeter must be inspected by officials both before and after the flight, and may not be modified in any manner. The altimeter must be confirmed by this official before flight to not have been triggered and to be ready for flight. The peak altitude of the rocket as recorded by this altimeter and sounded or flashed out on its audible or visible light transmission post-flight will be the sole basis for judging the altitude score and this altimeter may be used for no other purpose. Other altimeters of other types may be used for flight control or other purposes.

7. **FLIGHTS:** Team members cannot be changed after the first qualification flight, with one exception as noted below for the National Final. A team may make a maximum of three qualification flights if time and conditions allow, and will be ranked based on the sum of the best two qualified flights. More than two qualification flights are not required if the team is satisfied with the results of their first two flights. A qualification flight attempt must be declared to an authorised person or the UKRoC observer before the rocket's motor(s) are ignited. Once an attempt is declared, the results of that flight must be recorded and submitted to ADS, even if the flight is unsuccessful. A rocket that departs the launch pad under rocket power is considered to have made a flight, even if all motors do not ignite. If a rocket experiences a rare "catastrophic" malfunction of a rocket motor (as determined by an authorised person or the UKRoC official observer), a replacement flight may be made, with a replacement vehicle if necessary. Flights which are otherwise fully safe and qualified but which result in no altimeter reading despite correct usage of the altimeter by the team, or that result in a reading of less than 50 feet despite a nominal flight will be counted as "no flight" and may be reflighted without penalty. Based on the scores from qualification flight attempts the organizers will select 20 teams (with a limit of no more than the best three made up of students from any single school or organization) for the UK National Final. Teams will be selected on the basis of lowest combined scores for their best two flights. If a school has more than three teams whose flight score is better than the cut-off score for UK National Finals selection, they may adjust the membership of the three best teams invited to attend the UK National Finals to include students from other teams with scores that met the UK National Finals cut-off, up to a limit of six students on any single team. Teams will be notified by ADS of these results and will be invited to participate in the UK National Final to be held on the 29<sup>th</sup> June 2022, subject to weather and other considerations.

8. **SAFE RECOVERY:** Every portion of the rocket must return to earth safely, and at a velocity that presents no hazard. An entry which has any structural part or an expended engine casing separate from the rest and fall to earth will be disqualified. The rocket must be recovered intact and allowed to land at the end of flight without human intervention (catching) and the flight will be disqualified if there is such intervention.

9. **RETURNS:** Return of the entire rocket is required by the deadline time on that same day that was established at the beginning of the day's flying. If the rocket cannot be returned after an otherwise safe and stable flight because it cannot be located or because it landed in a spot from which recovery would be hazardous (as determined by an authorised person or the UKRoC official), a replacement vehicle may be substituted for a replacement flight without penalty. Once the authorised person or UKRoC official has declared that a rocket has landed in a place from which recovery would be hazardous, the results from that rocket's flight may not subsequently be used even if it is recovered.

10. **LAUNCH SYSTEMS:** Teams may use the electrical launch system and the launch pads (with six-foot long, 1-inch rails or at least four feet six inch long, ¼ inch rods) provided by the event officials or

may provide their own rail or tower system as long as it provides at least four feet six inches of rigid guidance. All launches will be controlled by the authorised person or event Range Safety Officer.

11. **FLIGHT CONTROL:** Rockets may not use an externally-generated signal such as radio or computer control (except GPS navigation satellite signals) for any purpose after lift-off. They may use autonomous on-board control systems to control any aspect of flight as long as these do not involve the use of pyrotechnic charges. Any on board flight-control electronics must use only commercially made altitude and/or timing devices that are available to all participants.

12. **TEST FLIGHTS:** Teams are encouraged to test fly their rockets before the regional finals preferably at one of the recommended rocket clubs identified on the UKRoC Website. A major benefit of this approach is the potential for mentoring. Provided they meet all safety requirements teams can use their own or local launch locations for test flights. Teachers or the Supervising Adult must familiarise themselves with the UKRA Model Rocket Safety Code and ensure it is followed.

13. **QUALIFICATION PROCESS:** Teams will be required to qualify at designated Regional Finals with the top scoring team from each Regional Final getting a place at the National Final. The remaining places (up to 20 in total) will be allocated based on scores at the Regional Finals.

14. **THE NATIONAL FINALS:** The final placings will be determined from the combined scores from a team's first scoring flight and team presentation with the top three final places ranked on the basis of a fly off between the top three scoring teams. Ties will result in pooling and even splitting of the prizes for the affected place(s) — for example, a two-way tie for 4th place would result in a merger and even division of the prizes for 4th and 5th places. If there is a tie for one of the top three places, the teams involved in the tie will be required to make another flight to determine final places. ADS reserve the right to make all last and final contest determinations.

15. **PRESENTATION AND LOG BOOK:** At the National Final each team must give a presentation of 10 minutes. Whilst Log Books are not a requirement at the National Final they are an essential requirement at the International Final so teams are encouraged to compile a Log book to support their presentations although this is optional and *not* a requirement. The presentation must **not** use PowerPoint or other software. The presentation will be marked for content and scoring will be; 0-4 points for participation of team members in the presentation; maximum score of 4 points will be awarded if each team member actively participates in presentation and answering questions; teams are encouraged to have all members participate at the same level during the presentation 0-10 points for design; maximum of 10 points will be awarded if the team explains one or more design features unique to their rocket and can confidently answer questions from the judges about the design. The number of design features explained is not a judging criterion (i.e., the judges will not score higher for teams solely based on presenting multiple design features). 0-6 points for lessons learned; a maximum of 6 points will be awarded if the team explains one or more lessons learned about their rocketry challenge experience and can confidently answer questions from the judges. Each judge will ask at least one question to the team. An example of a log book and other information will be made available on the UKRoC website.

**15: ADVERSE WEATHER CONTINGENCY AT THE NATIONAL FINALS:** A weather call will be made 3 days in advance of the National Final. In the event that adverse weather causes the National Final to be cancelled teams will be asked to make a presentation by Microsoft Meeting and the marks from that added to their scores from Regional Events to determine final placings.

Questions and enquiries can be made to [ukroc@adsgroup.org.uk](mailto:ukroc@adsgroup.org.uk).