



Invitation to Tender: providing launch capabilities for the UK CanSat Competition 2022-23

Summary

ESERO-UK is seeking a rocket launch provider to organise and carry out small rocket launch events for the UK CanSat Competition 2022-23. The CanSat Competition is a European Space Agency competition hosted in the UK by ESERO-UK. It provides students with the opportunity to have practical experience working on a small-scale space project.

1. Background

The European Space Education Resource Office in the UK ([ESERO-UK](#)) was established in 2009 and is funded by the European Space Agency (ESA) and the United Kingdom Space Agency (UKSA). The office works with educational providers, government, employers, charitable trusts and space specialists from across the United Kingdom.

Based at the [National STEM Learning Centre](#), the largest provider of STEM support to UK schools and colleges, ESERO-UK aims to use the context of space to open doors for young people. ESERO-UK provides influence, funding and services to improve the teaching of Science, Technology, Engineering and Mathematics (STEM) subjects and inspire young people through engaging, world-class STEM enrichment activities.

The CanSat competition provides students with the opportunity to have practical experience working on a small-scale space project. Aimed at school and college students over the age of 14, CanSat is a European Space Agency competition. The competition offers a unique opportunity for students to have their first practical experience of a real space project. They are responsible for all aspects: selecting the mission objectives, designing the CanSat, integrating the components, testing, preparing for launch and then analysing the data. ESERO-UK organises an annual UK CanSat competition, the winner of which will be invited to compete in the European CanSat competition.

A CanSat is a simulation of a real satellite, integrated within the volume and shape of a soft drink can. The challenge for students is to fit all the major subsystems found in a satellite, such as power, sensors and a communication system, into this minimal volume. There are three main challenges for students competing in the CanSat competition:

- To fit all major subsystems found in a satellite, including power, sensors and communications, into the volume and shape of a soft drink can.
- To provide a parachute to ensure the can survives the landing.
- To carry out scientific experiments and transmit in-flight data to an Earth-based computer.



CanSats are required to perform a primary and secondary mission:

Primary mission

After release and during descent, the CanSat shall measure air pressure and air temperature and transmit the data as telemetry once every second to the ground station.

It must be possible for the team to analyse the data obtained (for example, make a calculation of altitude) and display it in graphs (for example, altitude vs. time and temperature vs. altitude).

Secondary Mission

The secondary mission for the CanSat must be selected by the team. It can be based on other satellite missions, a perceived need for scientific data for a specific project, a technology demonstration for a student-designed component, or any other mission that would fit the CanSat's capabilities. Teams should brainstorm their own mission objectives, ideas and constraints to try to define their mission. The student teams are free to design a mission of their choice, if they can demonstrate it has some scientific, technological or innovative value. Teams should also keep in mind the limitations and requirements of the CanSat mission and consider the feasibility (both technical and administrative in terms of time and budget) of their chosen mission.

CanSat Requirements

The CanSat hardware and missions must be designed to the following requirements and constraints:

- 1. All the components of the CanSat must fit inside a standard soda can (115 mm height and 66 mm diameter), with the exception of the parachute. An exemption can be made for radio antennas and GPS antennas, which can be mounted externally (on the top or bottom of the can, not on the sides), based on the design**
- 2. The antennas, transducers and other elements of the CanSat cannot extend beyond the can's diameter until it has left the launch vehicle**
- 3. The mass of the CanSat must be between 300 g and 350 g. CanSats that are lighter must take additional ballast with them to reach the 300 g mass limit required**
- 4. Explosives, detonators, pyrotechnics, and flammable or dangerous materials are strictly forbidden. All materials used must be safe for the personnel, the equipment and the environment. Material Safety Data Sheets (MSDS) will be requested in case of doubt.**
5. The CanSat must be powered by a battery and/or solar panels. It must be possible for the systems to be switched on for three continuous hours.
6. The battery must be easily accessible in case it has to be replaced or recharged in the field.
7. The CanSat must have an easily accessible master power switch.
8. The CanSat should have a recovery system, such as a parachute, which is able to be reused after launch. It is recommended to use bright coloured fabric, which will facilitate recovery of the CanSat after landing.

9. The parachute connection must be able to withstand up to 500N of force. The strength of the parachute must be tested, to give confidence that the system will operate nominally.
10. The descent time of the CanSat when falling from 120 metres is limited to 12 seconds or 20 seconds for a guided landing. This is a requirement from the launch site since this will guarantee that the CanSat lands within the landing area under all wind conditions.
11. The descent rate must be at least 10m/s or 6m/s for a guided landing.
- 12. The CanSat must be able to withstand an acceleration of up to 2g for balloon or drone launch, or 20g for rocket launch.**

The highlight of the competition are the launch events. Historically CanSats have been dropped at height from drones and helikites, but more recently have been launched by small rockets to an altitude of around 300-400m. There are 2 types of launch events – regional launch events held in March and a National final launch event held in April.

The regional launches are not competitive, and every team is encouraged to attend a launch, even if their CanSat is not finished but is fit to launch. The regional launches are not used to choose teams for the National final launch, they are an opportunity for *all* teams to have a go at launching their CanSat to gain valuable testing experience of their CanSat. After the regional launch events and based on regular reporting provided by the teams around 10 teams will be invited to the CanSat National final launch event where they will launch their CanSats competitively.

More information about the competition can be found in the competition guidelines [here](#) (please note these are the guidelines for the previous 2021-22 competition. Updated guidelines will be provided once finalised).

2. Provider requirements

A small rocket launch provider is sought to organise and facilitate regional launches events across the UK and a National final launch event in Yorkshire.

Regional launches will comprise of a series of one day events at several locations across the UK. The National final will require a one-day launch event. Each launch date will have a backup launch day organised the next day as a contingency for bad weather. Venues will therefore be booked for 2 days for each event.

The launch provider needs to deploy between one and three CanSats per launch. CanSats should be launched to around 300-400m to ensure enough time during the descent to collect data. Contingency should be provided in case of launch failure to enable teams to launch again, presuming the failure is not catastrophic for the CanSats.

There will be up to 15 teams per launch event (both regional and final), however this is subject to change depending on the numbers of teams that sign up and is variable across locations.



Requirements for events

The launch provider will organise and run regional launch events at approximately 5 launch sites across the UK (locations and number of events to be discussed and decided on with ESERO-UK). Locations will depend on the distribution of schools that are taking part in the competition. Teams have until the 01 October 2022 to sign up to the competition. The locations of registered teams will be shared with the launch provider to aid deciding on launch venues.

Previous locations for regional events have included:

- Spaceport Machrihanish – Campbeltown, Scotland
- Midlands Rocketry Site – Twycross, England
- Castle Farm – Yorkshire, England
- East Anglian Rocketry Society, Cambridge, England
- Elvington Airfield – Yorkshire, England

(Regional launches do not have to be limited to the above sites)

The National final launch event is required to be in easy travelling distance (under 30 minutes by car) of the National STEM Learning Centre in North Yorkshire (YO10 5DD). Historically this launch event has been held at Elvington Airfield.

To facilitate regional and National final events the provider will, for each launch event:

- provide all equipment required to launch up to 15 CanSats per event by rocket
- occasionally provide opportunities for second launches on the day to teams who's first launches fail (if possible in the timeframe of the day)
- plan backup launch days for the day after the event date as a contingency for bad weather
- provide trained staff* with the correct expertise for launch events
- provide at least one member of staff who is first aid trained (copies of first aid certification will be provided to ESERO-UK)
- provide at least one Safety Range Officer
- liaise with launch sites to hire spaces
- ensure all necessary permissions and NOTAMs are in place for launch
- organise suitable insurance
- provide/hire small generators for power at venues which do not have power – this is required by teams to charge laptops, use soldering irons etc.
- provide/hire shelter (e.g. gazebos), tables and chairs at venues with no suitable buildings (one table per team with adequate seating)
- provide a safety briefing at the beginning of each launch event for teachers and students
- provide risk assessments to ESERO-UK for each venue at least 8 weeks before launch dates



- provide a PDF launch event guide for each event to ESERO-UK at least 8 weeks before launch dates for schools, including information on how to get there, what to expect, how the CanSats will be launched and safety information
- organise their own hotels and travel to attend regional and National events (included in the budget)

*All staff attending launch events in person must hold a valid DBS check. ESERO-UK can help organise this if required (at no cost) through the [STEM Ambassador Programme](#).

A member of staff from ESERO-UK will try to attend as many regional launches as possible. However, the launch provider should be prepared to run any event that a member of ESERO-UK cannot attend. This will include reporting back to ESERO-UK on which schools attended.

Regular online meetings with ESERO-UK will be required to ensure the smooth planning of the regional and final events.

4. Intellectual property rights

All intellectual property arising from the creation of guidance documents or videography related to the competition will be vested in STEM Learning.

5. Timeline

Activity	Milestone
Open, competitive Invitation to Tender issued	08 June 2022
Deadline for submission of tenders	29 July 2021
Launch provider appointed	12 August 2022
Regional and National final launch events venues booked	04 November 2022
Regional launch events risk assessments and launch day information packs provided to ESERO-UK	January 2023
National final launch event risk assessments and launch day information packs provided to ESERO-UK	February 2023
Regional launch events	March 2023



Final launch event in Yorkshire	April 2023
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6. Costing and pricing

Proposals should include a full budget plan for the whole costs, including any anticipated travel, expenses, and VAT. All costs should be clear and transparent, clarifying the number of days of each individual working on the activity that they provide.

Decisions will be based on perceived value for money, rather than the lowest cost proposal.

In the region of **£50,000 to £60,000** (exclusive of VAT) is available for the contract period (August 2022 to April 2023).

If more than 5 regional events are required to accommodate a higher than expected number of teams further costs can be negotiated with ESERO-UK.

7. Tender content

Tenders should show, as a minimum:

- details of small rocket launch capabilities, including multiple samples of previous work
- details on how the provider requirements will be met
- the timeline for organising regional events and the National final launch event
- the roles, responsibilities and brief CVs of personnel involved
- a breakdown of costs by staff and non-staff categories, equipment costs, travel and subsistence costs
- evidence that any staff intending on attending launch events have been DBS checked, or a commitment to staff being DBS checked before launch events if they are not already
- contact details of two referees
- any evidence of previous student outreach work

8. Submission and format of proposals

The deadline for receipt of submissions is midnight on the 29 July 2022.

Late submissions will not be accepted. All submissions will be acknowledged with a notification of receipt.

An electronic copy of the proposal should be received in PDF format by this deadline. This is an electronic only submission process, therefore all documentation must be submitted in PDF format as a single zipped folder if the size of the submission is greater than 10Mb.



Proposals should be no longer than 8 sides of A4 (excluding CVs of people involved) and typed in Arial size 12 font. If the proposal exceeds this limit, evaluators will be advised to disregard any information outside the limit.

Proposals with the subject line "CanSat competition launch provider" should be emailed to Rebecca Crawford-Richardson, ESERO-UK Project Officer, at r.crawford-richardson@stem.org.uk.

We may seek clarification or further information in respect of a submission.

STEM Learning Ltd reserves the right not to award a contract. STEM Learning Ltd will not in any circumstances be liable for any tender costs, expenditure, work or effort incurred by you in carrying out enquiries in relation to, proceeding with, or participating in, this tender.

A decision will be made as soon as possible after receiving the tenders, with a face-to-face or online clarification meeting if needed.

The successful bidder will be required to enter into STEM Learning Ltd's standard contract for services.

9. References

Tenderers should indicate the names of two current or recent customers for whom similar services have been carried out and who would be prepared to act as referees.

10. Selection criteria

Proposals will be evaluated against the following criteria, which are not listed in order of importance:

- compliance with, and understanding of, requirements outlined in this tender document
- effectiveness of the proposed methodology for undertaking the proposed activities
- clarity and feasibility of the programme of work and work plans
- relevant experience of the tendering team
- ability to meet the required timetable
- commitment to working with STEM Learning Ltd and appropriate stakeholders
- management of any existing or potential conflict of interest identified by the bidder
- realistic and appropriate budget
- value for money.

Once a decision has been reached in respect of contract award, all bidders will be notified. STEM Learning will not be obliged to discuss reasons for declining any response.

11. Enquiries



These instructions are designed to ensure that all tenders are given equal and fair consideration. It is important therefore that you provide all the information asked for in the format and order specified.

Please contact Rebecca Crawford-Richardson (r.crawford-richardson@stem.org.uk) if you have any difficulty in providing the information requested. Pre-tender negotiations are not permitted. If you have any questions relating to the requirements, then please contact Rebecca Crawford-Richardson as above. We will aim to respond to any queries within 5 working days.

If we feel that the query relates to an issue of which all prospective bidders should be made aware, we reserve the right to communicate the query and our response to all those who have requested tender documentation. If you consider any point you raise to be confidential to your own proposal, please make this clear and provide reasoning for this.

Please note the last date for the submission of any queries is midnight on the 28 July 2022.