



SpaceCraft:

prototyping, manufacturing and test
support for space developers





The SpaceCraft Initiative

surrey.ac.uk/spacecraft

SpaceCraft is a new initiative to help small and medium enterprises and colleges who want to create their own space-flight equipment, space experiments and to access specialist training. Co-funded by the UK Space Agency and the University of Surrey, and run from Surrey Space Centre, SpaceCraft provides:

- **collaboration- and maker-space technical facilities to enterprises which otherwise find it difficult to access technical support to enable space-related prototyping and manufacturing.**
- **access to test facilities in Surrey Space Centre.**
- **access to skilled engineering support to help kick-start work, for example by assisting with early design, development, prototyping and build.**
- **opportunities for consultancy, advice and modelling direct with academics for specialist work.**
- **assistance to Further Education institutions and start-up enterprises to develop training, building on Surrey's decades of experience in providing space-related training.**
- **introductory arrangements to make it easy to join the scheme and try it out.**

“

We are working with Surrey Space Centre and the SpaceCraft initiative to introduce space engineering experience and courses into our educational offering; we think it's going to add a very exciting dimension for students which also enhances their employability in this fast-growing sector.

”

Aaron Butson, Assistant Principal Business, Employment and Skills, Hampshire and South Downs College, Alton, Hampshire



“

We have already benefited enormously from SpaceCraft to develop our revolutionary new propellant tank gauging technology and prepare for its first in-orbit test. As a very small space company the support and facilities provided have been vital.

”

Richard Foster-Turner, COO Atout Process Ltd



Large Cleanroom

Class 1000 (ISO6) with an area of 110 m² with installed fume extraction bench. Cleanroom conditions are usually vital for final-stage assembly of space equipment and especially optical instruments. Flexible bench space options can be provided. Cleanroom clothing is also available.

General Prototyping Laboratory

The Surrey Space Centre general prototyping lab is a semi-clean large space for general development work with controlled access. Flexible spaces can be allocated.



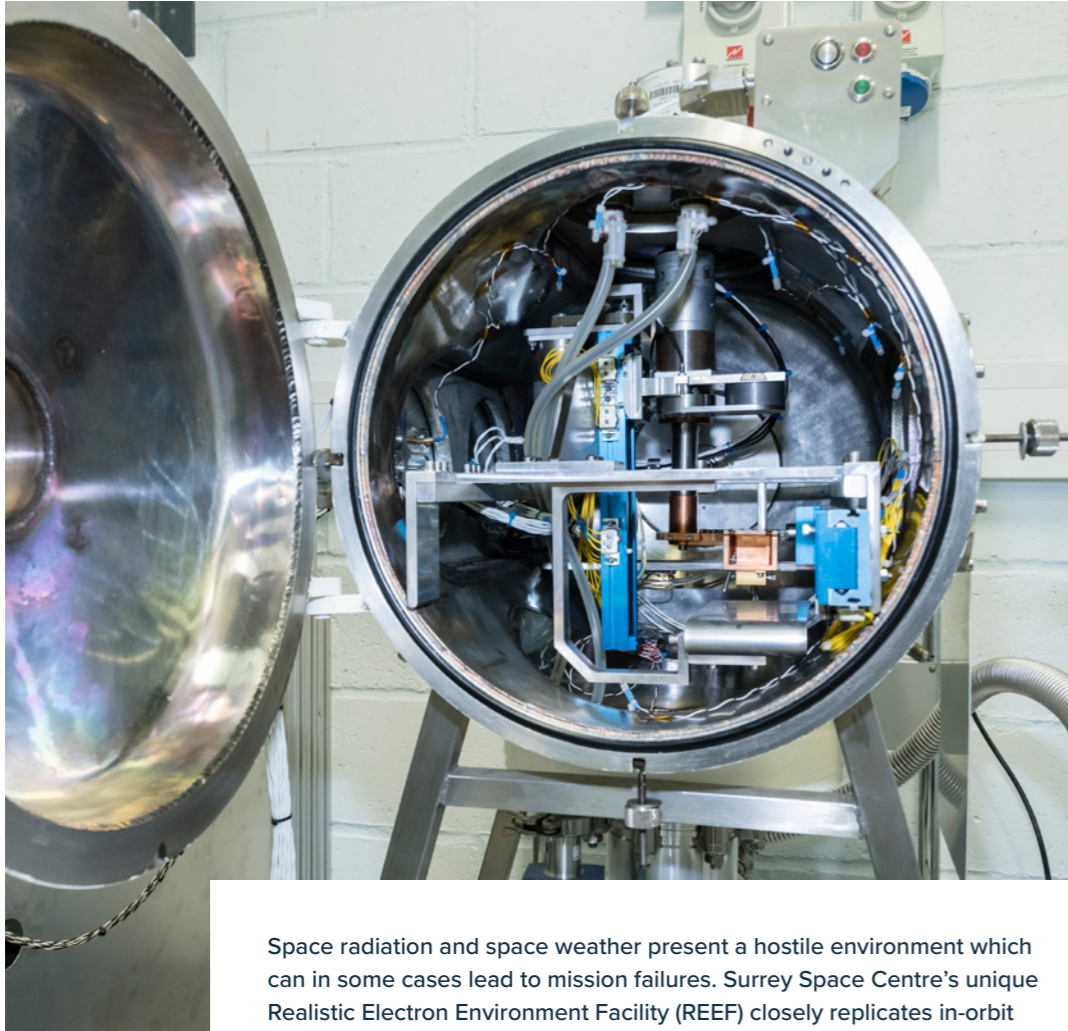


Ground Station and **Control Room**

The Surrey Space Centre Ground Station enables communication with satellites in a wide range of orbits from LEO to GEO and beyond. It is used for Surrey Space Centre in-house mission command and telemetry as well as to support educational and research activities. Flexibility of applications and operations is a key feature.

Fully functional receive and transmit capability (VHF, UHF, S and X-band) for satellite telemetry telecommand and communications. Served by several roof-mounted tracking antennas. Includes ground processing software.

Space Radiation **Facility**

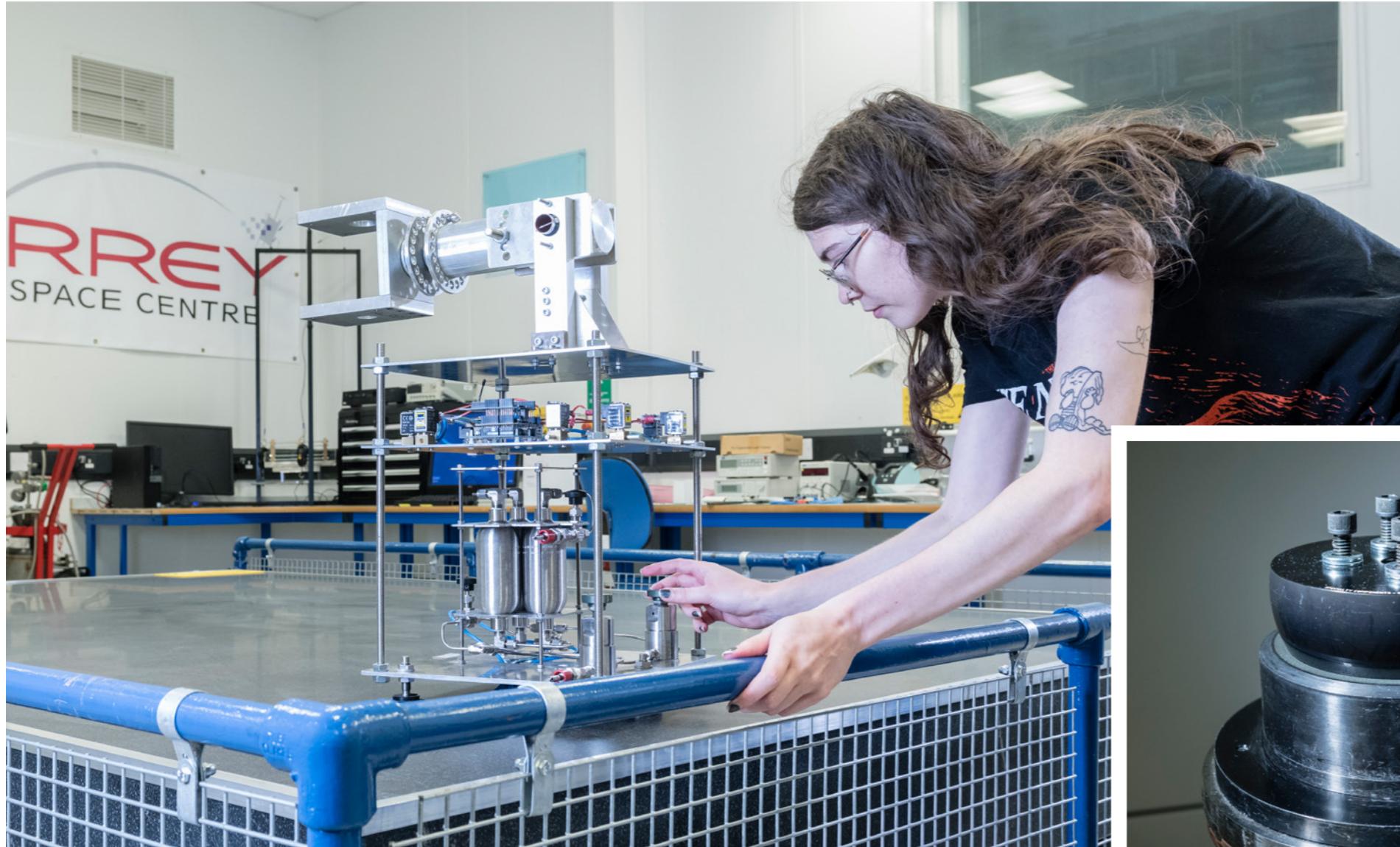


Space radiation and space weather present a hostile environment which can in some cases lead to mission failures. Surrey Space Centre's unique Realistic Electron Environment Facility (REEF) closely replicates in-orbit conditions, especially for geostationary and high-altitude satellites but also for LEO missions. It is a broad-spectrum electron radiation source up to 2MeV, either in-vacuum or in-air. It is often used for electrostatic charging work and also delivering total dose under realistic conditions. Assistance in facility use and safety is provided.

Electric Propulsion, **Vacuum and Plasma Lab**

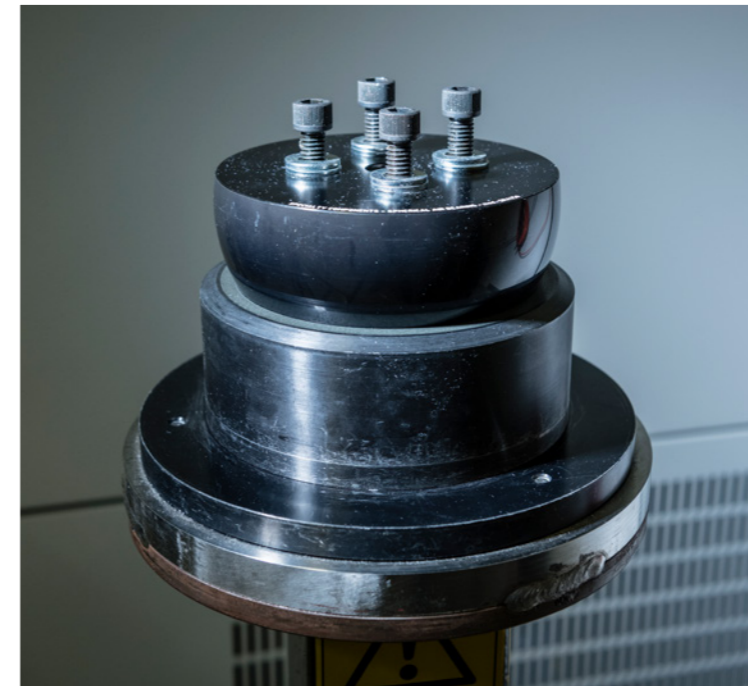
Vacuum and low pressure environments need specialist equipment. Surrey Space Centre offers large and small vacuum chambers with a wide range of pumps for vacuum work and plasma work including evaluation of electric thrusters. Ancillary equipment such as leak detectors and gauges are also available.





Air-Bearing/ Optical Tables

Critical spacecraft dynamics such as docking and capture manoeuvres can be simulated experimentally on air-bearing tables to validate algorithms and control systems. Other applications include optical experiments requiring high stability and vibration damping experiments. Surrey Space Centre has two high-specification air-bearing granite tables with vibration isolation legs on which air-supported load can be floated for 'zero-friction' experiments. Large table: 3.0 x 2.0 x 0.25m and small table: 1.0 x 1.0 x 0.5m. In addition we have a spherical air-bearing facility for an even wider range of testing conditions.



Control System Spherical Test Facility

A spherical three degrees-of-freedom air-bearing table. It is used for testing control systems to ensure a spacecraft can control its orientation in space.

Thermal testing and cycling over a wide temperature range is critical to developing aerospace equipment and instruments. Surrey Space Centre has a full climatic chamber especially suitable for small and medium sized equipment, as well as a much larger mini-satellite sized thermal chamber.

Thermal Environmental Chambers



Large (2.1 x 2.1 x 2.6m) chamber (mini-satellite sized) with a wide temperature range of -30°C to +70°C, with nitrogen purging available.



Climatic chamber

Wide temperature range of -75°C to +180°C and relative humidity from 10% to 95% (internal size 0.6 x 0.6 x 0.5m)



Spherical Helmholtz Coil Facility

The coil produces a uniform magnetic field with an intensity close to zero to cancel the Earth's magnetic field. It is useful when testing magnetic sensors and actuators as part of a satellite's attitude and orbital control system.

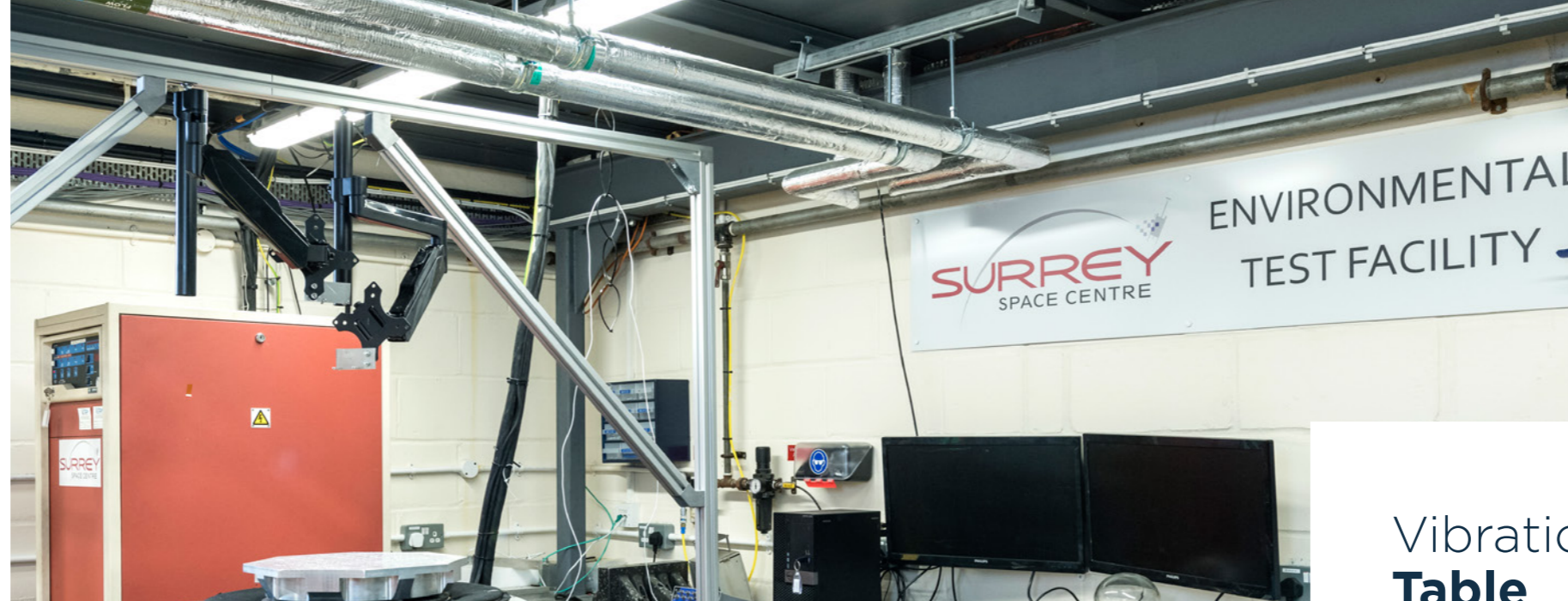


Continuous Sun Simulator

Provides illumination approximating natural sunlight under lab conditions for testing and characterisation of solar cells, sunscreens, materials and other devices. Intensity ranging from 500 to 1000 W/m².

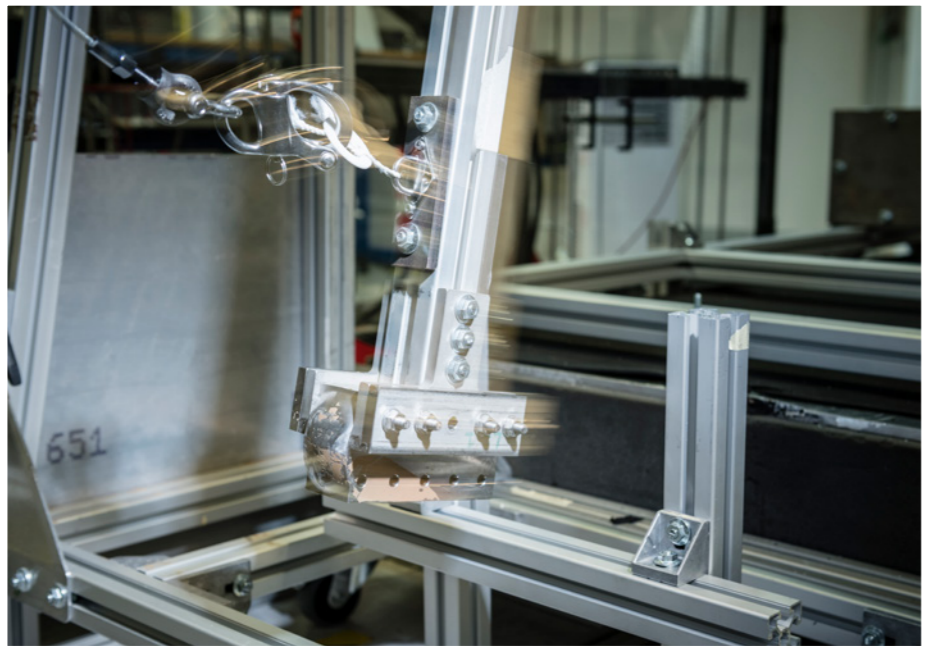
Shock Test Facility

Some systems are sensitive to shock requiring a shock test. The Surrey Space Centre shock test facility simulates shocks that a spacecraft may encounter during launch. Suitable for research and pre-flight testing.



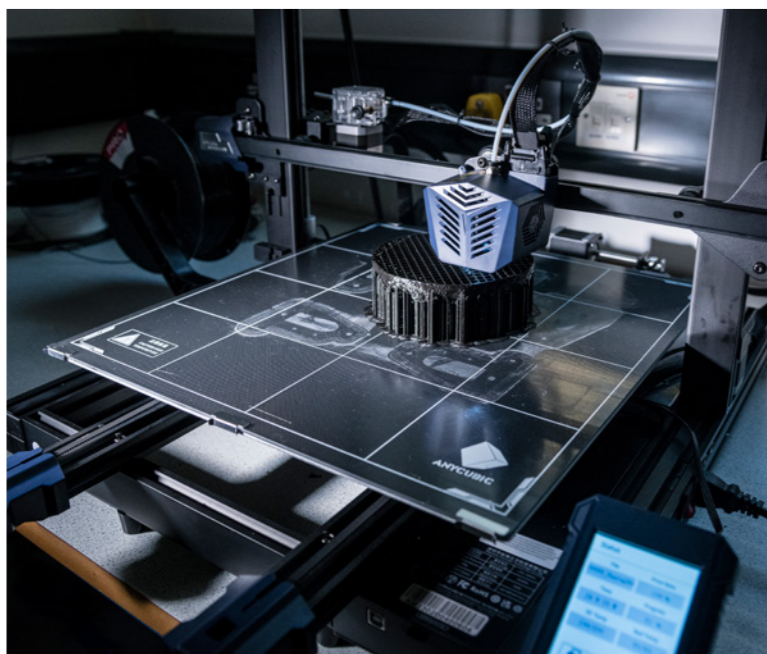
Vibration Table

Launch-induced vibration is a significant risk in the early stage of any space mission. The vibration table at Surrey Space Centre simulates the environment and is suitable for research and prototype activities, as well as qualification- and flight-model testing of equipment, instruments and small satellites.



3D Printers

For rapid prototyping of housings and assemblies.



Microscopes and Cameras

For inspection of electronic assemblies and training.



Surrey Space Centre

Surrey Space Centre (surrey.ac.uk/surrey-space-centre) is where the NewSpace era of small, low-cost satellites began with the launch of the experimental UoSat-1 Spacecraft in 1981, followed by dozens of missions since including the 'RemoveDebris' mission deployed via the International Space Station.

Today, Surrey Space Centre is a world-leading academic centre of excellence for space engineering research and education across a wide range of disciplines including astrodynamics and mission planning, Earth observation and remote sensing, space environment and space weather, space electric propulsion, lunar in-situ construction, on-board avionics and data processing. Surrey Space Centre is renowned for its Space Engineering education at both Masters and Undergraduate level.



Surrey is well known for its space entrepreneurship so we want to encourage more of it. Under SpaceCraft we are delighted to be opening our doors to small and medium sized space enterprises who need support for their manufacture and test activities. At the same time we are developing new space and satellite training courses with the Further Education sector to bring on the next generation of engineers and scientists. Together these initiatives should give a very valuable boost to the UK space ecosystem.



**Professor Keith Ryden,
Professor in Space Engineering
and Director of Surrey Space Centre
at the University of Surrey**

For more information and to become
part of SpaceCraft please contact:

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