Science and Technology Facilities Council

RAL Space

National Satellite Test Facility

Complete environmental testing in the UK for large satellites

Clean space in the NSTF. Credit: STFC RAL Space

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Dynamics testing suite in the NSTF. Credit: STFC RAL Space

Welcome to the National Satellite Test Facility

At RAL Space, we have been building space instrumentation and testing satellites for over 60 years. At the National Satellite Test Facility, we offer this experience at a new scale in the UK. For the first time we'll be able to provide test services for spacecraft up to seven tonnes, all under one roof.

Because we don't just test, we also invest in research and development, we're particularly excited about the innovations we're implementing in the National Satellite Test Facility. We know how important it is to help simplify test campaigns, reduce risk, and improve turnaround time between tests while maintaining the high standards needed before launch.

These include flexible, scalable acoustic testing, developing digital twins to model your satellite, and providing centre of gravity and moments of inertia measurements in a few hours, rather than days.

We offer professional, proactive support based on our deep understanding of space technology. Our expert test team is supported as needed by the facilities and skills of wider RAL Space, including smaller test equipment and clean rooms, precision machining facility, our specialist thermal, systems, electronics, and mechanical engineers as well quality and product assurance.

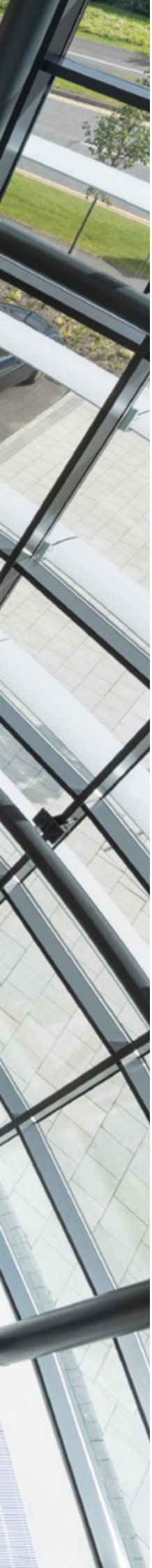
As the UK's national space laboratory, we occupy a unique and independent position between industry, academia and government. Our facilities are open to everyone, whether you're based in the UK or internationally, whether we've worked with you for a long time, or you're a new partner.

We look forward to welcoming you and working with you to get your spacecraft ready for launch.

Professor Chris Mutlow,
Director STFC RAL Space

Professor Chris Mutlow. Credit: STFC RAL Space

Staff at RAL Space. Credit: STFC RAL Space



Why test with RAL Space

Supporting your journey to launch

Get your spacecraft ready to launch with our purpose built, large scale environmental test facilities. The National Satellite Test Facility is specifically tailored to help space companies raise confidence in satellite performance.

Access to facilities

Test your spacecraft under one roof. With two large test preparation clean rooms alongside a complete suite of test facilities, all within a clean environment, our specialist, professional team can test your mission efficiently. Our open access approach ensures all customers receive the same high level of service.

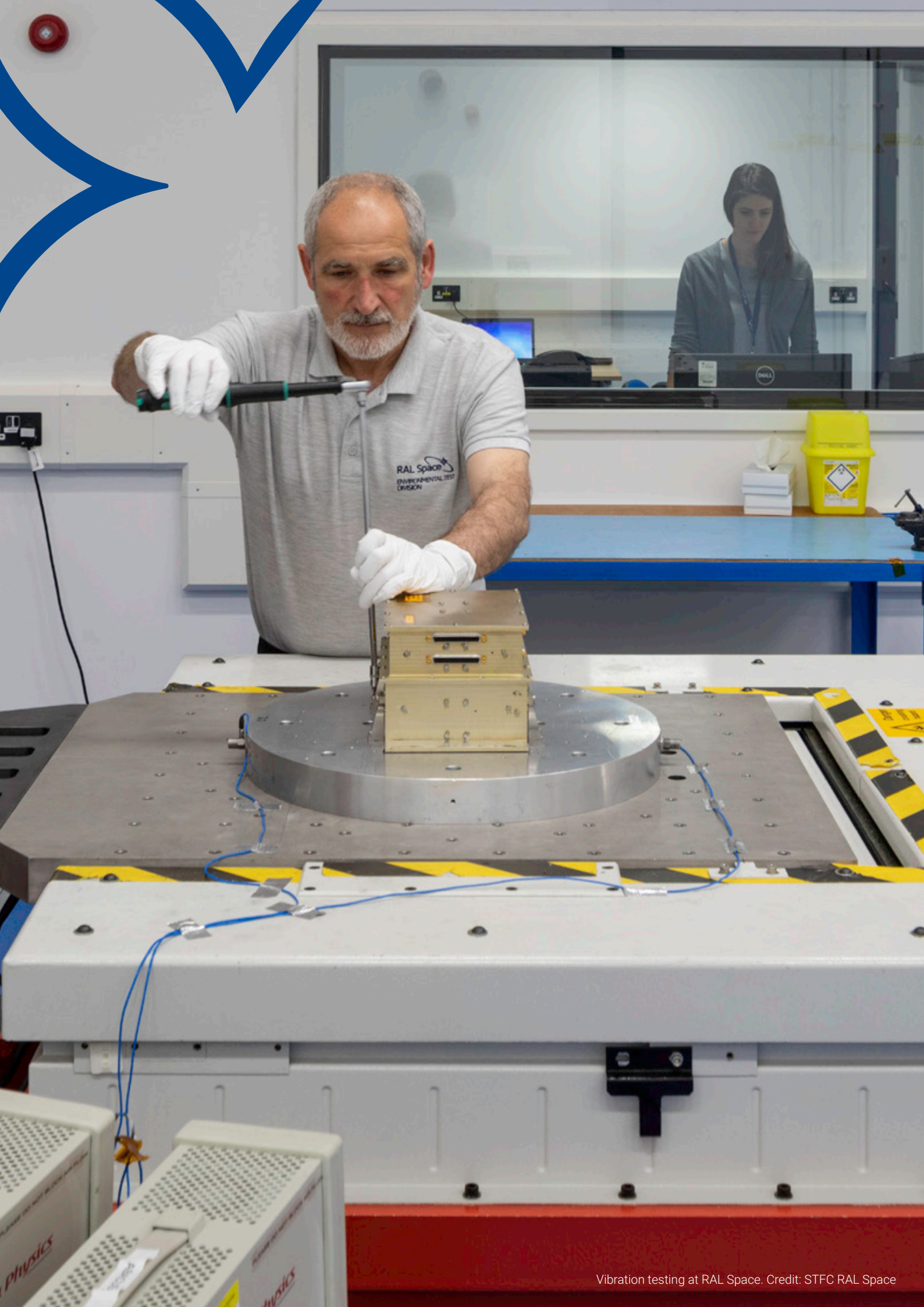
Access to expertise

A dedicated test programme manager will ensure each test programme is able to progress efficiently, working with you to support your needs before you arrive until your spacecraft safely leaves site.

Each test is run by an experienced team, embedded within RAL Space which has a deep knowledge of problem solving for space and access to other supporting facilities and services.

Access to campuses

Our campus location is easy to get to and provides a wealth of local amenities and hosts a range of organisations, institutions and businesses shaping the world of today and tomorrow.

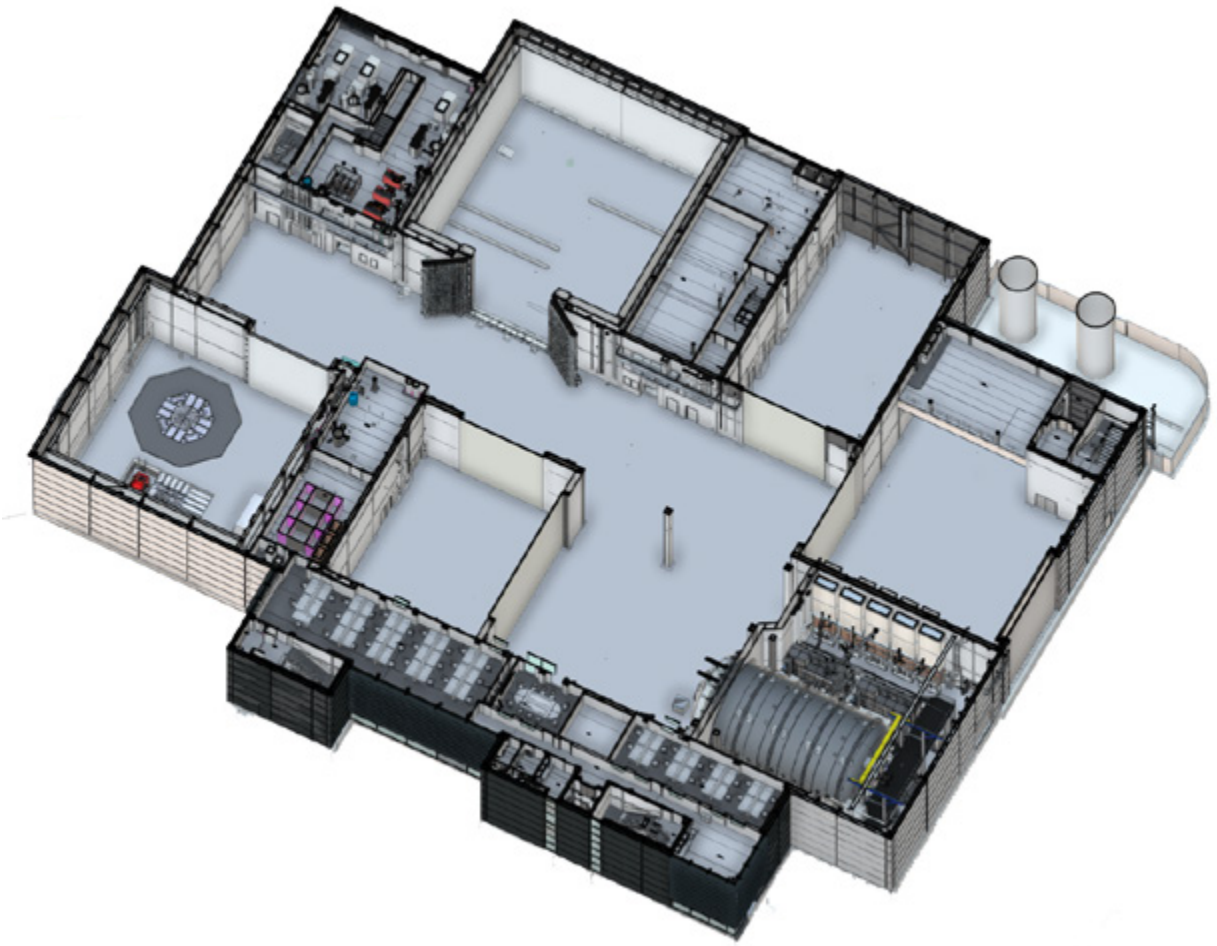


Vibration testing at RAL Space. Credit: STFC RAL Space

Test facilities

- 2 large separate ISO 8 cleanrooms for customer use, one of which can be operated at ISO 6
- Level floor transitions to all testing facilities
- ISO 9 air lock and unloading bay: 17.2 m long by 15.8 m wide by 14.5 m high
- 2 customer offices to accommodate up to 30 people each
- Secure data infrastructure
- Aiming for ECSS-Q-ST-20-07C test centre certification from the European Space Agency

Layout of the National Satellite Test Facility



Credit: STFC RAL Space

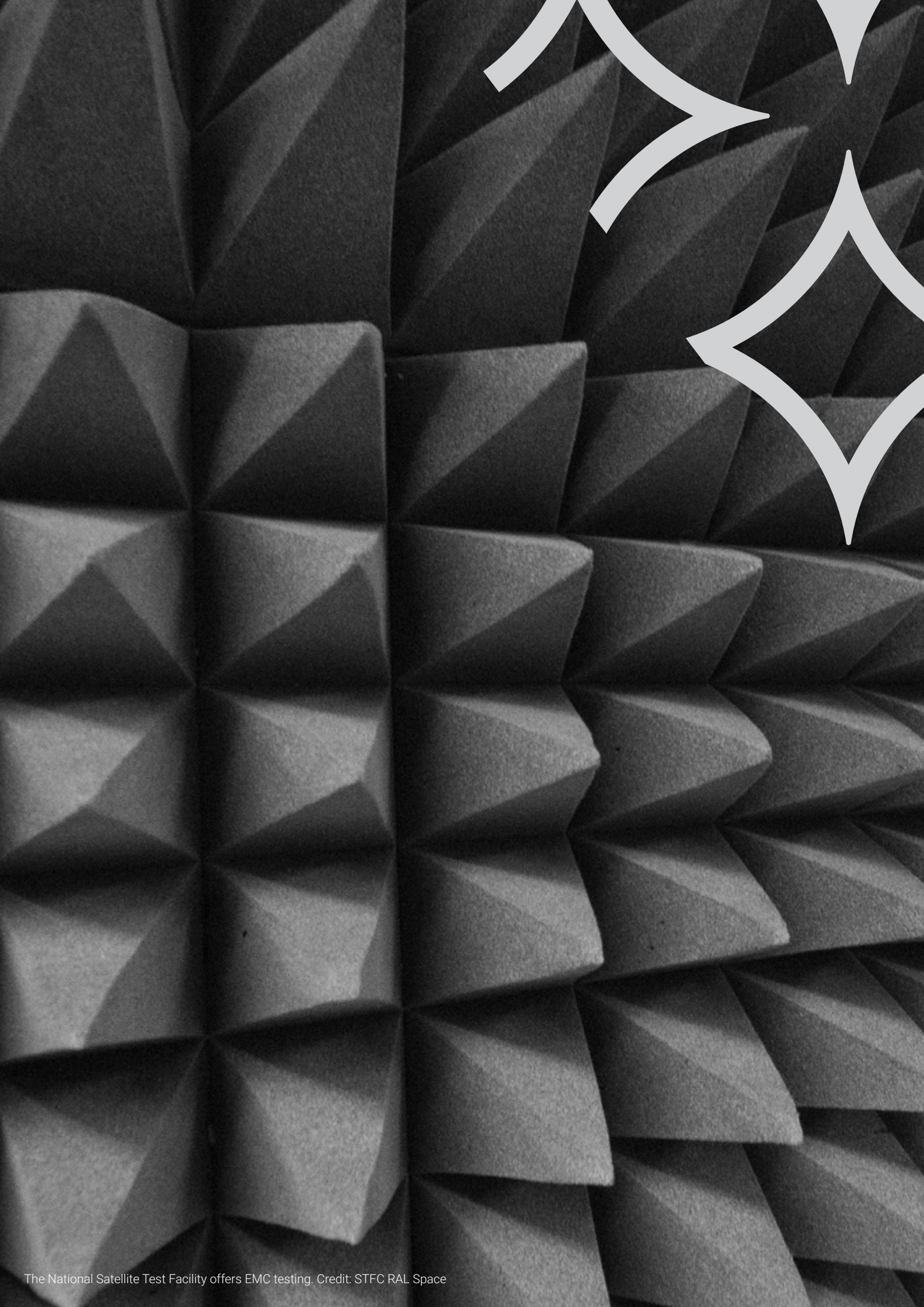
Large Space Test Chamber in the National Satellite Test Facility. Credit: STFC RAL Space

Thermal vacuum testing

From telecommunication satellites to interplanetary landers, the large space test chamber can replicate a variety of space environments to meet your test requirements.

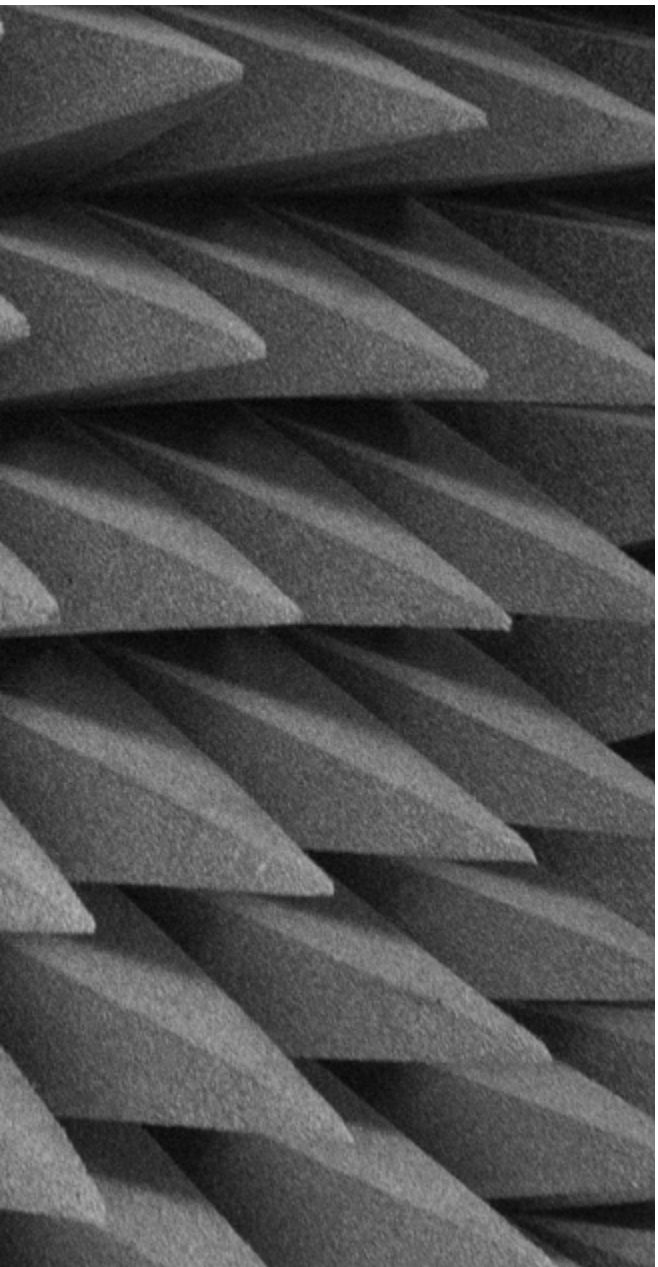
For smaller payloads, a wide range of other thermal vacuum chambers are also available within RAL Space.

- Dedicated operational team
- 7m diameter, 12m long usable space inside the thermal shroud
- 10 thermal zones, allowing 95 K to 400 K at 1 K/min
- Base pressure <1E-5 mbar
- Preparation and EGSE space available together with UPS/ generator
- MGSE to rotate the satellite from vertical to horizontal for loading into the chamber



The National Satellite Test Facility offers EMC testing. Credit: STFC RAL Space

Electromagnetic compatibility (EMC) and antenna measurement system



Electromagnetic interference can distort signals, preventing your satellite from delivering its full potential. Using our vertical planar scanner system, our dedicated team can help you evaluate the outputs from your satellite and validate its performance.

- Dedicated EMC and antenna testing team
- Facility can be operated as a low oxygen environment

Antenna testing

- 12 m by 12 m vertical planar near-field scanner covering 500 MHz to 75 GHz

EMC testing

- Following the ECSS-E-ST-20-07C EMC test standard
- Capabilities include conducted tests and radiated E-field testing up to 40 GHz
- Dedicated, shielded customer EGSE room adjacent to the test chamber

Dynamics testing suite

Dedicated dynamics team covering vibration, acoustic, mass properties and shock/deployment testing.

Our specialist team can support you to understand the dynamic behaviour of your satellite in response to a wide range of stimuli to replicate its complete journey to orbit.

Digital models that predict behaviour can be validated with physical testing under a range of conditions enabling complete characterisation of its dynamic behaviour.

Physical properties facility

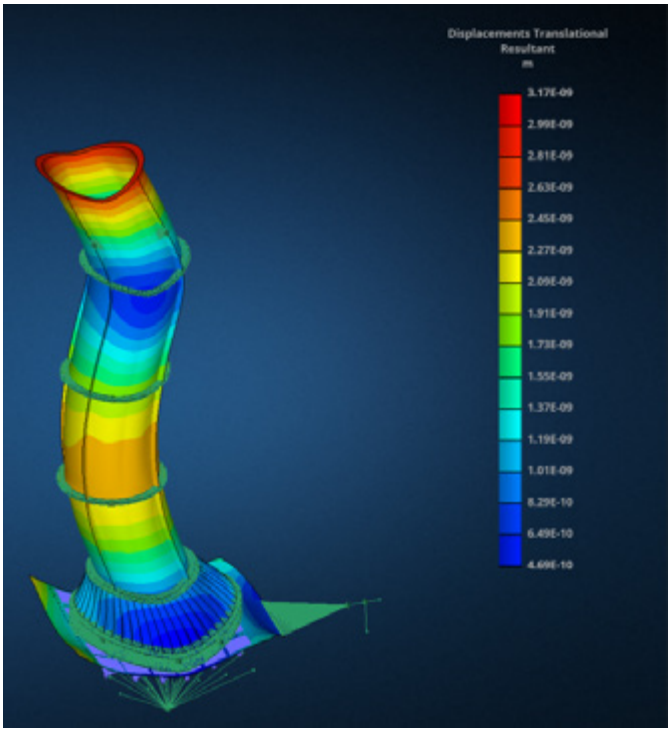
- Centre of mass
- Moments of inertia

Data analysis support

- 512 channel data acquisition system supporting the complete dynamics test suite
- Data capture also available through high-speed camera and force measuring devices
- Modelling and digital twin capability in development

Shock and deployment testing

- Pyro-shock rig for sub-system tests (<50 kg)
- Full-scale separation and deployment tests
- Clamp band release tests



Data analysis model. Credit: STFC RAL Space


Pyroshock rig ready to test. Credit: STFC RAL Space

Vibration testing

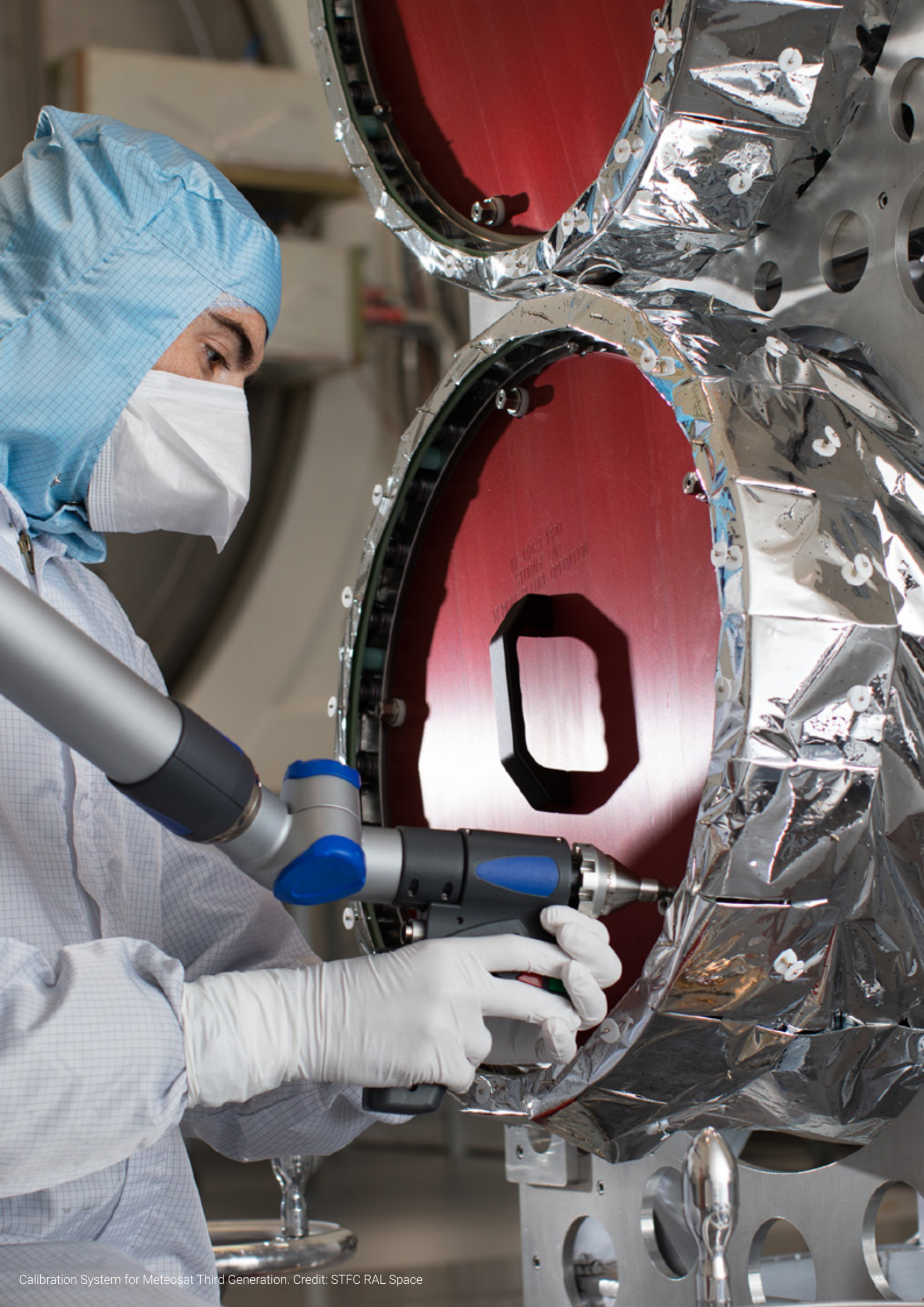
- Separate vertical and horizontal vibration facilities, both with large guided interface areas to accommodate large and heavy test articles
- 222 kN sine force, 76 mm stroke
- 5 to 2,000 Hz frequency range
- Solid state power amplifier with soft shutdown
- 70 control channels

Acoustic testing

- Direct field acoustic noise testing approach
- Flexible and modular arrangement simulates a wide variety of test conditions appropriate to the specific test article
- Driven by high power amplifiers (>0.5 MW)
- Sound pressure level 146 dB

Direct field acoustic noise amplifiers. Credit: STFC RAL Space

Vibration test equipment at the National Satellite Test Facility. Credit: STFC RAL Space



Calibration System for Meteosat Third Generation. Credit: STFC RAL Space

Space at STFC

Your partner in space

STFC gives space businesses access to world-leading knowledge, unique facilities and the networks they need to succeed.

From development of bespoke instruments to specialist data retrievals, from industry wide networks to multiple UK locations, our expertise is diverse and accessible.

Whether you're a space start-up, a high-growth small or medium sized business or multi-national organisation, we have the breadth and depth of expertise to support your growth journey.

RAL Space

RAL Space is the UK's national space laboratory. Our activities and our facilities enable scientific research in disciplines such as climate science, space weather and astronomy. With over 60 years of experience in space programmes, we have had significant involvement in more than 210 instruments on missions to date.

We run some of the UK's most advanced space and science facilities and our experts work throughout the lifecycle of space missions. From leading concept studies for future spacecraft; developing bespoke scientific instrumentation; providing space test and calibration services; operating ground-stations to processing and analysing data.

We support UK academia through collaborations, services and technology development and partner the UK space industry through contract research and access to our world-leading facilities. We bring together ideas to make the UK space community stronger.

RAL Space is an integral part of the Science and Technology Facilities Council's Rutherford Appleton Laboratory and is the space hub for UK Research and Innovation. We employ more than 350 highly skilled staff in the heart of the Harwell Space Cluster and at the Chilbolton Observatory.

Harwell Campus

Harwell Campus is a place where experimentation is encouraged and technology is developed that transforms people's lives. At the heart of the science, space and health tech sector, Harwell is a centre of progress and an established beacon of global science and discovery.

A large campus of 700 acres with open spaces and 200+ thriving businesses, Harwell Campus hosts over 6,000 people. All of this is supported by a variety of onsite and local amenities including nurseries, sports facilities, cafés, post office, mini supermarket, weekly pop-up food stalls and attractive public spaces.

RAL Space on the Harwell Campus in Oxfordshire. Credit: STFC RAL Space

Location and logistics

Access via road and rail, with connections to air (London Heathrow and London Gatwick) and sea (Southampton and others)

Support can be provided for finding and booking local accommodation for test campaign teams.

Additional office space on site can also be made available through separate arrangement.

Didcot is 5 miles away and Oxford is 15 miles away both with a wide variety of amenities.

Map of southern England

Open access large spacecraft environmental test facilities

All test facilities within an ISO8 environment

Dedicated customer offices

Operated by experienced STFC staff

Open for bookings now

For enquiries contact the RAL Space Business Development Team:

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Front cover: The National Satellite Test Facility. Credit: STFC RAL Space

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