

Innovation Potential of Research Infrastructures

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European Space Agency



WHAT IS ESA?



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To provide for and promote, for exclusively peaceful purposes, cooperation among European states in space research and technology and their space applications.

Article 2 of ESA Convention

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WHAT IS ESA?



- 50 years of experience
- International Organisation
- 20 Member States + Canada Associate MS
- Six establishments in Europe, about 2200 staff
- More than 4 billion Euro budget (2013)
- Over 80 satellites designed, tested and operated in flight
- 17 scientific satellites in operation
- Six types of launcher developed

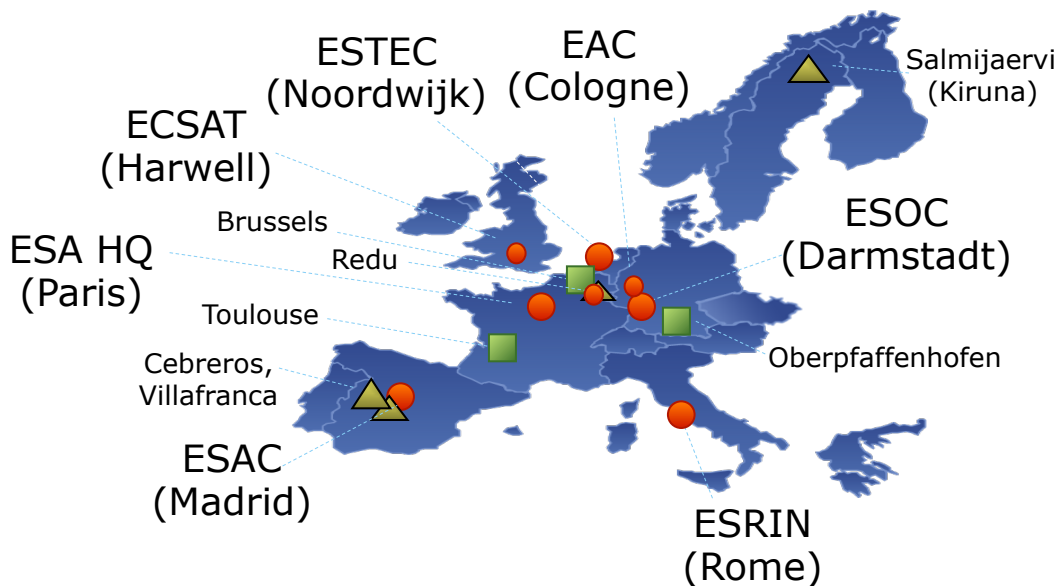




WHAT IS ESA?



- ESA sites/facilities
- Offices
- ▲ ESA ground stations





Europe's largest space centre, technical heart of the European Space Agency

ESA/ESTEC generic business model:

Unique assembly of competences and labs tailored to support space projects

One central localization avoids duplication of expensive investments and maintenance in industry

Labs and Competences are available for all project participants as well as SME's

Portfolio of labs and facilities is continuously scrutinized for efficiency and obsolescence



ESA/ESTEC Laboratories: ESTEC-LAB@esa.int		Network of External Facilities		
01. Materials & Electrical Components Laboratory		ONERA, Toulouse; DLR, Cologne, IVF, Gotenburg ARC, Seibersdorf Tyndall, Cork	Several Radiation Test facilities to cover the energy spectrum of radiation	Three different test facilities for shock testing
02. Concurrent Design Facility (CDF)				
03. Avionics Systems Laboratory	Software & Simulation			
	Data			
	Control			
04. Electro-Magnetic Laboratory	EMC			
	Antenna Measurement	Spherical Near Field Antenna Test Facility (SNFTF), Lyngby		
05. Radio Frequency Payload and Systems Laboratory	Navigation	Time & Frequency Expertise Lab, Neuchatel		
	Microwave			
	Communication			
	Remote Sensing			
	Radio Frequency and High Power	High Frequency RF Laboratory, Valencia		
06. Power Laboratory:	Power System			
	Solar Generator	Spaso Lab, Madrid, Solar Energy Calibration Lab, Fraunhofer Freiburg		
	European Space Battery Test Centre			
07. Propulsion Laboratory				
08. Automation and Robotics Laboratory	Planetary Robotics	Preparing a MoU with CNES		
	Telerobotics and Haptics	Robotics and Mechatronics Centre: European Space Reference Facility for Robotics and Mechatronics, Oberpfaffenhofen		
09. Optics & Opto-Electronics Laboratory	Optics			
	Opto-Electronics	Laser SEE-Test facility, Bristol		
10. Mechanical Systems Laboratory		European Space Tribology Lab, Warrington		
11. Life & Physical Science Instrumentation Laboratory		MELISSA, Micro-Ecological Life Support System Automation Lab, Barcelona		



New ESA missions are based on technologies that do not exist – yet.

Bringing future plans into the realms of the possible therefore demands a **steady stream of innovation**. This process is overseen by ESTEC experts, based on detailed R&D plans





The actual work is outsourced to European industry and academia

In general 90% of ESA's budget is spent on external contracts

ESTEC is Europe's space hub, performing coordination and oversight



Items can be bombarded with radiation, crushed, shaken, heated or exposed to space- quality vacuum

- Tests are often long – such as **spinning items for up to six months**
- ESTEC maintains only facilities that are unique for Europe and relies on a network of external labs to perform standard testing

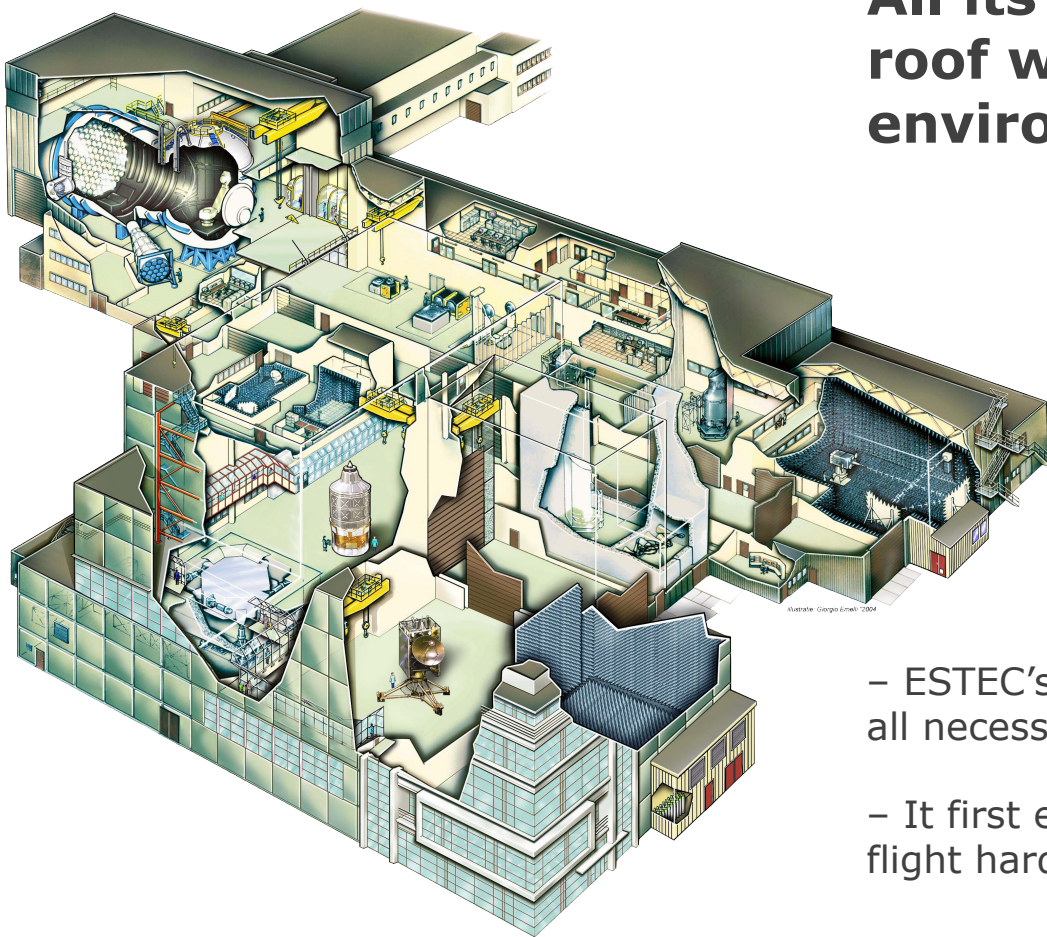


OPEN VIDEO





All its facilities under one roof within a clean-room environment



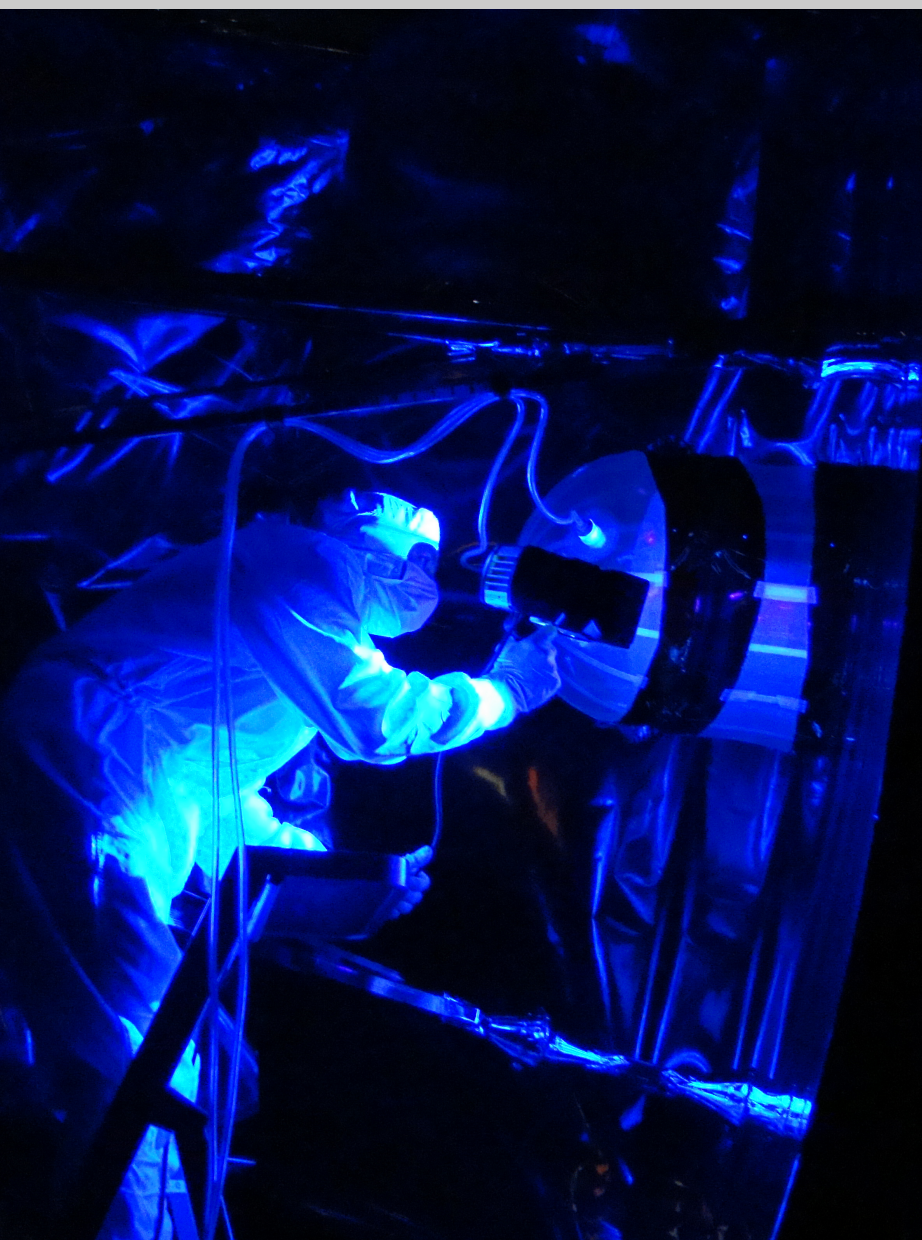
- ESTEC's Test Centre puts satellites through all necessary tests in a single location
- It first evaluates prototypes, then verifies flight hardware before launch



ESTEC facilities are at the disposal of wider European industry

- **Non-space research** is also performed here
- Including **Airbus simulating landing stresses** on aircraft airframes





ESA maintains its research facilities to serve the needs of European Space Industry

- Funding of resources to maintain and operate the infrastructure, especially very specialised ones
- Growing need to spin-in technologies for future missions, which tend to become more complex
- Improving exploitation of research infrastructure by non-space industry/ research



Thank you

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Aiming at the stars' both literally and figuratively, is a problem to occupy generations, so that no matter how much progress one makes, there is always the thrill of just beginning.

”

Rocket pioneer Robert Goddard, 1932

European Space Agency