

OPSys facility and the ALTEC support to METIS development

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ALTEC : Advanced Logistic Technology Engineering Center

ALTEC is the Italian center of excellence for the provision of engineering and logistics services to support operations and utilization of the International Space Station and the development and implementation of planetary exploration missions.

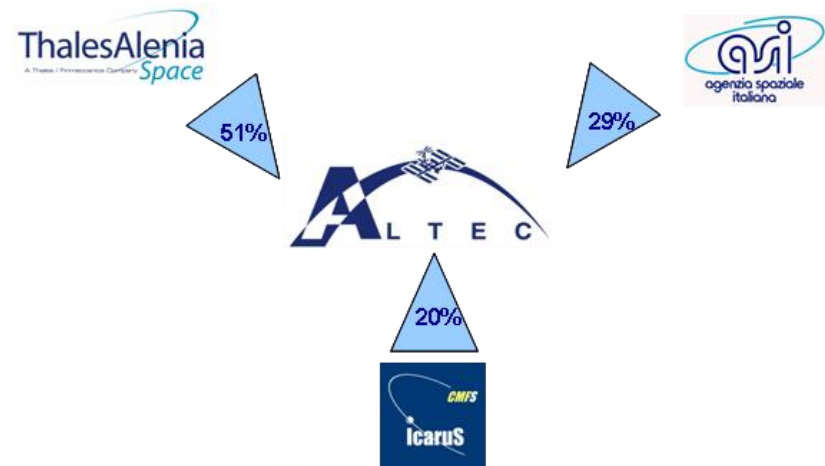
ALTEC is a public-private company owned by the major European space company, Thales Alenia Space, the Italian Space Agency and the public consortium ICARUS (formed by local authorities and Finmeccanica). ALTEC is based in Turin and has liaison offices at NASA and ESA.

ALTEC services ranging from engineering and logistics support, training of astronauts, to support experiments in biomedicine; in particular, the processing of scientific data, the development and management of the ground segment of space programs and the promotion of space culture.

ALTEC organization, structure, activities and programs are showed on ALTEC Web site:

<http://www.altecspace.it>

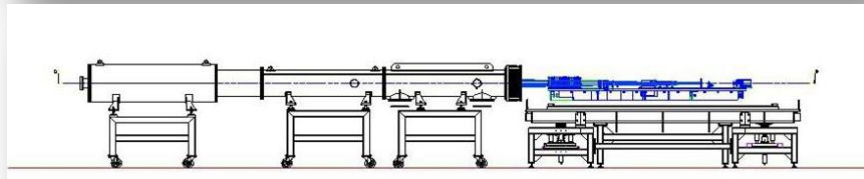
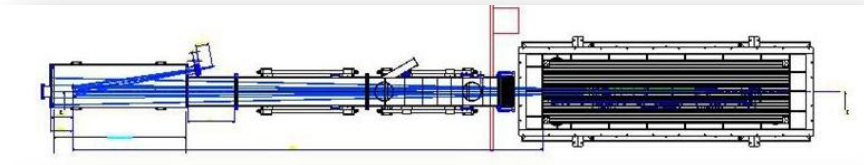
A Payload Optical System (OPSys) facility is hosted in, and is part of, the ALTEC facilities.





OPSYS facility: overview

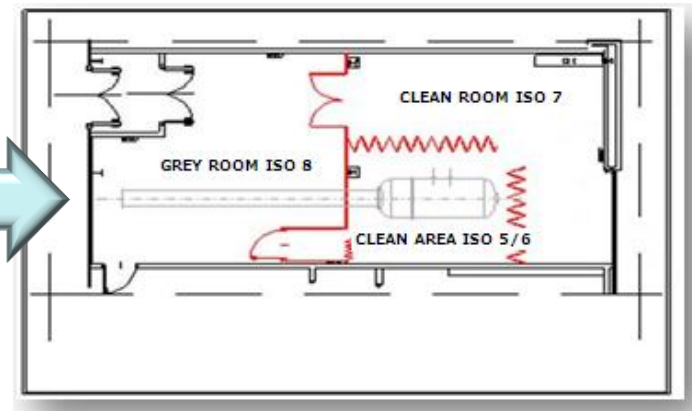
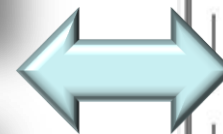
The OPSys facility provides, in line with the INAF – Osservatorio di Torino requirements, a controlled environment, adequate technical infrastructures and hosts the Space Optics Calibration Chamber (SPOCC).



SPOCC CAD Design



OPSYS /SPOCC imagery



OPSYS Layout

The OPSys laboratory is ALTEC certified to guarantee ISO required levels. ISO 5/6 is assured by usage of the laminar flux.

A photograph of a white space station module, likely the Optical Payload System (OPSys) laboratory, with the number '6' visible on its side. The module is attached to a structure with gold-colored brackets and cables.

OPSYS facility : overview

The Optical Payload System (OPSys) laboratory provides controlled environment for the ~100 m² laboratory and is composed by the following areas:

- ❖ **Grey room (ISO 8 – class 100k).** The mechanical grey room is an area environmentally controlled to an ISO 8 cleanliness level. This room of ~50 m² houses the SPOCC pipeline section, the pumping system, the remote SPOCC control area and the precision cleaning equipment.
- ❖ **Clean room (ISO 7 – Class 10k).** The ISO7 clean room is a ~ 34 m² area used for supporting the AIV activities to be carried out in the clean area ISO 5/6.
- ❖ **Clean area (ISO 5/6 – Class 100/1k).** The clean area ISO 5/6 hosts the AIV activities on the optical space instrumentation under test. This activity requires a high cleanliness level. The most relevant features of the clean area are:
 - ❑ dimensions: 5.000 m × 3.975 m;
 - ❑ cleanliness level: ISO 5/6;
 - ❑ number of HEPA filters: 6;
 - ❑ air flow speed: 0.46 m/s;
 - ❑ Total air volume flow rate: 7260 m³/h.
 - ❑ number of air changing per hour: ~ 124;
 - ❑ Anti-UV lamps.



OPSYS facility: utilization scenario

- ❖ **The Grey Room (ISO 8), Clean Room (ISO 7), Access Areas are properties of ALTEC.**
- ❖ **The Space Optics Calibration Chamber (SPOCC) located at the ALTEC premises is property of INAF.**
- ❖ **A Memorandum of Understanding (MoU) which defines the collaboration agreements for the management and operations of a “Optical Payload System – OPSys Facility” between INAF and ALTEC has been worked out in draft issue and is subject of negotiation between the parties.**
- ❖ **The OPSys can be put in the market to provide to users a facility able to perform calibration and functional testing of optical payloads.**

ALTEC Relevant Background

- ❖ **Gaia Data Processing Center Turin (DPCT):** development and operations (joint effort between the science team of the Astronomical Observatory of Torino and the ALTEC industry team): ALTEC is in charge of providing the overall HW, SW infrastructure and DB required for running the scientific S/W components, which represent part of the Italian Contribution to the ESA Gaia mission
- ❖ **Intermediate eXperimental Vehicle – IXV :** development and management of the IXV Ground Segment that will provide all required capabilities for IXV mission support. The IXV Ground Segment is composed by the following major elements:
 - IXV Mission Control Center (hosted at ALTEC premises)
 - IXV Ground Stations (including one embarked on recovery ship)
 - IXV Communication Network;
- ❖ **SMAT-F1** (research project funded by the Regione Piemonte (Italy), and promoted through the Promoter Board of Piedmont's Aerospace District): objective were to define, to design and to develop an advanced monitoring system of the territory based on innovative unmanned air systems (UAS), coordinated by a supervision and coordination station (SSC) - ALTEC roles:
 - responsibility for the definition and organization of Communication Segment & Supervision and Coordination Station (SC&SSC), the key element for the provision of required data to the users and for the transfer of user needs in operation terms.
 - involvement in the definition of SC&SSC architecture and requirements, as well as in the activities relevant to the overall system definition and to the final user interface and link.
 - responsibility for the preparation H/W and S/W of SC&SSC at Centro Multi Funzionale Spaziale (CMFS) and for the provision of the communication infrastructure, linking SSC to CSs (Control Stations).
- ❖ **SMAT-F2 – ALTEC roles:** enhancement of the SSC (e.g implementation of 2nd level of data processing).

A close-up photograph of a white spacecraft component, possibly a camera or sensor, with various mechanical parts and a small label that reads 'CUP02-05'. The number '6' is visible on the right side of the component. The background is dark, suggesting space.

Potential Involvement for METIS during Mission Operations

- ❖ Today ALTEC has established a deep collaboration with INAF /OATO for the implementation of the DPCT where the scientific pipeline developed by the OATO science team run.
- ❖ ALTEC is responsible for the design, implementation, integration (including hosting) and operations of the H/W and S/W framework infrastructure required for the pipeline and associated large database management
- ❖ A dedicated mission operation room for the GAIA DPCT Team and supporting scientist is available in ALTEC
- ❖ For Solar Orbiter, the preliminary ground segment design identifies ESOC as the Mission Operations Centre (MOC) and ESAC as the host facility for the Science Operations Centre (SOC). Several other remote centers, hosting the PI and Instruments team are envisaged and connected to the SOC.
- ❖ Considering GAIA experience, and with a similar, ALTEC can be candidated for the host, design, implementation and operations of the necessary infrastructure (HW and SW) to support the METIS P/L in data reception, archiving, processing and distribution as well as support to mission operations for the METIS science team.
- ❖ This infrastructure can be also used for the post-operations phase and mission data exploitation.