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Leonardo-Finmeccanica: technologies for Earth observation

Leonardo-Finmeccanica has been active in the Earth observation sector for over 30 years. Satellites help us monitor our planet and its health, night and day, to ensure accurate weather forecasts, monitor natural phenomena, defend the environment in which we live, and assure our security.

Leonardo deploys its technology to construct satellites and sensors, set up control centres, develop services and applications. Through the Airborne&Space Systems division and the joint ventures with Thales, Telespazio and Thales Alenia Space, Leonardo takes centre stage in all the most important international space missions, working every day to develop cutting edge solutions that help improve the lives of all of us.

COPERNICUS

Leonardo performs a primary role in the European Commission's Copernicus programme, serving as an essential partner in the development of systems as well as in the various satellite applications of the programme.

Copernicus is, to date, the most ambitious project ever carried out in the field of Earth observation and monitoring, supplying accurate, timely and easily accessible information to improve environment management, understand and mitigate the effects of climate change and to assure civilian safety, also through emergency management. Copernicus is led by the European Commission in cooperation with the European Space Agency (ESA) and the European Environment Agency (AEA) and makes use of the COSMO-SkyMed, Radarsat, GeoEye, DigitalGlobe, Spot and Sentinel satellites.

Thales Alenia Space is responsible, as prime contractor, for the design, development, integration and final testing of the constellations for the Sentinel-1 and Sentinel-3 missions. The attitude sensors and power units made by Leonardo are installed on Sentinel-1 satellites, while Sentinel-3 is equipped with the SLSTR radiometers – able to measure the temperature of the oceans and Earth from an altitude of 800 km with tenths of a degree accuracy – and with photovoltaic assemblies, which are also on board the precursor of Sentinel-5.

Telespazio is one of the main industrial partners of the Copernicus programme: the company contributes to the development of the ground segment and operations. Through its subsidiary e-GEOS (a company of Telespazio and Italian Space Agency) it makes available the data of the COSMO-SkyMed satellite constellation and provides geospatial services and applications for Earth monitoring, emergency operations and maritime security. The data acquired by the satellites of the Sentinel-1 and Sentinel-2 families are received for Italy by the e-GEOS-managed Matera Space Centre – one of the three ground stations of Copernicus' Core Ground Segment. e-GEOS supplies to the European Commission geospatial information and satellite maps of the areas struck by emergencies, making the data required for managing catastrophic events available to the civil protection services and competent authorities of the Union's countries, as well as to international humanitarian Organisations.

COSMO-SkyMed

Cosmo-SkyMed is the most ambitious terrestrial satellite observation programme ever carried out by Italy for the prevention of environmental disasters, studying the earth's surface and security, and it is the first satellite Earth observation system designed for dual purposes, i.e. civil and

military. Its four satellites are four "eyes" capable of scanning the Earth from space metre by metre, day and night, in all weather conditions. To help forecast landslides and floods, coordinate relief in the event of earthquakes or fires, and monitor from above crisis stricken areas.

Developed by the Italian Space Agency in cooperation with the Ministry of Defence and with MIUR – Ministry of Education, University and Research – COSMO-SkyMed is based on a constellation of four identical satellites, equipped with synthetic aperture radars (SAR) that operate in X band – therefore able to see through clouds and in the absence of sunlight. The system is able to collect up to 450 images a day of the Earth's surface, equal to 1,800 radar images, every 24 hours.

Leonardo plays a primary role in the COSMO-SkyMed programme, by constructing the satellites (through Thales Alenia Space) and the on-board sensors as well as in control and monitoring activities (operated from Telespazio's Centro Spaziale del Fucino), in addition to the acquisition, processing and distribution of satellite data for civilian use, which the Centro Spaziale di Matera – managed by e-GEOS – is responsible for.

METEOSAT Third Generation

Meteosat Third Generation (MTG), stems from a partnership between ESA and Eumetsat with ASI's contribution, and is the third generation European meteorological satellite system which will ensure a significant improvement in the performance of the current Meteosat constellations, both in the field of weather forecasts and in environmental monitoring applications.

Meteosat third generation satellites will be launched starting in 2017 and will be operative well beyond 2037. The constellation will be equipped with advanced technologies to collect high quality images and will carry instrumentation able to process a map of lightning strikes and to issue early warnings in the event of major showers and thunderstorms.

Thales Alenia Space is a prime contractor for the construction of the satellites and it supplies the photovoltaic panels and attitude sensors, as well as being responsible for the design, development and construction of the Lightning Imager, an instrument developed and supported by the Meteorological Service of the Italian Air Force.

The four Lightning Imagers used in the programme will simultaneously observe Europe, Africa and parts of South America from up high, day and night, to detect electrostatic discharges (lightning) that take place in the clouds or between the clouds and the ground. The availability of detailed and large-scale information, complementary to that supplied by the monitoring systems based on ground infrastructures, will be an important aid in a number of meteorological applications, as well as for studying the atmosphere in general.

A fundamental role is also played by Telespazio, which is to support EUMETSAT in launching and placing into orbit the satellites and is set to develop receiving stations, telemetry and programme control stations. Telespazio's Centro Spaziale del Fucino will be responsible for the preparation and execution of the satellites' flight operations, for the development of the LEOP control centre, for the flight dynamics software and for the preparation, validation and operative coordination of six S band ground stations.