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## **Leonardo-Finmeccanica: the role in the Galileo programme**

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The Galileo programme is one of the greatest and most ambitious European projects born from the collaboration of the European Union with the European Space Agency (ESA) to create a global navigation satellite system for a highly accurate, and reliable global positioning service for civil use. At full operation, Galileo will consist of a constellation of 30 satellites, of which the first ones were launched on 2011.

Italy has had a major role since the very beginning of the Galileo programme, through the Italian Space Agency (ASI) and through the involvement of Leonardo-Finmeccanica.

An important technological component in the satellites already in orbit, in those to be launched and those still under construction – the IRES-N2 (Infrared Earth Sensor) attitude sensors used to control the satellites' position, and the PHM (Passive Hydrogen Maser) atomic clocks – has been developed by Leonardo. Leonardo's PHM is the most accurate atomic clock ever developed for space navigation applications since its accumulated error is merely one second every three million years. Two PHMs are installed on each Galileo satellite and they are its actual core. In fact, since the satellite receiver's position is obtained from a measurement of time, better time measurement equals more accurate localisation.

Thales Alenia Space, a joint venture between Thales and Leonardo, partner of the Galileo programme from the very start of the project, provides industrial support to the European Space Agency (ESA) in system design, performance, integration and validation and for controlling the whole satellite navigation system. The company also supplies important technological components such as the signal generation units and the antennas for the first 22 satellites of the FOC stage (Full Operation Capability) of the constellation. Thales Alenia Space has also carried out assembly, integration and testing of the 4 IOV satellites (In Orbit Validation) at the Rome facility.

Telespazio (joint venture between Leonardo and Thales) also plays an important role in the programme, having built, at the Fucino Space Centre, one of the Galileo Control Centres (GCC), which manage the programme's constellation and mission.

Through Spaceopal, set up in joint venture with the German Space Agency, Telespazio is responsible for mission operations, assuring management and delivery of the navigation message. Telespazio also supports CNES and Arianespace in managing the Launch Centre in Guyana, as well as in operations for launching and placing satellites into orbit. It is also actively engaged in the validation stage of the programme's early services and in developing Galileo-based applications, which will foster the development and spread of innovative services in a number of sectors: transport, telecommunications, geodesy, oil and mineral prospecting.

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**Leonardo-Finmeccanica** is among the top ten global players in Aerospace, Defence and Security and Italy's main industrial company. As a single entity from January 2016, organised into business divisions (Helicopters; Aircraft; Aero-structures; Airborne & Space Systems; Land & Naval Defence Electronics; Defence Systems; Security & Information Systems), Leonardo-Finmeccanica operates in the most competitive international markets by leveraging its areas of technology and product leadership. Listed on the Milan Stock Exchange (LDO), at 31 December 2015 Finmeccanica recorded consolidated revenues of 13 billion Euros and has a significant industrial presence in Italy, the UK and the U.S.