ARTE: next stop International Space Station

Thermal Exchange is an experiment designed and developed by Argotec inside the Italian Space Agency project titled ARTE. This project will test the behavior of heat pipes containing fluid of low toxicity in microgravity conditions.

Turin/Rome, March 23, 2016 - Today at 04:05 Italian time, the experiment **Thermal Exchange** took flight to the International Space Station (ISS) aboard the carrier Cygnus CRS OA - 6 of the Orbital / ATK company.
This payload, a heat pipe technology demonstrator, has been designed and built by Argotec and coordinated by the Italian Space Agency (ASI), in the context of the notice "Human Space Flight for Research and Technological Demonstration on the ISS" promoted by ASI. Politecnico di Torino participated in the initial phase of electronics design with the development of a prototype aimed to validate the architecture.

Thinking about future missions, in which human exploration will always lead further away, requires the focus be on simple, reliable and low maintenance systems.
In this context, the heat pipes represent a viable solution in order to transfer heat because they are passive systems and their use doesn't require human intervention or an external control. In fact, the heat pipes are devices that take advantage of the fluid change of phase to transfer heat from a hot zone to a cold one without the use of pumps or devices that require electrical energy.

In Space, the surfaces of the modules are subjected to different temperatures because they are exposed in part directly to the Sun and partly to deep Space. Furthermore, in microgravity conditions, the air inside the inhabited modules doesn't naturally move, but it must be kept in motion by fans in order to cool down all devices that produce heat aboard. Therefore, thermal control is one of the basic systems for the success of a mission to maintain the temperatures of all on-board systems within their operating range.
At the moment, there are no heat pipes inside the astronauts inhabited modules because the fluids used inside them are toxic and their release would be catastrophic.
Therefore, the project **ARTE (Advanced Research for passive Thermal Exchange)** represents a turning point, the research was focused on fluids which guarantee the required performance and that at the same time were characterized by low toxicity. The scientific activity in microgravity and the results will give a valuable contribution to the possible terrestrial applications of these innovative devices.

"This experiment represents another positive effect of the Memorandum of Understanding signed between NASA and ASI in 1997 and for the supply of the three logistic modules MPLM" says **Marino Crisconio, from ASI Microgravità e Volo Umano unit.** "Thanks to the rights of utilization of Experimental Resources on board the ISS obtained in exchange of that supply (upmass, volume, time of the crew, down mass), ASI is able to make available these resources to the scientific community and national industrial through notices for proposals."

"The future of explorations and the success of space missions will be increasingly linked to systems able to reduce the control and human intervention for their maintenance – says **David Avino, Managing Director of Argotec.** - With the ARTE project, in a few days we're going to test some heat pipes on the International Space Station, which perfectly reflects these features and which constitute the first step in the certification of a class of thermal systems that are not currently in

production in Italy. For several years, Argotec has been studying and developing devices that could be used not only in Space but also in terrestrial applications."

The experiment was scheduled for April 4 when **Thermal Exchange** will be installed in the Microgravity Science Glovebox (MSG) in the US module, Destiny.

Argotec engineers will provide real-time support for the operations from the companies Mission Control Centre in Turin. The control center is connected with the NASA control center

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