WIND RIVER

A Round Trip to Space with Wind River and CIRA

Wind River technology is at the "core" of the first unmanned space vehicle built by Centro Italiano di Ricerche Aerospaziali (CIRA)

Taking Research to New Heights

The FTB-1 is the first unmanned space vehicle built by Centro Italiano di Ricerche Aerospaziali (CIRA) as part of its strategic Unmanned Space Vehicles (USV) program. Offering a series of reusable, unmanned spacecraft acting as "flying laboratories," CIRA's spacecraft will be used by the international community for a range of scientific projects. Wind River technology plays a fundamental role in this innovative undertaking, performing mission-critical, complex functions such as flight management, flight path control, and communications management.

USV: The Future of Flight

"Unmanned Space Vehicles is the only fully funded European program dedicated to reusable launchers that will enable Italy to play a leading role in Europe's future development program," says Gennaro Russo, Head of Space Programs and USV Program Manager at CIRA. "In fact, in the future, launching a spacecraft will become a common daily operation. It will be necessary to adopt reusable craft based on technologies such as those of USV." Launched in 2000, the USV program has achieved a major goal: the creation of the first airborne research laboratory, already declared ready for its first flight.

The program includes design and implementation of three separate but closely linked projects that will take place in phases through 2012. The overall cost of the program is estimated at €179 million. "With this project," explains Russo, "we are seeking to create a craft with a closer resemblance to a normal airplane than the shuttle, therefore enabling much broader maneuvering compared with the American spacecraft, to reduce the risks linked with the reentry phase and provide increased flexibility to the craft."

"The combination of [VxWorks' flexibility, scalability, robustness, performance, and compatibility] has proven to be decisive in the creation of a control solution capable of responding to the application's critical requirements."

— *Gennaro Russo, Head of Space Programs and USV Program Manager, CIRA*

Company Profile: CIRA

- Leading research center for experimentation, production, information exchange, and personnel training in the aeronautics and space industries
- Unmanned Space Vehicle (USV) program targets development of a multipurpose flying lab that can execute atmospheric reentry from low earth orbit
- Headquarters and operational facilities in Capua, Italy

Industries

- Aerospace & Defense

Solution

- Wind River's VxWorks

Results

- Flight-ready FTB-1 USV containing the first airborne research lab

Wind River Solutions: Proven, Flexible, Robust

The "core" of USV-1 flight computers is the VxWorks operating system, a truly hard real-time OS capable of ensuring execution of critical functions within a defined time frame. VxWorks stands out for its flexibility, scalability, robustness, performance, and compatibility. "The combination of these factors has proven to be decisive in the creation of a control solution capable of responding to the application's critical requirements," says Russo.

In particular, CIRA designers valued the reliability of VxWorks, which has an impressive case history in the aerospace sector, including the Mars Exploration program conducted by NASA and the PROBA satellite for the European Space Agency. Reliability is a fundamental requirement for mission-critical projects like USV-1. VxWorks' portability was also a key factor, offering CIRA the freedom to choose the architectures best suited to this application.

In addition to VxWorks, CIRA also adopted the Wind River Tornado 2 development environment, a comprehensive solution that includes compilers, a debugger, and a variety of tools and target/host communication utilities to simplify and accelerate the creation of VxWorks applications, regardless of the developer's level of expertise.

Another factor in CIRA's choice of Wind River solutions was the seamless integration of VxWorks with Simulink, a platform for multi-domain simulation and design of model-based dynamic systems developed by technical computing software company The MathWorks. Leveraging this integration enables developers to generate VxWorks code automatically, starting from graphically processed flight algorithms. "Moving from the simulation phase to the actual spacecraft checking proved to be a rapid, smooth, and seamless procedure," Russo explains.

Successful Results

Using Wind River's industry-leading VxWorks platform, CIRA engineers created a control solution capable of responding to the program's critical requirements. CIRA dramatically reduced development time and saw substantial savings in testing and qualification costs.

Learn More

For additional information about the products mentioned in this case study, visit:

www.cira.it/usv
www.windriver.com

WIND RIVER

Wind River is the global leader in Device Software Optimization (DSO). We enable companies to develop, run, and manage device software faster, better, at lower cost, and more reliably. www.windriver.com

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