SIEMENS

Aerospace and defense

Intespace

Intespace successfully tests and validates multimillion-dollar satellites and payloads with advanced LMS testing solutions

Product

LMS

Business challenges

Safely and securely test and validate satellites, components and scientific equipment for extreme conditions during launch

Maintain a highly efficient and secure process to manage busy test campaign workload

Continuously improve best practices and equipment to deliver accurate data as fast as possible

Keys to success

Replace existing testing solution that had become obsolete

Integrate testing solution with in-house platform to increase testing campaign efficiency

Significantly increase efficiency and lower risk factors for each and every test campaign

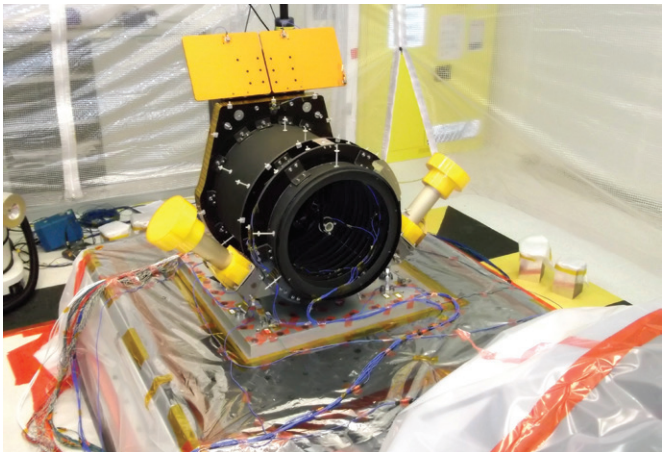
Priceless payloads are ready for the launchpad thanks to dedicated LMS environmental dynamic testing solutions

Aiming for the stars

Launched from the European Space Port in French Guiana in December 2013, the Gaia spacecraft is taking precise positional measurements of approximately one billion stars and radial velocity measurements of the brightest 150 million objects. Set to operate until 2018 and possibly 2019, Gaia will be sending back information about the composition, formation and evolution of the galaxy we live in, the Milky Way. Scientists hope that the mission's data will shed some light on some of the basic questions about space. Gaia's spectrophotometric observations from each of the billion stars will help determine the origin, structure and development of galaxies, solar systems, planet systems, quasars and even asteroids.

Built by Astrium (now known as Airbus Defence and Space) for the European Space Agency (ESA), Gaia is a complex two-ton machine packed with sophisticated instrumentation including a billion-pixel spectrophotometric array aligned to two telescopes, an atomic clock and a 10-meter sunshade. The spacecraft is orbiting 1.5 million kilometers from Earth and sending back data that could possibly answer the mysteries of the universe.

How do Gaia and other priceless space payloads make it from the launch pad to the depths of space with everything intact and in perfect working order? For people like Paul-Eric Dupuis and his team at Intespace in Toulouse, France, the answer is simple: use the latest simulation and testing solutions in one of the most advanced test facilities with some of the world's most experienced people, hand-in-hand with customers.



Cheops instrument, Almatech.

Results

Updated and installed a dedicated environmental testing solution totaling 512 channels of LMS SCADAS hardware equipment and LMS Test.Lab software

Significantly increased efficiency and lowered risk factors for test campaigns

Fewer issues, a smoother workflow and much faster and highly accurate data delivery

The Intespace secret: 30 years of experience

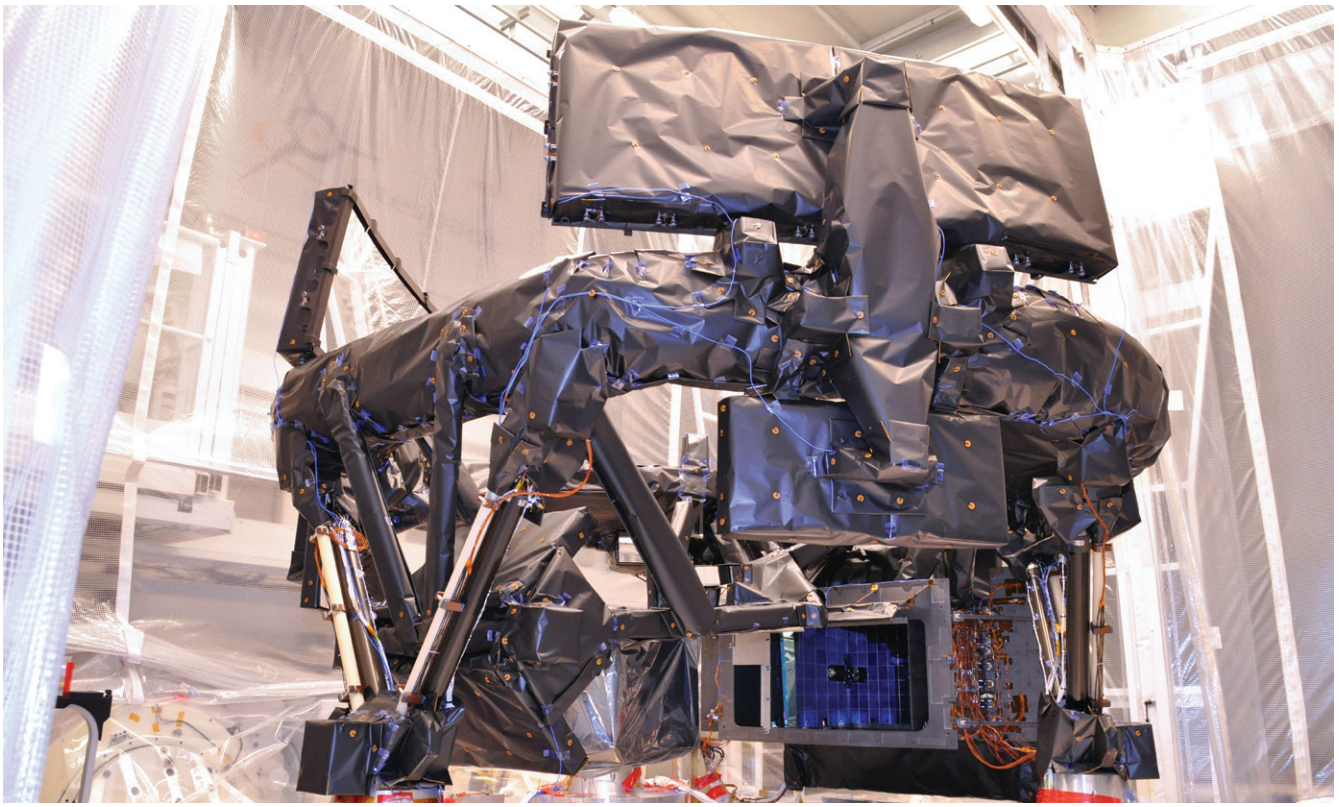
Intespace is a leading specialist in environmental aerospace testing with more than 30 years of experience. Part of the international space testing scene since 1983, the company's 20,000-square-meter test facility is located in the Airbus Defence and Space production site. Intespace's shareholders are Airbus Defence and Space and Thales Alenia Space, and the site connects directly to the satellite integration room.

Dedicated mostly to projects for Airbus Defence and Space, Intespace has invested more than €11.5 million in the site since 2000. The facility attracts attention from outside the French aerospace community, including from the United States, whose DIRECTV 15 satellite was tested at Intespace and launched in 2015 from French Guiana.

A test campaign every week

Since more and more satellite integrators and component manufacturers are counting on Intespace's expertise to test and validate their multimillion-dollar payloads, the company is very busy at times. Intespace relies on LMS™ solutions from product lifecycle management (PLM) specialist Siemens PLM Software, including LMS SCADAS™ hardware and LMS Test.Lab™ software.

"My team has many shakers with two acquisition systems to run tests campaigns," says Carine Pont, mechanical test manager at Intespace. "The smaller one, featuring a 128-channel LMS SCADAS hardware control system, is used about 10 to 12 times a year. The 96-channel LMS SCADAS control system on the big multi-vibration system shaker gets used every week. Our campaigns aren't always on big satellites.



Testing subsystems, like telecom satellite reflectors, is a main part of our job as well. Just recently, we were quite excited because we completed the first test campaigns on the telescope for the CHEOPS mission."

The team at Intespace has the right to be excited. CHEOPS (CHaracterising ExOPlanet Satellite) is a special project organized by ESA and the Swiss Space Office. Scheduled to launch in December 2017, CHEOPS is a spacecraft that will carry a single payload: a Ritchey-Chrétien telescope developed by Almatech. It will orbit around the Earth at a height of about 800 kilometers to study the formation of extra-solar planets similar to ours.

Europe, North America and beyond

The CHEOPS telescope, Gaia and the American DIRECTV 15 satellite are just a few of the many projects the center handles annually. Intespace manages all the volume with its highly advanced and efficient process based on years of experience.

"Intespace always had a very efficient way of testing based on our own software, DynaWorks," explains Paul-Eric Dupuis, Intespace's chief technical officer (CTO) and research and development (R&D) director. "This software is really a collection of all the experience that we have accumulated these past 30 years in the space industry. Today, we have a clear process that we intend to put to work."

For the testing side of the solution, the team had been using a custom-built, one-of-a-kind system since 2000. This system was integrated into the DynaWorks® process and for quite some time worked very efficiently. "After a few years, we discovered there were some issues with maintenance," explains Depuis.

"With our old acquisition system, we had to wait quite a while before we got all the information from the time-history data and now we practically get it immediately after the run. Instead of minutes, it takes seconds. We can easily see a factor of 10 in terms of time-saving improvements with our new LMS system."

Carine Pont
Mechanical Test Manager
Intespace

"Previously, we took about 30 minutes to get the data back and something like 20 minutes to program the amplifiers. It is much, much faster today. With these speeds, the test center can perform a full campaign within a five-day work week. And by a full campaign, we mean three-axis sine tests and acoustic tests. I don't think any other test center can do this."

Paul-Eric Dupuis
CTO and R&D Director
Intespace

"With our new LMS testing solution, our job is getting easier. We will have less issues and a smoother process and the data gets into the hands of the analysis team much faster than before. They are reassured that the data is correct and they get it faster – as much as 10 times faster."

Carine Pont
Mechanical Test Manager
Intespace

"After 15 years, we found ourselves without spare parts. The supplier wasn't willing to reinvest anymore."

A quest for new testing equipment

Intespace decided to keep the aspects that worked and find a different solution for the testing equipment. The old data acquisition system was completely programmable. The entire preparation and all of the various sensor setups could be automated and traced back into the DynaWorks platform. An entire batch of valuable setup information, including types of sensors and channel cable connections, was sent to the data acquisition station on the floor to program the amplifiers and channel connections. After the test run, all the collected data was sent back to DynaWorks for post-processing and archiving.

Efficiency and security was something Intespace wanted to enhance with its new hardware choice, but this time with a supplier willing to provide support and essential spare parts. For the next system, the call for bids was quite strict regarding these specifications.

Industry-standard excellence

Intespace contacted more than eight suppliers. In the end, they selected the LMS environmental dynamic testing solution featuring dedicated LMS SCADAS™ hardware and LMS Test.Lab™ software.

"The LMS solution opens the right doors for us to send the information as effectively and test as efficiently as possible today," claims Dupuis. "Combined with DynaWorks, it is the fastest and most efficient solution on the market. Previously, we took about 30 minutes to get the data back and something like 20 minutes to program the amplifiers. It is much, much faster today. With these speeds, the test center can perform a full campaign within a five-day work week. And by a full campaign, we mean three-axis sine tests and acoustic tests. I don't think any other test center can do this."

Besides high-quality tools and an efficient process, Dupuis is quick to credit the in-house knowledge and the Intespace testing teams' experience. "We have excellent test engineers and technicians who work hand-in-hand with our customers," explains Dupuis. "Everything is under one roof. We have all the facilities and the integration laboratory and we know our job. We have more than thirty years of experience in this area. We always try to keep all our processes up-to-date to have the best solutions to offer to our customers."

High-quality, dependable tools

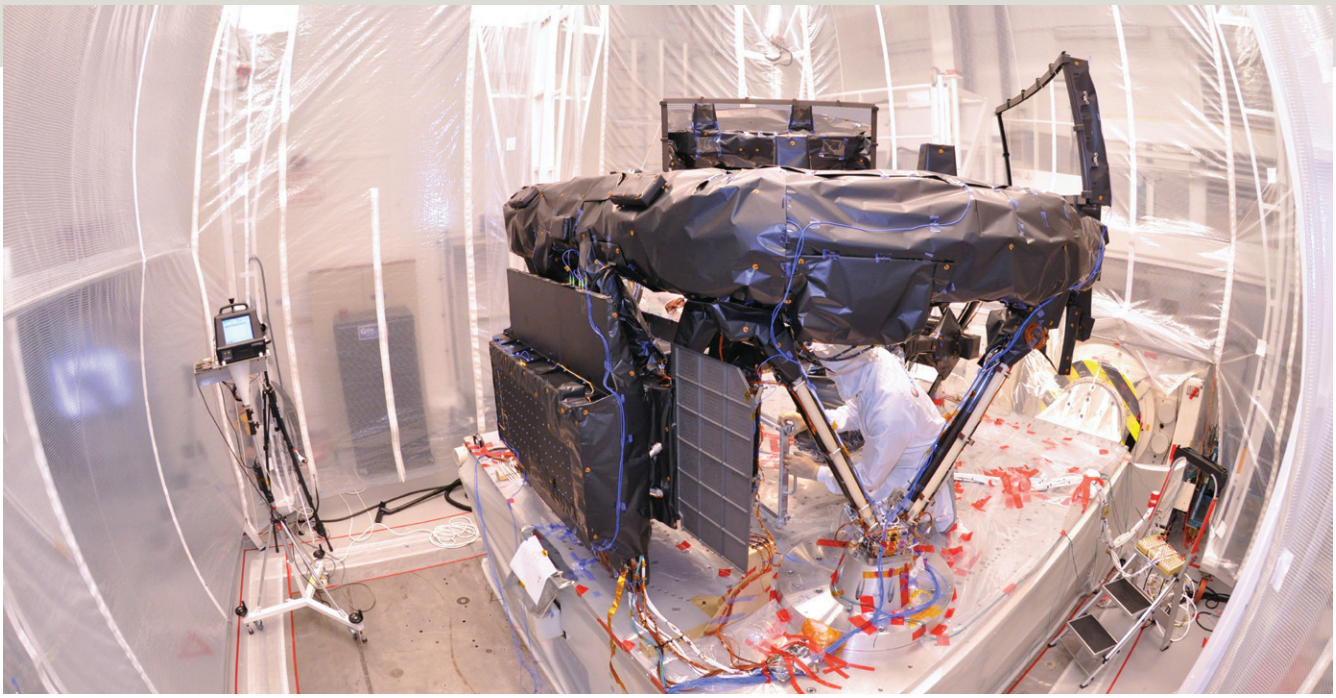
This is music to the ears of Pont and her team of 12 engineers and technicians who recently used their new LMS environmental testing solution on the CHEOPS telescope. "This was the first test campaign with our new LMS system," states Pont, "We really noticed a difference. It was very efficient for data acquisition and programming."

On the hardware side, one big difference is that the acquisition boards are universal so it is easy to attach whatever type of sensor required, and it is extremely easy to program the acquisition channels.

"Thanks to the monitor output function on the control system's VCF4 data acquisition cards that we specifically requested from LMS solutions, we can record a redundant copy of the control channels on the acquisition system. Since this is supported in the setup definition software, chances of making setup mistakes are kept to a minimum," adds Pont.

The LMS SCADAS hardware is also a compact, singular unit. Compared to other systems, there are less connection points as well as universal cabling. This improves the quality overall.

"With our LMS testing system, we have a much bigger dynamic range," Pont says. "We can perform 0.1 or 0.2g sweeps. We couldn't perform tests with so low a range



Copyright Astrium SAS.

with our previous system. We were very satisfied with these results as well."

"With our old acquisition system, we had to wait quite a while before we got all the information from the time-history data, and now we practically get it immediately after the run," Pont explains. "Instead of minutes, it takes seconds. We can easily see a factor of 10 in terms of time-saving improvements with our new LMS system."

Also during the test, the team noticed other improvements, such as the online, real-time spectral data from LMS Test.Lab that contributes to overall time savings during the test runs. "With our new LMS testing solution, our job is getting easier," says Pont. "We will have fewer issues and a smoother process, and the data gets into the hands of the analysis team much faster than before. They are reassured that the data is correct and they get it faster - as much as 10 times faster."

512 channels

The LMS environmental testing solution at Intespace totals 512 channels of LMS SCADAS hardware equipment. Updated and installed in June 2015, it is one of the largest data acquisition systems dedicated to vibration qualification testing, including data reduction and vibration control.

Besides the 512 channels, Intespace thought it would be helpful to have some additional capabilities in the LMS data acquisition cards, including the ability to copy the analogue signal input at an output or electrical grounding selection for each channel. The team in Breda, The Netherlands, especially developed the new voltage/charge/floating/4-channel (VCF4) card with this request in mind.

"The excellent quality of the LMS products is really appreciated by our technicians who use it every day," adds Dupuis. "Siemens PLM Software took into account our specifications and developed this special card, having its best experts from The Netherlands come and make sure that the product really matched the requirements. We understand that it is actually a standard available product now delivered with the same high level of hardware and software support as the other LMS SCADAS products. That is a true business partner."

"The excellent quality of the LMS products is really appreciated by our technicians who use it every day. You took into account our specifications and developed this special card, having your best experts from The Netherlands come and make sure that the product really matched the requirements. We understand that it is actually a standard available product now delivered with the same high level of hardware and software support as the other LMS SCADAS products. That is a true business partner."

Paul-Eric Dupuis
CTO and R&D Director
Intespace

Solutions/Services

LMS Test.Lab Environmental
www.siemens.com/plm/lms-test-lab

LMS Test.Lab
www.siemens.com/plm/lms-test-lab

LMS SCADAS
www.siemens.com/plm/lms-scadas

Customer's primary business

Intespace is a service and engineering company in Toulouse, France, providing a complete set of environment simulation test facilities in the domains of space, aeronautics and defense. Intespace offers mechanical, acoustic, thermal and radio-electric testing for validation of systems and equipment prior to operational implementation. For the past 10 years, Intespace has invested in the development of its industrial base in order to adapt to new generations of systems.
www.intespace.fr

Customer location

Toulouse
France

Taking the partnership a step further

Intespace's core business is the test center itself, but to support its testing activities the organization has a software division and an engineering division. Besides the test center in Toulouse and the software development for the DynaWorks platform, Intespace is also known for its engineering division, which has more than 25 years of experience consulting in the environmental testing business for the international aerospace community.

"We started our consulting work in Brazil 25 years ago," says Dupuis. "We have done so much consulting work at test centers around the world over the last two years that we have gained a tremendous amount of experience. We try to pass this on to our customers continuously. For example, our engineering team is involved in several projects worldwide in Argentina, Kazakhstan, Malaysia, Turkey and last year in Korea."

"At Intespace we never impose, we propose to have our customers use different data acquisition systems along with our DynaWorks software solution for managing the test campaign itself," says Dupuis. "The most useful combination is the LMS testing data acquisition solution and DynaWorks. Most of the time, customers request – actually impose upon us – to take the LMS solutions as well. That is perfect for us since we know that LMS testing solutions bring significantly increased efficiency and a much lower risk factor to each and every test campaign."

> "The LMS solution opens the right doors for us to send the information as effectively and test as efficiently as possible today. Combined with DynaWorks, it is the fastest and most efficient solution on the market."
>
> Paul-Eric Dupuis
> CTO and R&D Director
> Intespace

Siemens PLM Software

Americas +1 248 952 5664
Europe +32 16 384 200
Asia-Pacific +852 2230 3308

www.siemens.com/plm

54848-Z11 3/16 H