THALES ALENIA SPACE

COMPANY PROFILE

ThalesAlenia Space
a Thales / Leonardo company

SPACE FOR LIFE

We believe in Space as humankind's new horizon to build a better, sustainable Life on Earth.

In Space, governments, institutions and companies rely on us to design, operate and deliver satellite-based systems that help them position and connect anyone or anything, everywhere, to observe our planet and to optimize the use of the resources offered by the Earth and the solar system.

A Joint Venture between Thales (67%) and Leonardo (33%), Thales Alenia Space is a global space manufacturer delivering, for more than 40 years, high-tech solutions for telecommunications, navigation, Earth Observation, environmental management, exploration, science and orbital infrastructures.

Thanks to our diversity of skills, talents and cultures, our customers (governments, institutions, space agencies, telecommunications operators), therefore have Space to Connect, Secure & Defend, Observe & Protect, Explore, Travel & Navigate.

We also team up with Telespazio to form the parent companies' Space Alliance, which offers a complete range of solutions including services. We are willing to have a win-win approach shared both with our partners and customers.

And yet, we had the privilege to manage world-class space missions all over the world and won several awards, among them the Randstad Golden Awards recognizing Thales Alenia Space as one of the most attractive companies in Italy.

THALES ALENIA SPACE POSTED CONSOLIDATED REVENUES OF

2.5 BILLION EUROS IN 2018

AROUND

8,000 EMPLOYEES

IN NINE COUNTRIES

LOCATIONS

17 SITES WORLDWIDE

SCIENCE & EXPLORATION

ASI: ITALIAN SPACE AGENCY

CNES: FRENCH SPACE AGENCY

ESA: EUROPEAN SPACE AGENCY

ESTEC: EUROPEAN SPACE RESEARCH & TECHNOLOGY CENTRE

NASA

RUSSIAN FEDERAL SPACE AGENCY

UK SPACE AGENCY

OBSERVATION, METEOROLOGY & ENVIRONMENTAL MONITORING

CNES

ESTEC: EUROPEAN SPACE RESEARCH AND TECHNOLOGY CENTRE

EUMETSAT: EUROPEAN ORGANISATION FOR THE EXPLOITATION OF METEOROLOGICAL SATELLITES

EUROPEAN SPACE AGENCY / EUROPEAN UNION

FRENCH GOVERNMENT

ITALIAN GOVERNMENT

MOROCCAN GOVERNMENT

NPO LAVOCHKIN

TELECOM OPERATORS

ARABSAT

AVANTI COMMUNICATIONS

EUTELSAT

HISPASAT

INDOSAT INDONESIA

INMARSAT

ISS-RESHETNEV

KOREA TELECOM

MINISTRY OF INFORMATION BANGLADESH

MINISTRY OF TRANSPORTATION & TELECOMMUNICATIONS OF TURKMENISTAN

PT TELKOM INDONESIA

RSCC: RUSSIAN SATELLITE COMMUNICATION CORPORATION

SES GLOBAL

TELEBRAS BRAZIL

YAHSAT UNITED ARAB EMIRATES

SATELLITE CONSTELLATION OPERATORS

CLS

GLOBALSTAR

IRIDIUM

LEOSAT

SES

TELESAT CANADA

MILITARY SATELLITE COMMUNICATIONS

BRAZIL

FRANCE

GERMANY

ITALY

SOUTH KOREA

NAVIGATION

EUROPEAN GLOBAL NAVIGATION SATELLITE SYSTEMS AGENCY

EUROPEAN SPACE AGENCY / EUROPEAN UNION

KOREA AEROSPACE RESEARCH INSTITUTE

SATELLITE INTEGRATORS

AIRBUS DEFENSE & SPACE

BALL AEROSPACE & TECHNOLOGIES

MAXAR

MITSUBISHI

SPACE TO CONNECT

BRIDGING THE DIGITAL DIVIDE AND CONNECTING PEOPLE ANYWHERE, ANYTIME.

Today, citizens want to be connected anywhere and anytime; people want to have access to more and more content at any given moment; and we want to eliminate all shadow zones and bridge the digital divide to ensure connectivity anywhere in the world. Satellite communications systems, especially the digital variety, are undoubtedly the best solution to meet the requirements of a fast changing and fiercely competitive market.

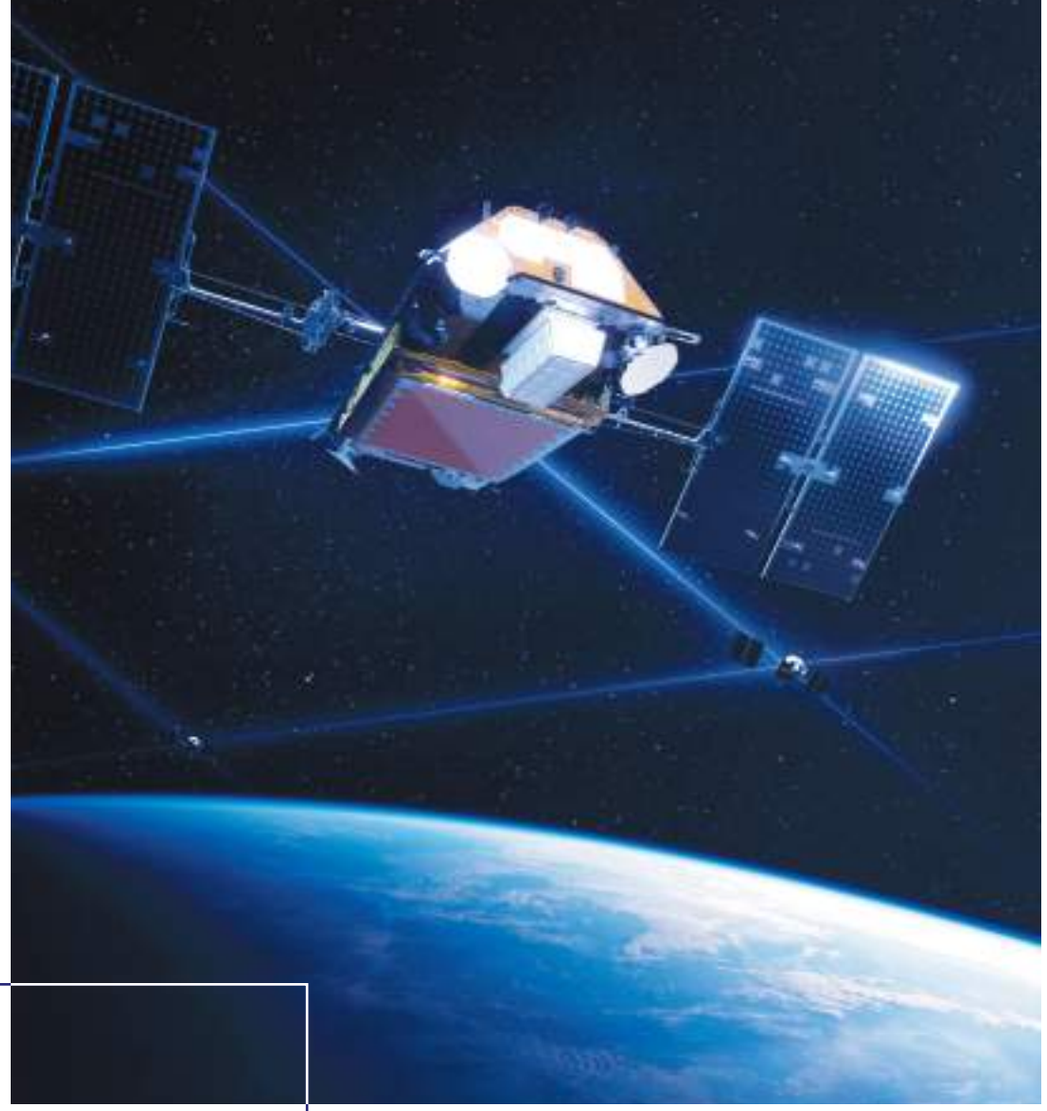
At the forefront of very high throughput satellite solutions

Satellite systems, especially the latest digital models, are clearly the best way to address the requirements of the fast-changing and highly competitive telecom market. New market segments are also emerging, especially aeronautical and maritime communications, driving a boom in connectivity requirements. The very high throughput satellite (VHTS) solutions spearheaded by Thales Alenia Space are digital, to offer tremendous flexibility. This type of system was first developed for military telecom applications and more recently transitioned to the commercial market. Digital VHTS systems combine high capacity, agility and competitiveness, allowing operators to adapt distribution across their coverage zone at any given moment. In other words, this type of payload addresses the changing needs of operators throughout a typical telecommunications satellite mission's lifetime. To mention a few, we will provide Eutelsat's KONNECT VHTS, featuring a powerful digital processor to enable the quick deployment of high-speed Internet access in areas that are isolated or have low population density. We are also manufacturing telecommunications satellites, such as SES-17 or Inmarsat GX5, offering connectivity services for aviation passengers.

VHTS payload + Spacebus Neo platform: a very dynamic duo

Spacebus Neo is the new family of satellite platforms from Thales Alenia Space for geostationary communications satellites. All Spacebus Neo platforms now feature all-electric propulsion and combine higher performance, greater robustness, modular design and higher power.

Electric propulsion means a drastic reduction in satellite launch weight. The lower the weight of the platform, of course, the more payload it can carry. Lightweight, robust, modular and powerful, our Spacebus Neo platforms perfectly meet our customers' expectations for competitiveness, flexibility and multi-launcher compatibility. The VHTS payload matched to the all-electric Spacebus Neo platform makes for a very dynamic duo.



125

SATELLITES BUILT AS PRIME CONTRACTOR FOR 3 CONSTELLATIONS

Thales Alenia Space, the global benchmark in communications constellations

With 125 satellites built as prime contractor for three different constellations (Globalstar 2, O3b and Iridium® NEXT), Thales Alenia Space is clearly the world's preferred partner in low and medium Earth orbit (LEO and MEO) communications satellite systems. The Iridium® NEXT constellation is recognized as the highest performance telecommunications system in the world. We're ready and willing to meet new challenges and build the communications constellations that will define the future.

SPACE TO SECURE AND DEFEND

FRANCE, ITALY, GERMANY, TURKEY, BRAZIL AND MORE TRUST US TO PROVIDE THEM WITH ELEMENTS FROM OUR BRAND OFFER OF DEFENSE TELECOMMUNICATIONS, VERY HIGH RESOLUTION OPTICAL OR RADAR INSTRUMENTS, GROUND CONTROL SYSTEMS AND TESTING & INTEGRATION CENTERS.

Secured communications for armed forces

Thales Alenia Space has supplied military telecommunications systems as prime contractor for more than 30 years now. We are the exclusive domestic supplier in France, with four generations of Syracuse satellites, as well as providing two Sicral first-generation satellites plus the second-generation Sicral 2 for the Italian defense ministry, Athena-Fidus for military and dual (civil-military) telecommunications for France and Italy, and two Satcom BW satellites for Germany. Through Athena-Fidus and Sicral 2, Thales Alenia Space is at the heart of European defense collaboration. Thales Alenia Space has also exported products reflecting its dual telecom system expertise to Turkey, Brazil and South Korea.

Surveillance & Observation for field intelligence

A complete range of optical and radar observation systems

Intelligence, maritime surveillance, mapping, crisis management... Space-based systems give users, especially governments, access to a wide range of applications to guarantee their security and sovereignty. A number of countries have indicated a keen interest in acquiring space systems capable of independently supplying them with intelligence images. Thales Alenia Space, offering both optical and radar very-high-resolution instruments, draws on over 30 years of experience to propose a **complete range of observation systems** designed to meet market expectations. For instance, Thales Alenia Space is prime contractor for Italy's COSMO-SkyMed radar-based Earth Observation system. We also built Turkey's Earth Observation satellite, including its high-resolution instrument. Thales Alenia Space has been the exclusive supplier of all very-high-resolution optical instruments for French intelligence satellites, including Pleiades, Helios and CSO. In 2018, we were chosen by South Korea to supply four Earth observation satellites with synthetic aperture radars (SAR). Today, drawing on our unrivaled expertise in optical and radar technologies, we are developing brand-new Earth Observation products, including high revisit solutions.

Moreover, Thales Alenia Space and the American startup Spaceflight Industries have created LeoStella LCC, an equally-owned joint venture fully reflecting the needs of the New Space environment. Their aim is to deploy the first constellation featuring short revisit times, comprising 60 high-resolution optical satellites.

A 30-YEAR

EXPERTISE IN RADAR AND OPTICAL SOLUTIONS

SPACE TO OBSERVE & PROTECT

BY PROVIDING EXPERTS WITH INFORMATION ABOUT THE WEATHER, THE CLIMATE AND THE STATE OF OUR PLANET, THEY CAN GET READY FOR STORMS, UNDERSTAND THE IMPACT OF CLIMATE CHANGE, DEVISE PLANS TO OPTIMIZE THE USE OF NATURAL RESOURCES AN PROTECT AT-RISK POPULATIONS – ALL WHILE ENABLING SUSTAINABLE DEVELOPMENT.

Environmental monitoring & weather satellites

At Thales Alenia Space, we help further the understanding of our planet by contributing advanced satellite technology, especially for Earth Observation. For instance, the company is working hand in hand with the European Space Agency (ESA) on the European Commission's Copernicus program.

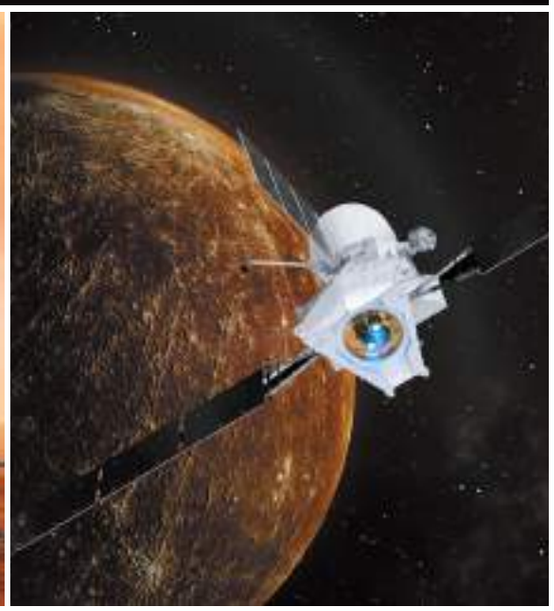
Thales Alenia Space is major partner in this ambitious environmental monitoring and management program, as prime contractor for the Sentinel -1 and -3 families (4 satellites per family), in charge of the Sentinel-2 image ground segment, and manufacturer of the Poseidon-4 radar altimeter for the Jason-CS/Sentinel-6 mission. Moreover, we have already supplied a wide range of Earth Observation satellites and instruments used for oceanography, altimetry, meteorology, mapping, crisis management, climatology and much more. All Meteosat geostationary satellites were built by Thales Alenia Space as prime contractor. We have already produced seven first-generation Meteosat satellites and four Meteosat Second Generation (MSG) satellites, and we are now working on the third generation (MTG). The latest generation will comprise four imaging and two sounding satellites.

17

NUMBER
OF METEOSAT SATELLITES
TO BE BUILT BY
THALES ALENIA SPACE
AS PRIME CONTRACTOR

Exploring Space from Space

The Space Alliance (between Thales Alenia Space and Telespazio) recently acquired a stake in NorthStar Earth & Space Inc, an information services company from Montreal that is developing the world's most sophisticated system for the surveillance of our environment and near space. Through this investment, the Space Alliance will provide NorthStar with design, development and production solutions for an innovative constellation of 40 satellites.



SPACE TO EXPLORE

VENUS, MARS, MERCURY, SATURN, THE MOON, ASTEROIDS AND COMETS... THALES ALENIA SPACE IS A MAJOR PARTNER IN EUROPE'S FANTASTIC MISSIONS ACCROSS THE SOLAR SYSTEM.

Exploring the Solar System & understanding the universe

Thales Alenia Space is the overall prime contractor for the ExoMars mission, and a major contributor to the BepiColombo mission to explore Mercury, the most mysterious planet in the Solar System. The company led the Herschel & Planck science mission, deploying the largest space observatories ever developed in Europe. We also developed Corot, France's own low-orbit "exoplanet" hunter (planets outside the Solar System), and we will be heavily involved in a new program called PLATO, also tasked with tracking exoplanets, but from the Lagrange 2 point.

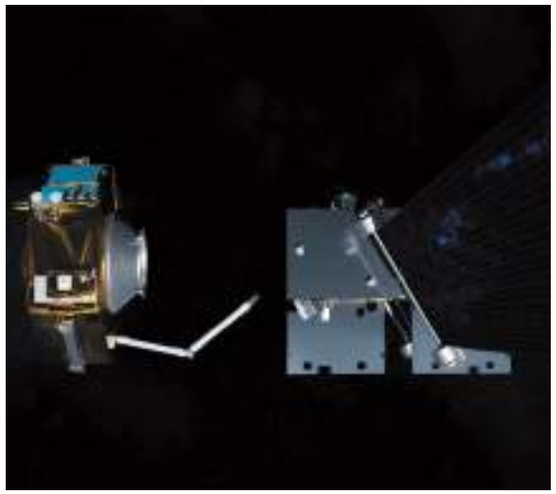
Thales Alenia Space built 25 of the 64 huge parabolic antennas (Europe's contribution) for the giant ALMA radiotelescope array located on the Atacama plateau in Chile. In addition, we played a lead role on the famous Rosetta-Philae comet mission [especially via assembly, integration and testing of the spacecraft], as well as on Cassini-Huygens. The Huygens space probe was built by Thales Alenia Space as prime contractor.
Also on the agenda at Thales Alenia Space is the European program Euclid, which will help us better understand dark matter.

In the meantime, Europe is holding its breath in the run-up to the ExoMars 2020 mission. ESA's rover on this mission should touch down on Mars in 2021. Fitted with a special drill built by Leonardo, the rover will take soil samples at a depth of two meters, in an attempt to discover evidence of past life (bacteria), while the Trace Gas Orbiter (TGO), launched in 2016, continues its mission in orbit around Mars, "sniffing" the Martian atmosphere to discover traces of methane gas in particular.

Living & working off Earth

The ISS holds a special place in the hearts of Thales Alenia Space engineers based in Turin, Italy. Thales Alenia Space has in fact supplied fully half of the pressurized volume on the ISS, including Nodes 2 and 3, the Multipurpose Module, Multipurpose Logistics Modules (MPLM), Cupola and the Columbus lab structure, along with ATV resupply vessels and the structure for the Bishop commercial airlock from NanoRacks. In addition, Thales Alenia Space supplied pressurized cargo modules for the ATV and Cygnus resupply vessels.

Looking beyond the ISS, Thales Alenia Space is gearing up for lunar missions, in particular with the LOP-G (Lunar Orbital Platform Gateway), and is carrying out design studies for NASA (as part of STEP 2) and ESA. Following the success of the IXV atmospheric reentry demonstrator, Thales Alenia Space is now developing Space Rider, Europe's new-generation, low-orbit, reusable space transport system.



In-Orbit servicing

Thales Alenia Space is offering a brand new in-orbit servicing solution. These space vehicles will be able to carry out a wide range of operations in orbit, including controlled reentry of space debris, robotic manipulation, extending a satellite's service life, in-orbit refueling, inspection, etc.

These vehicles will mark a real paradigm shift from a "stationary" to a "dynamic" space environment. If we ever start building lunar bases, in-orbit servicing could prove invaluable, especially for transporting the various components to be assembled. And Thales Alenia Space is naturally at the cutting edge of this trend.

40%

OF THE ISS MANUFACTURED
BY THALES ALENIA SPACE

SPACE TO TRAVEL & NAVIGATE

SATELLITE SYSTEMS PROVIDE THE INFORMATION THAT MAKES ONLINE MAPS AND NAVIGATION APPS A REALITY. IT'S HARD TO REMEMBER THE DAYS BEFORE WE COULD FIND OUR WAY JUST BY TYPING A DESTINATION INTO A SMARTPHONE APP OR A CAR'S DASHBOARD. TODAY, WE WOULD ALL BE LOST WITHOUT THIS—LITERALLY LOST! WITH PROGRAMS SUCH AS EGNOS AND GALILEO, THALES ALENIA SPACE IS AT THE FOREFRONT OF SATELLITE NAVIGATION SYSTEMS IN EUROPE.

AT THE FOREFRONT
OF SATELLITE NAVIGATION SYSTEMS IN EUROPE

About EGNOS

EGNOS, for instance, is essential for applications where extreme accuracy and reliability are critical – such as helping airplanes land or navigating ships through narrow channels.

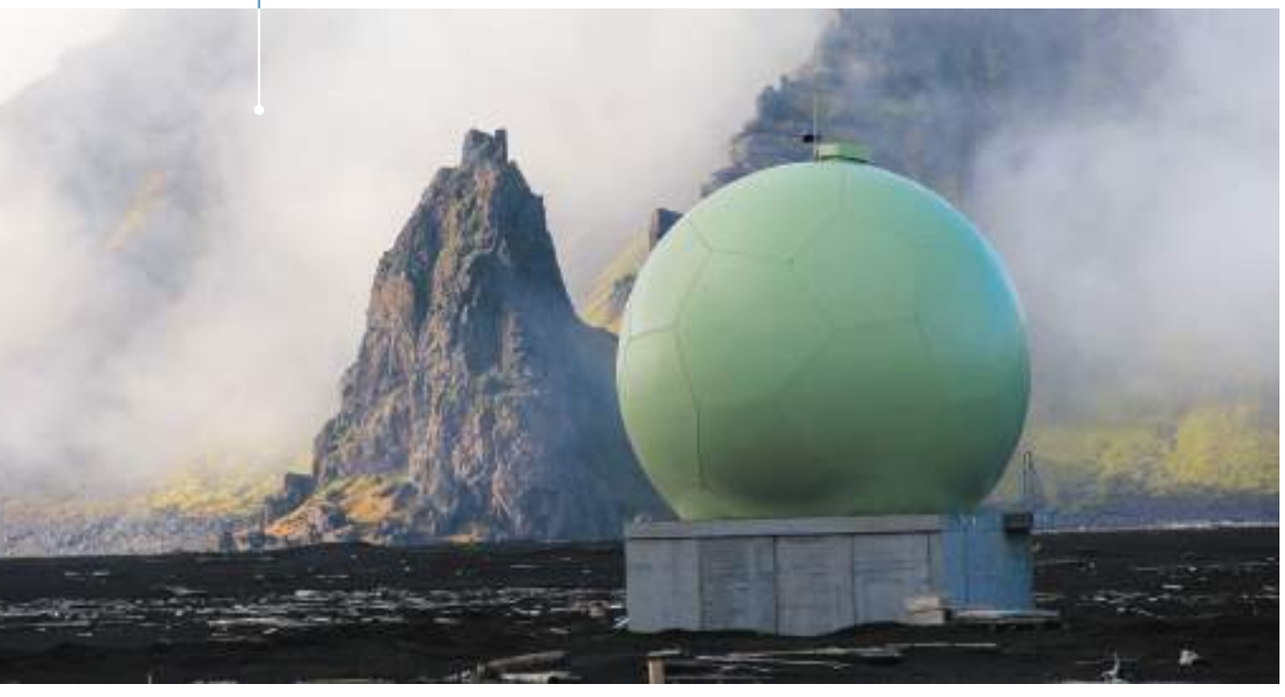
We actually developed the EGNOS satellite system, which is used today to improve the performance of global navigation satellite systems (such as GPS) for people in Europe. We were chosen by South Korean space agency KARI to produce KASS, their own version of EGNOS, which will provide Safety of Life and other services. We are also providing advanced geolocation solutions and leading the way in Search & Rescue through our MEOLUT Next solution for local user terminals.

About Galileo

The Galileo global navigation system is more than just satellites. An infrastructure on the ground is also needed to properly manage all the information sent in the signal from space. Even just a 1-second clock error could give a position 300,000 kilometers away from reality. In order to provide reliable information, Galileo depends on sensor stations, control centers, mission uplink stations and telemetry, tracking & command stations. We are prime contractor for the Galileo Mission Segment (GMS) and the Galileo Security Facility (GSF). We will develop new versions of both the GMS and the GSF, all while maintaining the already-deployed operational versions.
The goal: modernize the entire ground infrastructure and enhance its security, including cybersecurity.

Geo-localization to enable the Internet of Things

Thales Alenia Space is the system architect of Kineis, a constellation of 20 nanosatellites dedicated to The Internet of Things, produced in conjunction with Nexeya for CLS.



DIGITAL TRANSFORMATION & INNOVATION

IN THE FIERCELY COMPETITIVE SATELLITE MARKET, MANUFACTURERS HAVE TO PRODUCE “MORE AND FASTER”.

THALES ALENIA SPACE SET UP IN 2016 AN INNOVATION CLUSTER TASKED WITH ACCELERATING THE DEVELOPMENT OF INNOVATIVE PROJECTS

100%

OF OUR TELECOMMUNICATIONS SATELLITES

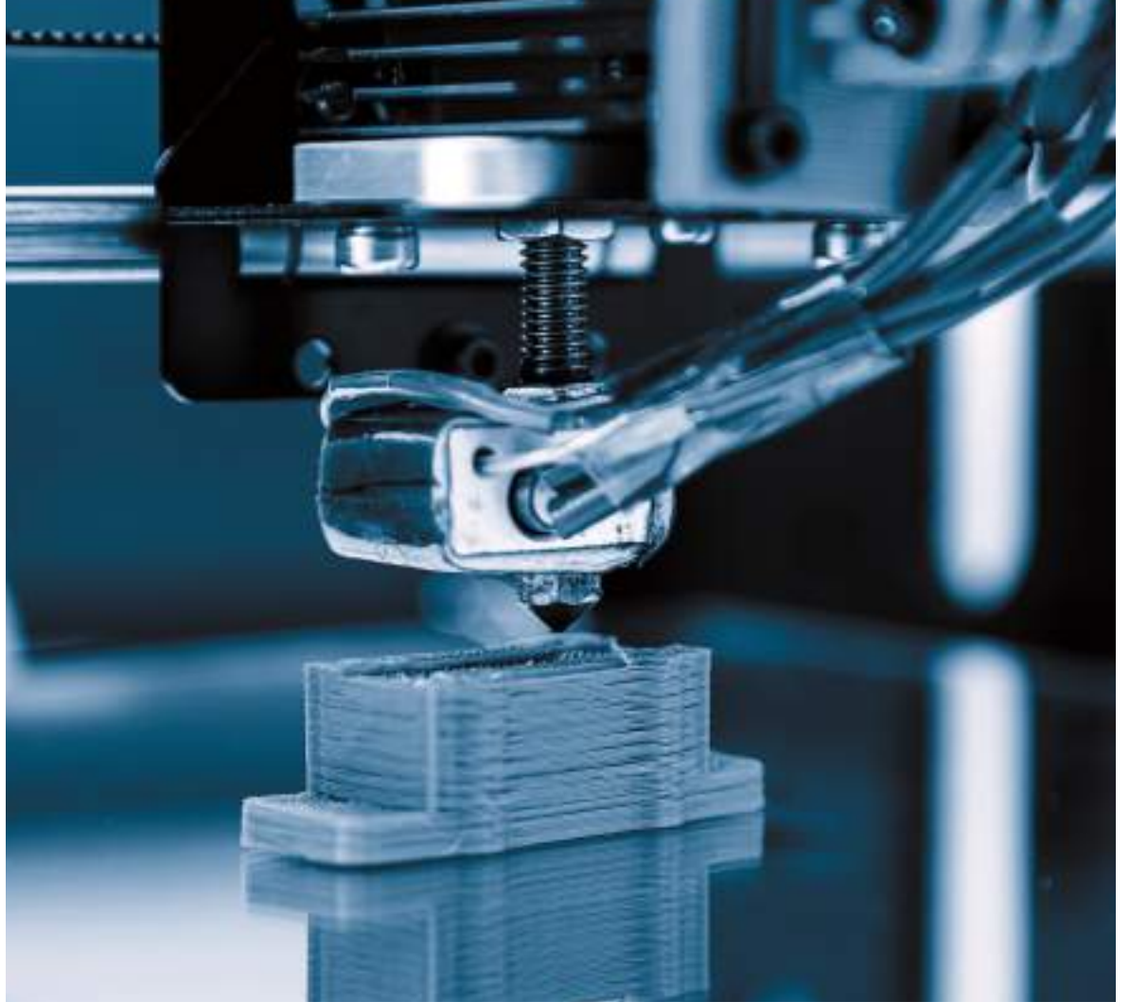
FEATURE SPACE PARTS MADE THANKS TO ADDITIVE MANUFACTURING TECHNOLOGY

At the heart of Digital transformation

New technologies have become a key to increasing satellite production rates, against the backdrop of a fast-evolving industry. The Factory of the Future is designed to incorporate state-of-the-art and cost-competitive technologies in production organizations, fully reflecting the digital transformation. Additive manufacturing, robots and cobots, Industry 4.0, virtual and augmented reality, digital twins… Digital Transformation is clearly visible within Thales Alenia Space's clean rooms!

Innovation in our DNA!

At Thales Alenia Space, our best success-stories happened because our mindset, our DNA, is driven by innovation. To mention a few examples, we were at the forefront of satellite navigation systems in Europe. We always thought that full-electric telecommunications platforms would be the new benchmark, not to mention flexible digitalized payloads we always believed in. And yet, we were a real pioneer in terms of telecommunications satellite constellations. We capitalized on our passion for innovation and engineering to be who we are.



Thales Alenia Space also set up in 2016 an Innovation Cluster tasked with accelerating the development of innovative projects. Open to all employees, at all levels across the company, this participative initiative is designed to bolster the company's innovation culture. More specifically, the Innovation Cluster aims to nurture disruptive concepts within Thales Alenia Space, whether for design, production, engineering, sales or support, and to encourage all employees to unleash their creativity and initiate actions.

The good thing about innovation is that it is always a beginning of a new area. The difficulty is of course to find the proper balance between disruptive solutions and our customers' expectations.

Stratobus™, an autonomous, multimission stratospheric platform is a good example of what our company could bring in terms of new technologies. This airship fits perfectly with conventional satellite systems. Operating at an altitude of 19 kilometers (above the jet stream and air traffic), it is designed for a wide range of civil and military applications at the local or regional level, including telecommunications, navigation and observation. It could provide a permanent surveillance solution over a predefined regional coverage zone to meet the needs of security and defense organizations.

We expect, in the years to come, to work on such numerous innovative programs with our customers and partners to draw the Space of the future.

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a Thales / Leonardo company

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