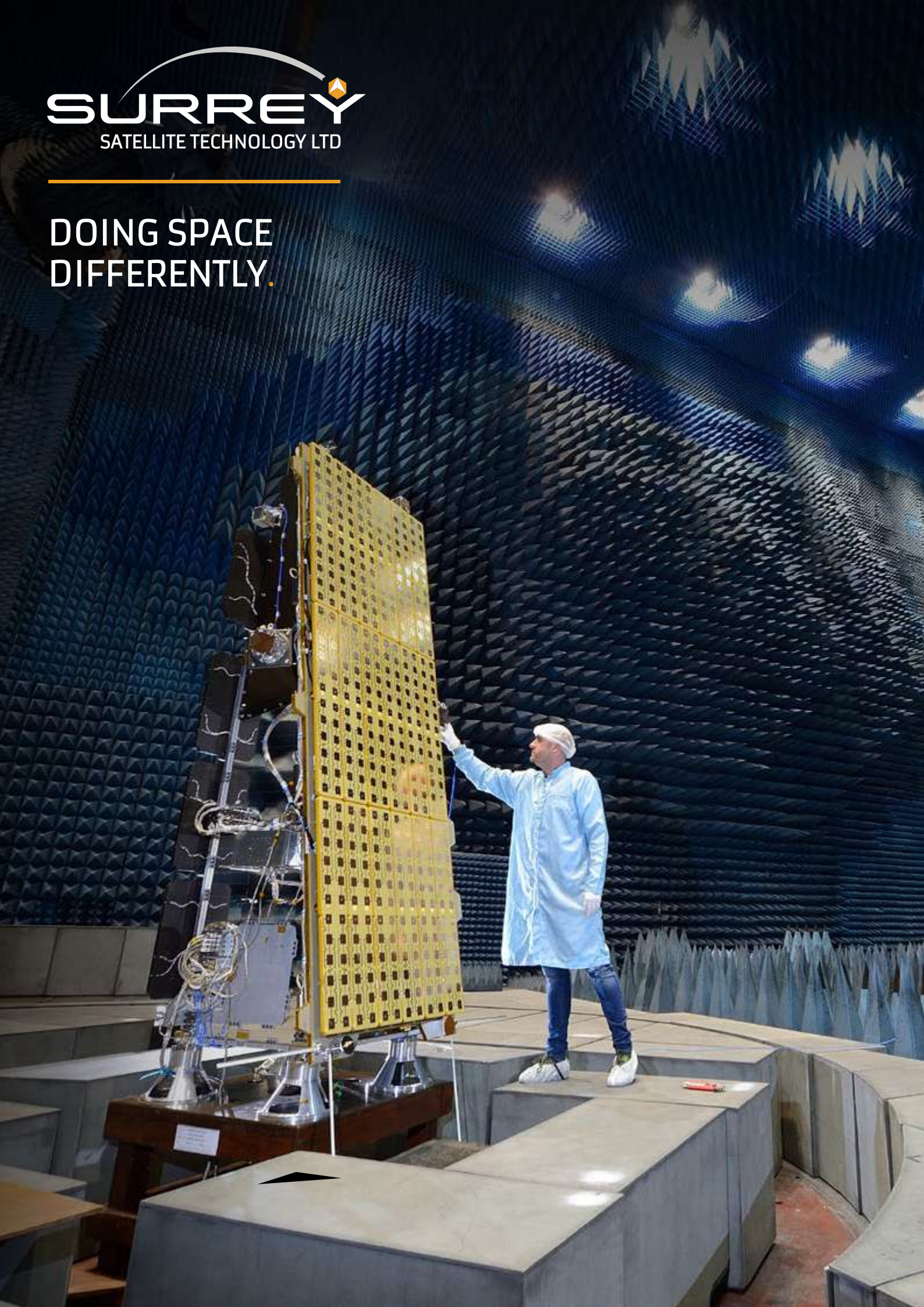
SURREY
SATELLITE TECHNOLOGY LTD

DOING SPACE DIFFERENTLY.



SSTL ARE THE WORLD'S LEADING SMALL SATELLITE MANUFACTURER AND PIONEERS OF THE USE OF NEW TECHNOLOGIES ON SATELLITE PRODUCTS AND SERVICES

RemoveDEBRIS during assembly at SSTL December 2017. Credit: SSTL/Max Alexander

THE SSTL STORY IS A SHOWCASE OF INGENUITY, AMBITION AND ENGINEERING EXPERTISE

In the late 1970s, a group of aerospace researchers working at the University of Surrey, including a young Martin Sweeting, decided to experiment by creating a satellite using commercial off-the-shelf (COTS) components.

The idea was bold and audacious since at this time satellites were generally bespoke engineered and with a price tag in the multi-millions.

That first satellite, UoSat-1, was launched in 1981 with the help of NASA and the mission was a great success, outliving its planned three year life by more than five years.

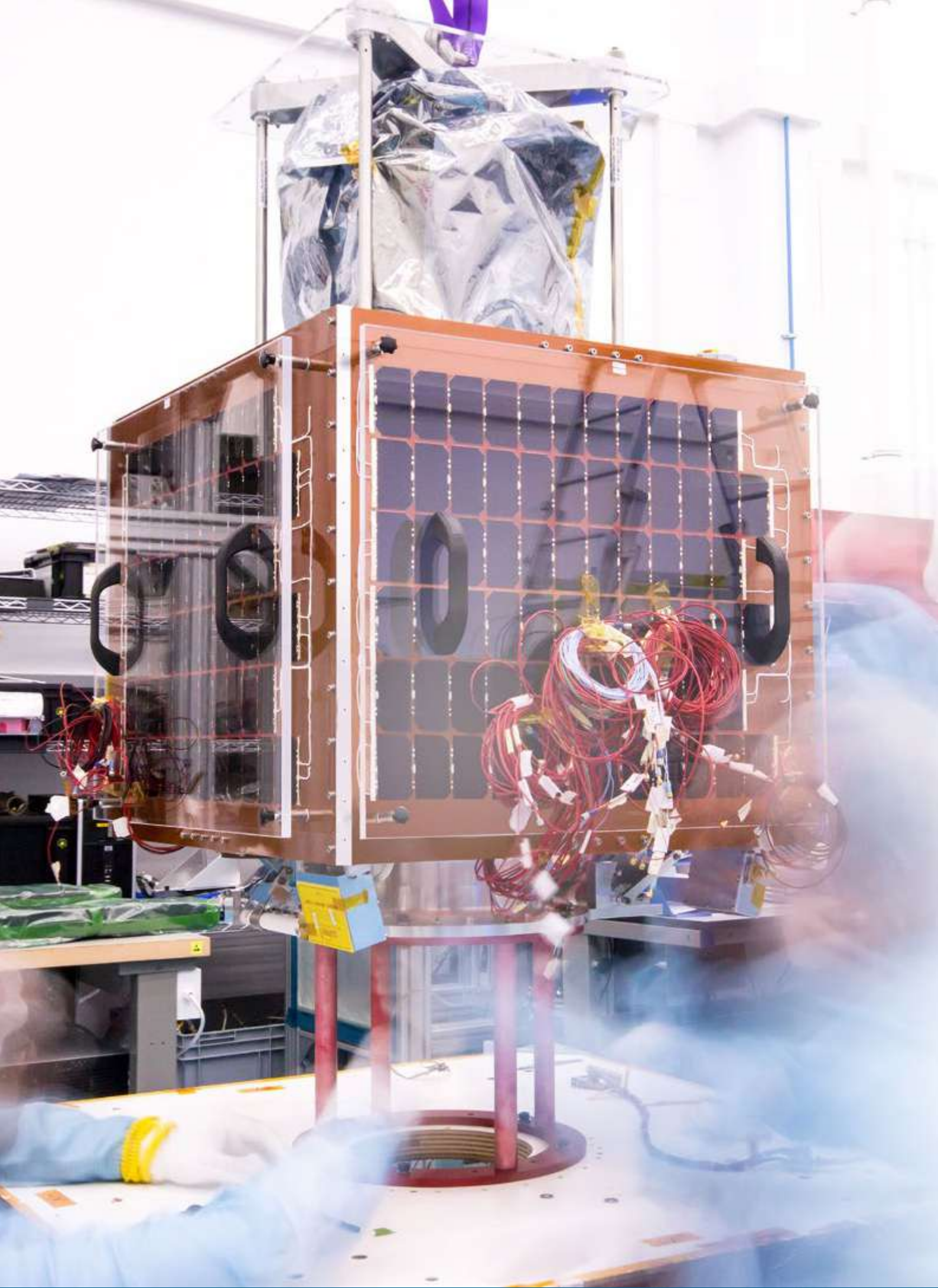
Most importantly, the team showed that relatively small and inexpensive satellites could be built rapidly to perform successful and sophisticated missions.

'THE RESULTS WERE CONCLUSIVE, AND THE SMALLSATS REVOLUTION HAD BEGUN'

In 1985 Surrey Satellite Technology Ltd was formed as a spin-out company to transfer the results of research into a commercial enterprise.

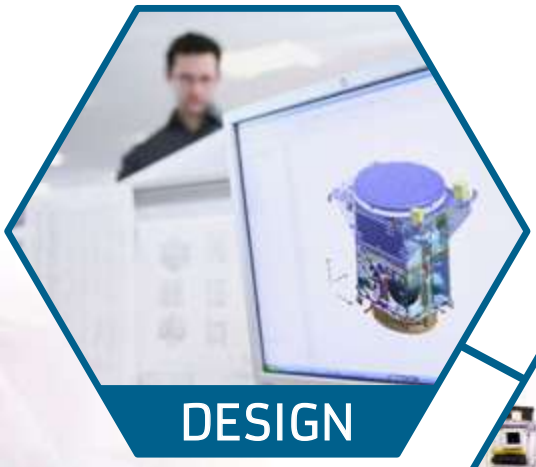
The growth of the company has accelerated, but innovation continues to be a key driver in our approach to the design, build, test and operation of all our spacecraft.

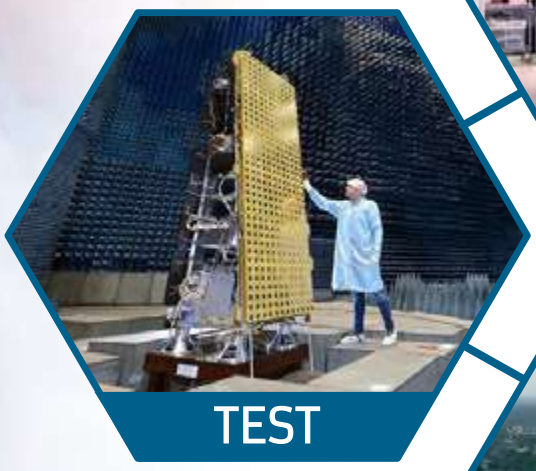
We now manufacture satellites for commercial, governmental and institutional customers based all over the world.



CARBONITE-1 in build. Credit: SSTL

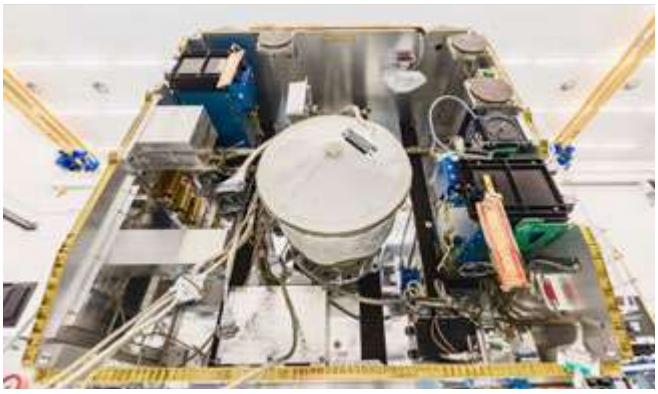
OUR END-TO-END SMALL SATELLITE CAPABILITY DELIVERS ON-ORBIT TECHNOLOGIES FOR A RANGE OF SPACE APPLICATIONS





OUR INNOVATIONS DRIVE SUCCESSFUL MISSIONS

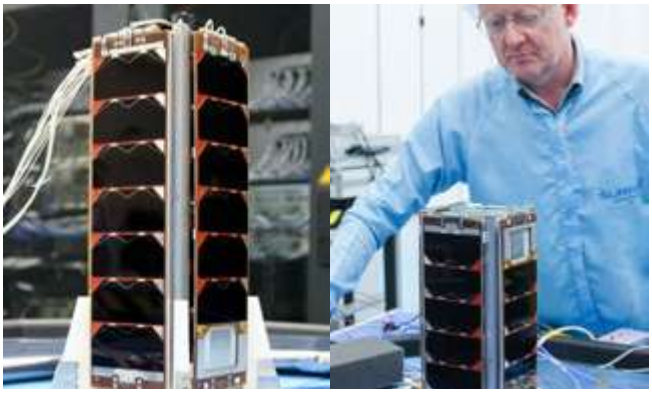
RemoveDEBRIS



SSTL designed and manufactured the satellite platform for the RemoveDEBRIS Active Debris Removal demonstration mission, launched from the International Space Station in 2018.

Our engineers operated the spacecraft in orbit where it has successfully performed a series of ADR technology demonstrations including net and harpoon capture experiments and a Vision Based LiDAR system designed to track debris targets.

VESTA-1



SSTL has a proven track record of successful technology demonstration and pathfinder missions and in 2018 we delivered VESTA, a 3U nanosatellite to test an innovative two-way VHF Data Exchange System (VDES) payload for the exactEarth advanced maritime satellite constellation.

The 4kg satellite has 3-axis pointing capability and an SEU tolerant on-board computer.

GALILEO GNSS SYSTEM

Launched in 2005, SSTL developed and delivered GIOVE-A, the first operational satellite for Europe's Galileo navigation constellation, in a rapid 30 month programme which allowed the European Space Agency to claim the frequency filings for the Galileo programme just 3 months before the licence expired.

Since then SSTL has delivered 34 navigation payloads for the deployment phase of Galileo, Europe's satellite navigation system.

Lunar Pathfinder

Lunar Pathfinder will be the first spacecraft in orbit around the Moon to commercially offer communication services to Lunar assets, whether coming from companies, governments, universities, non-profit organisations or individuals, the aim is to offer a high-performance, competitively priced option to relay communications between the Earth and Lunar assets.

It will offer 2 simultaneous channels of communication to lunar assets: 1 in S-band and 1 in UHF. Communications are then relayed back to Earth ground station in X-band.

DMC3 CONSTELLATION

SSTL designed and manufactured 3 satellite platforms with very high resolution optics for a new constellation, DMC3/TripleSat, which delivers 1 metre resolution imagery for Twenty First Century Aerospace Technology (21AT), a commercial Earth observation data distribution company based in Beijing.

Under an innovative image data contract SSTL retains ownership of the satellites and the data is leased to 21AT over a 7 year period.

TELESAT LEO PHASE 1

SSTL supplied a small low earth orbit (LEO) satellite to Telesat, a leading global satellite operator, as part of a test and validation phase for an advanced, global LEO satellite constellation.

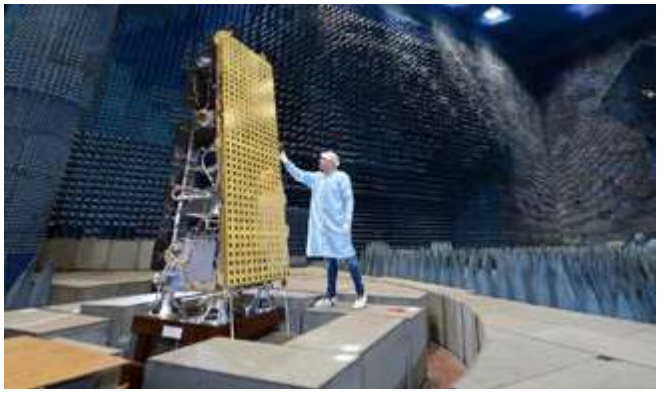
Launched in 2018, the satellite flies an SSTL-built Ka payload and is operated by Telesat in low earth orbit at ~1000km.

CARBONITE-1 & CARBONITE-2

The CARBONITE-1 and CARBONITE-2 satellites launched in 2015 and 2018 are 100kg earth observation technology demonstration missions owned and operated by SSTL.

They were launched to demonstrate a low cost video-from-orbit solution delivering 1m resolution images and colour HD video clips. Video from space provides new opportunities for change detection, pattern of life assessments and support to humanitarian and disaster relief operations.

NOVASAR-1



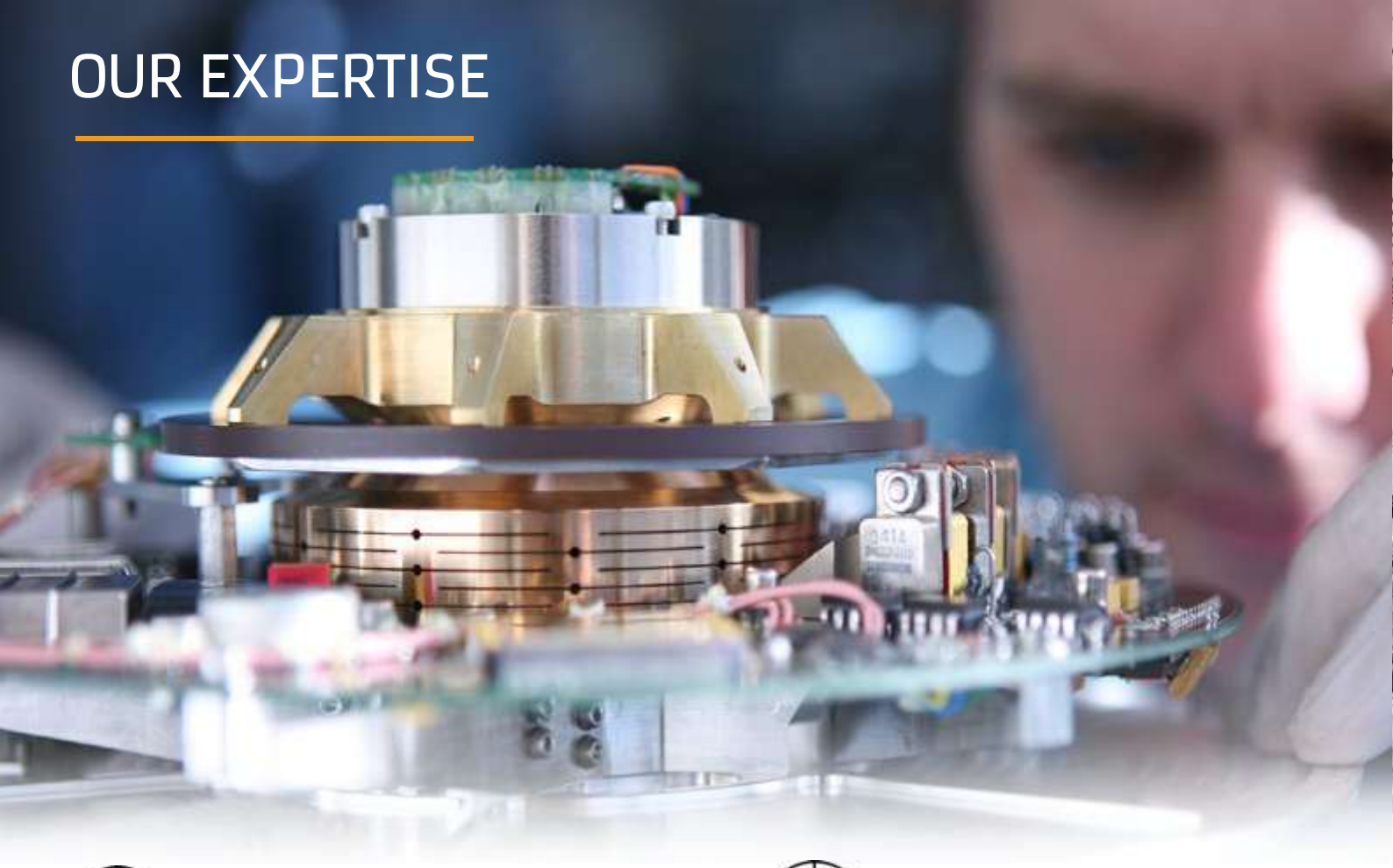
Launched in 2018, NovaSAR-1 was designed and manufactured by SSTL and flies an innovative S-Band SAR payload developed by Airbus Defence and Space.

The SAR payload has a dedicated maritime mode designed with a very wide swath area of 400km to enable the monitoring of the marine environment, and provides direct radar ship detection information simultaneously with AIS ship tracking data. NovaSAR-1 has 3 additional imaging modes, for a range of applications such as flood monitoring and agricultural and forestry applications.

LONDON, UK ACQUIRED BY DMC3/TRIPLESAT

London image acquired by DMC3/Triplesat Constellation 2016. ©21AT, all rights reserved.

OUR EXPERTISE



OPTICAL

SSTL has more than 30 years of expertise and a worldwide reputation for delivering low cost, small satellite optical Earth observation missions. Our latest mission designs combine our flight-proven avionics and platforms with a range of high performance imagers, video cameras and telescopes.

Our systems are agile and flexible and can deliver:

- High resolution imagery
- Multi-target imagery
- Large area strip imaging
- Stereo imaging
- Wide area coverage
- Regular revisit constellations
- Accurate geolocation
- HD full colour video

RADAR

SSTL's Synthetic Aperture Radar low cost missions are built on our flight-proven core platforms and avionics.

The ability to image through cloud and at night provides additional and enhanced imaging opportunities for the monitoring of the maritime environment, agricultural and forestry applications, and the assessment of natural disaster zones to aid rapid-response relief planning and reconstruction.

BRING-INTO-USE

With low cost small satellite platforms, flight-proven avionics, and a rapid order-to-orbit time, SSTL can provide our customers with a Bring-Into-Use mission that will rapidly reduce costs and risks for an operational programme, or validate key technologies in the orbital environment.

INTERNET OF THINGS

SSTL has been pioneering the world of LEO communications for over 30 years, enabling the Internet of Things (IoT) applications since 1985.

We focus on providing scalable platforms in LEO to enable IoT, M2M and broadband applications.

VIDEO FROM SPACE

Continuing the innovative approach of our CARBONITE satellite programme, we offer a low cost video platform, enhanced and designed for fast manufacture in high volumes.

SSTL's CARBONITE satellites offer high resolution 1m GSD imagery from 500km orbit.

The agile platform allows for 45 degree off pointing manoeuvres and is compatible with multiple low cost launchers.

NAVIGATION

SSTL developed and delivered the first operational payload for Europe's satellite-supported navigation programme as part of its GIOVE-A mission launched in 2005.

Since then SSTL has delivered 34 navigation payloads for the deployment phase of Galileo, Europe's satellite navigation system.

Our GNSS receivers are highly regarded for quality and robustness and are flying on many missions, including TechDemoSat-1 and NASA's CYGNSS constellation.

SSTL LUNAR

We have been involved in many lunar mission and environment studies over the years, including supplying the flight computer for the US Mini-SAR payload on the Chandarayan-1 Lunar Orbiter, launched in 2008.

Now SSTL offers off-planet communication and navigation services to companies and institutions around the World.

SSTL Lunar, supported by the European Space Agency (ESA) under a commercial partnership programme, has the vision of setting up a sustainable infrastructure around the Moon, capable of supporting communication and navigation needs of lunar assets, in a reliable and cost-effective way.

PSLV-C40 launch carrying CARBONITE-2 and Telesat LEO Phase 1 satellite to LEO orbit, January 2018. Credit ISRO / Antrix

SPACECRAFT OPERATIONS

SSTL has accumulated over 200 years of in-orbit satellite operations through our automated Satellite Operations Centre, monitoring satellites 24 hours a day.

Our Satellite Operations Centre, based at our headquarters in Guildford, has access to SSTL Ground Stations located in the UK and Svalbard.

In addition to these, SSTL is part of the Viasat Real Time Earth (RTE) network, hosting one of the RTE ground stations at our Guildford site.

LAUNCH SERVICES

With decades of experience when it comes to launching small satellites, we have worked on more than thirty launch campaigns on a host of different launch vehicles.

Today SSTL works with all the leading launch service providers worldwide to ensure that our customers enjoy the widest possible range of attractive launch options.

We can support our customers' launch procurement process, the launch interface design, export of the spacecraft and associated licensing, shipping, launcher fit-checks as well as the launch campaign itself.

MISSION SUPPORT

We offer both emergency and non-emergency support for our customer's Space and Ground Segments throughout their mission, depending on their requirements.

GROUND SEGMENT

We provide complete Turnkey Ground Segment solutions for our range of Space Platforms, including all the hardware and software necessary to operate, maintain, process and archive data from our platforms.

Viasat RTE antenna dish sited at SSTL Guildford site.

We offer world class training opportunities, from academic courses to “hands-on” complete design and construction. All of our training and development programmes are customisable and tailor-made to fit our customers’ objectives.

SSTL and customer engineers working on NigeriaSat-X. Credit: SSTL

SPACE MISSION TRAINING

CASE STUDY: KAZAKHSTAN

SSTL has trained a total of 39 Kazakh customer engineers in 2 separate space mission training programmes.

The first training programme provided a mix of hands-on and academic training and delivered a medium resolution earth observation satellite, KazEOSat-2, designed by SSTL.

In accordance with the KazCosmos national space programme, the second training programme was designed to complement and enhance the customer's growth in space mission experience, with a jointly developed satellite design for KazSTSAT flying customer designed payloads and experiments.

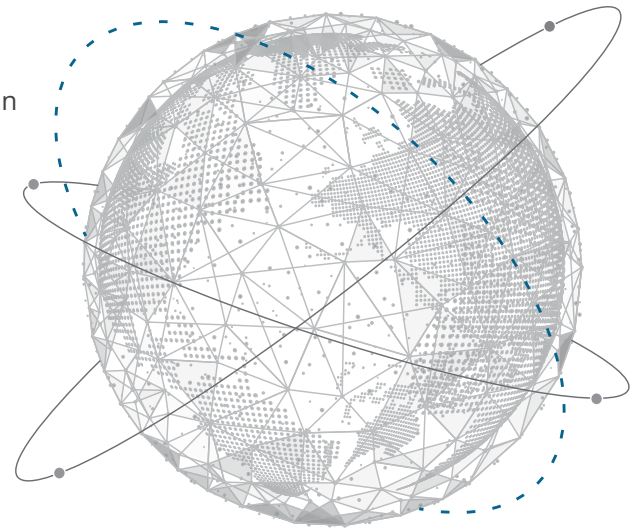
KazEOSat-2 and KazSTSAT acquire earth observation images for Kazakhstan and the international image data market.

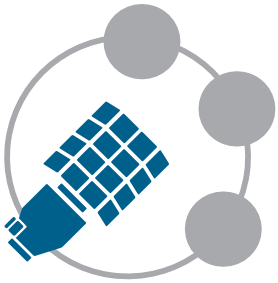
Customer engineers working on THEOS-2. Credit: SSTL

DMC3 spacecraft for the TripleSat Constellation. Credit: SSTL

DELIVERING THE WORLD'S CONSTELLATIONS

Our range of small satellites are ideally suited for low-cost constellations, enabling rapid revisit, data continuity and flexible space missions.





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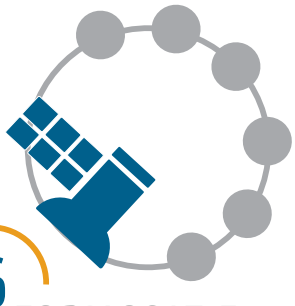
DMC3/TRIPLESAT CONSTELLATION

The first daily re-visit, high resolution Earth Observation constellation



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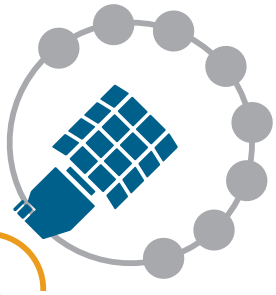
FORMOSAT-7 CONSTELLATION

Meteorological/weather forecasting constellation



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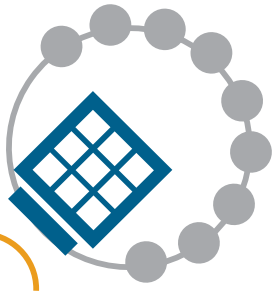
NASA CYGNSS CONSTELLATION

Space GNSS Receiver remote sensing payloads



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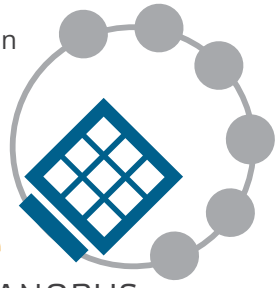
THE DISASTER MONITORING CONSTELLATION

The first Earth Observation constellation

5

RAPIDEYE CONSTELLATION

The first fully commercial Earth Observation constellation



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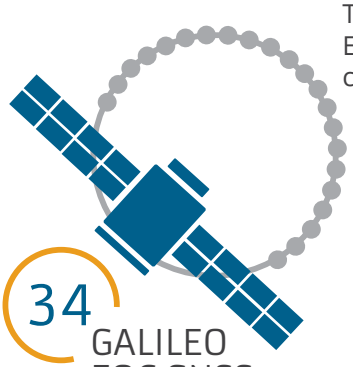
KANOPUS CONSTELLATION

SSTL avionics suites and software



34

GALILEO FOC GNSS CONSTELLATION

34 Navigation and timing payloads

LEADING THE WAY

First microsatellite to take multispectral Earth images

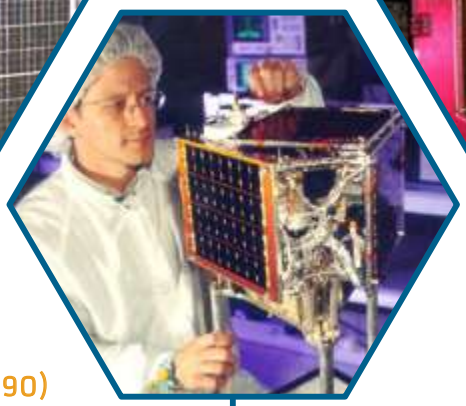
TMSat (1998)

First modular 50kg microsatellite design, now widely emulated

UoSAT-3 and UoSAT-4 (1990)

First modern microsatellite with in-orbit re-programmable computers

UoSAT-1 (1981)



First use of propulsion on a nanosatellite
First use of butane as a space propellant

SNAP-1 (2000)

SSTL IS A RECOGNISED INNOVATOR

Queen's Award for Technological Achievement (1998)

The Queen's Award for Enterprise in Innovation (2005)

Sir Martin Sweeting, OBE in the Queen's Birthday Honours List (2005)

The Royal Institute of Navigation Harold Spencer Jones Gold Medal (2006)

The Times Higher Award for Outstanding Contributions to Innovation and Technology (2006)

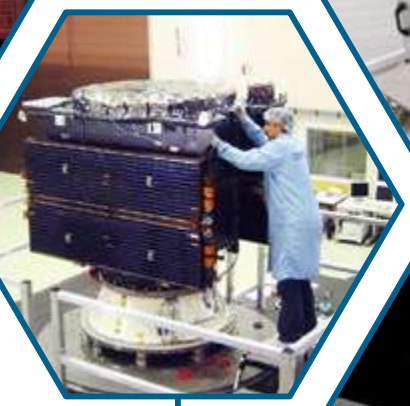
Royal Aeronautical Society Silver Medal for TopSat (2007)

ESA Award for Outstanding Contribution to the Galileo programme (2008)

AIAA Space Systems award for the Disaster Monitoring Constellation (2012)

First use of interplanetary internet v6 on board a satellite in orbit

UK-DMC-1 (2003)

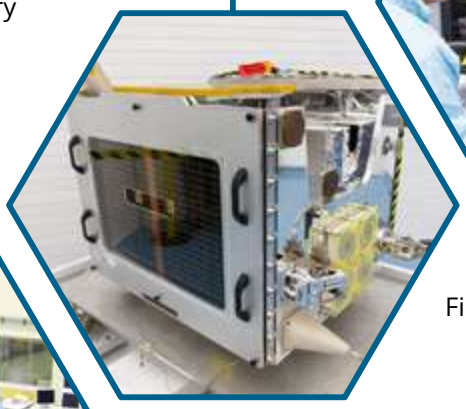


First Galileo positioning satellite for Europe

GIOVE-A (2005)

First use of reflected GPS signals to measure sea-state and generate Delay Doppler Maps on board the satellite

TechDemoSat-1 (2014)



First in-orbit demonstration of space debris capture

RemoveDEBRIS (2018)

First demonstration of 5G connectivity on a LEO Spacecraft

LEO Vantage Phase 1 (2019)

First momentum wheel to guide a lander to land on a comet's surface

Rosetta / Philae mission (2014)

Arthur C Clarke Project Team Award NigeriaSat-2 (2012)

IET Award for Innovation NovaSAR-1 (2013)

Arthur C Clarke Project Team Award - Galileo navigation payloads (2016)

Royal Aeronautical Society Silver Medallist - Martin Unwin, GNSS Principal Engineer (2017)

International Board of Trade Award for outstanding contribution to international trade & investment (2018)

Aviation Week Network Laureate Award for Space Technology and Innovation – RemoveDEBRIS (2019)

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