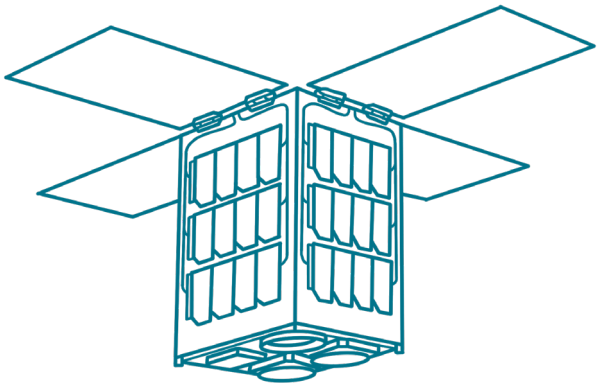
SURREY SATELLITE TECHNOLOGY LTD

SMALL SATELLITE MISSION PROGRAMME

A LOW COST SOLUTION FOR GROWING YOUR SPACE CAPABILITY



SHARING OUR EXPERTISE SINCE 1984.

Small Satellite Mission Programme

Earth Observation or Communication SmallSat

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Hands-On Engineering Training Programme

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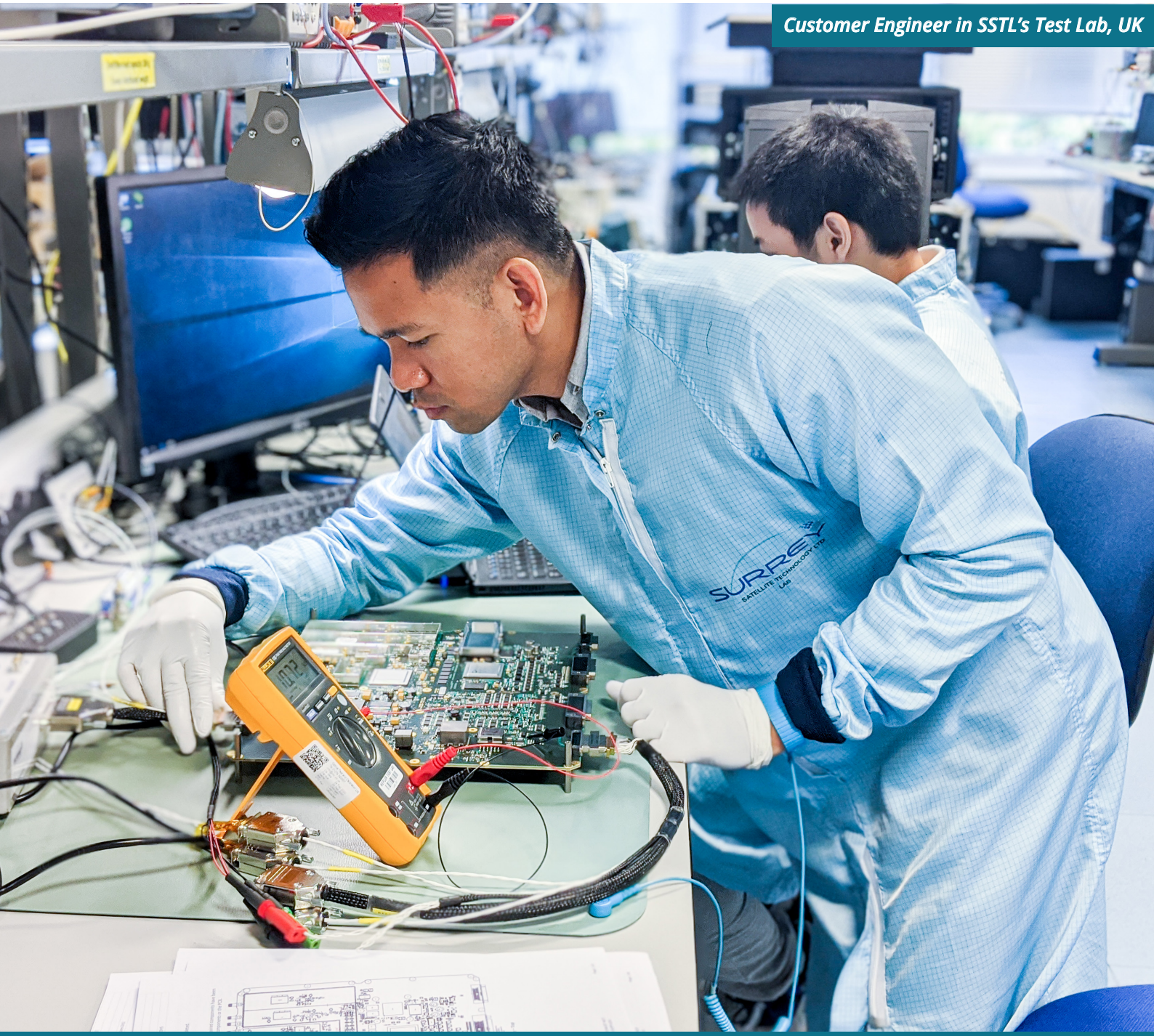
Launch AND In-Country Ground Segment



Customer Engineer in SSTL's Test Lab, UK

DOING SPACE DIFFERENTLY.

Space for sustainable development

Surrey Satellite Technology Limited (SSTL) is the world's leading small satellite company, delivering operational space missions for a range of applications including Earth observation and communications, together with know-how transfer and capacity building programmes.

Headquartered in Guildford, UK, SSTL is part of the Airbus Group with strong links to University of Surrey, from which the company originated.

SSTL has developed a full life-cycle small satellite capability - from design through development, manufacture, integration, test, launch, operate, de-orbit and applications exploitation.

We design and manufacture the majority of our satellite payloads, subsystems and equipment in-house and we share that knowledge with our Customers, enabling the establishment of their own national capability and the growth of their local space sector.

Unparalleled Smallsat Expertise accessed via Unique End-to-End Engineering Experience

World leading small satellite company

290 satellite years in-orbit experience

69 successful satellite missions since 1981

End-to-end Smallsat capability

20 Customer Training Programmes delivered

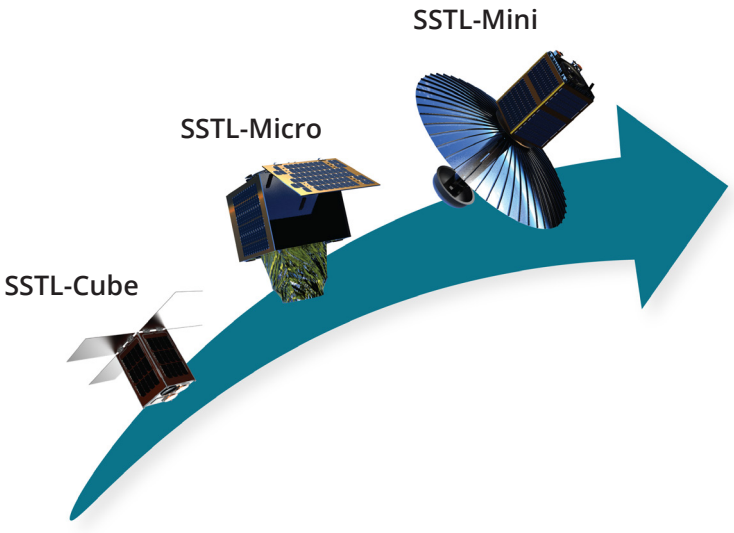
State-of-the Art facilities

DOING SPACE DIFFERENTLY.

GROW YOUR SPACE CAPABILITY

SSTL offers our Customers a long-term partnership with a vision for expansion of capability and moving towards more complex systems on your space roadmap.

Our turnkey solution for a capable space project includes space, ground and launch segment, together with our comprehensive and tailored know-how transfer and training programme.



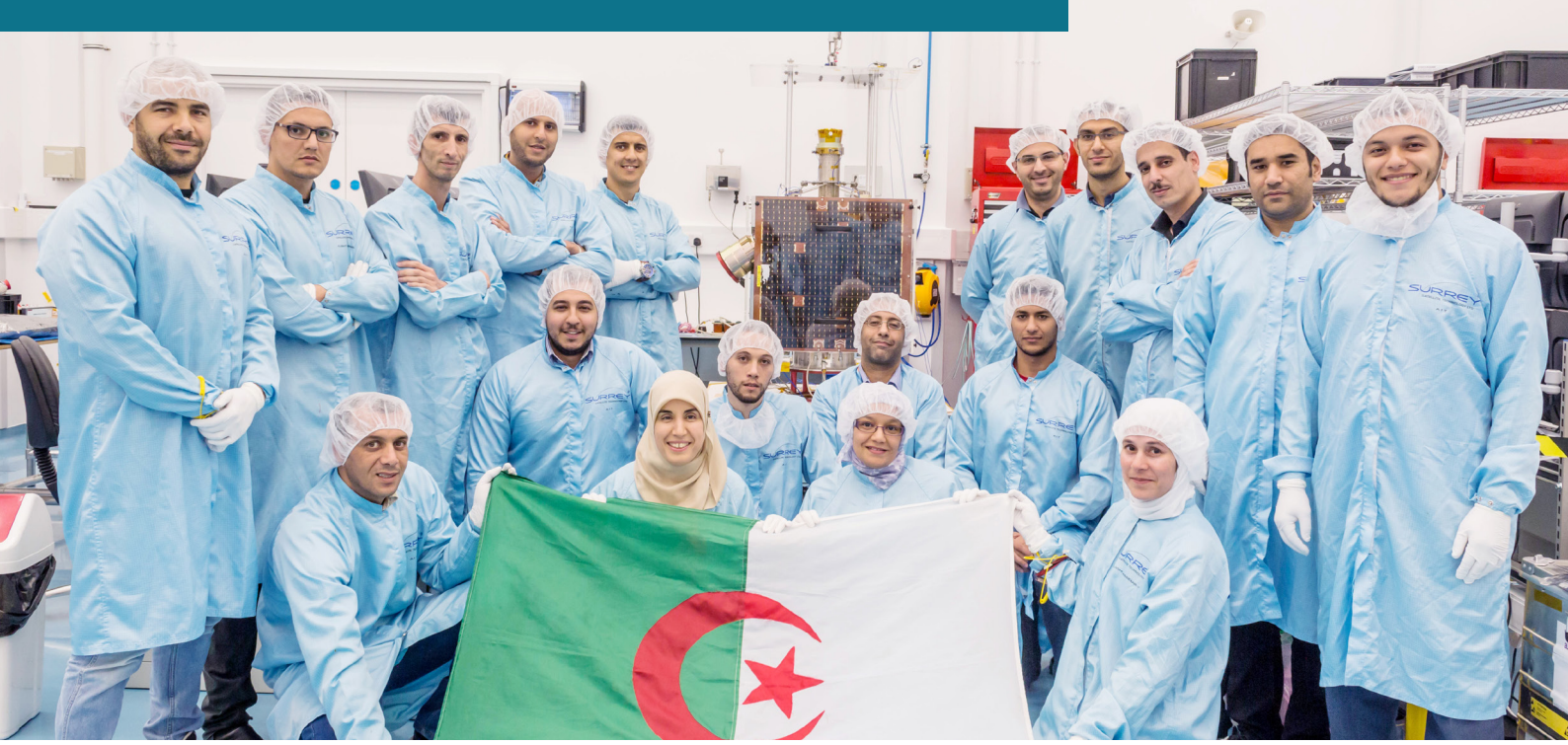
Space Segment

SSTL Cube Platform flying

Customer payload
Or
Earth observation payload
Or
Software Defined Radio payload

> *Our Small Satellite Mission Programme is designed to deliver a reliable spacecraft supplying valuable data from in-orbit*

> *Starting our partnership with the SSTL-Cube opens the doors to future satellites based on a similar satellite architecture of SSTL-Micro and Mini platforms with potential for Very High resolution (VHR) optical, video or SAR payloads.*



HANDS-ON ENGINEERING TRAINING PROGRAMME

Our Hands-On Engineering Training Programme is based around our capable Cubesat and allows your engineers to work alongside SSTL's engineers, gaining experience in practical design and build through direct mentorship.

All of SSTL's training and capacity building programmes are customisable and can be tailor-made to fit our Customer's objectives.

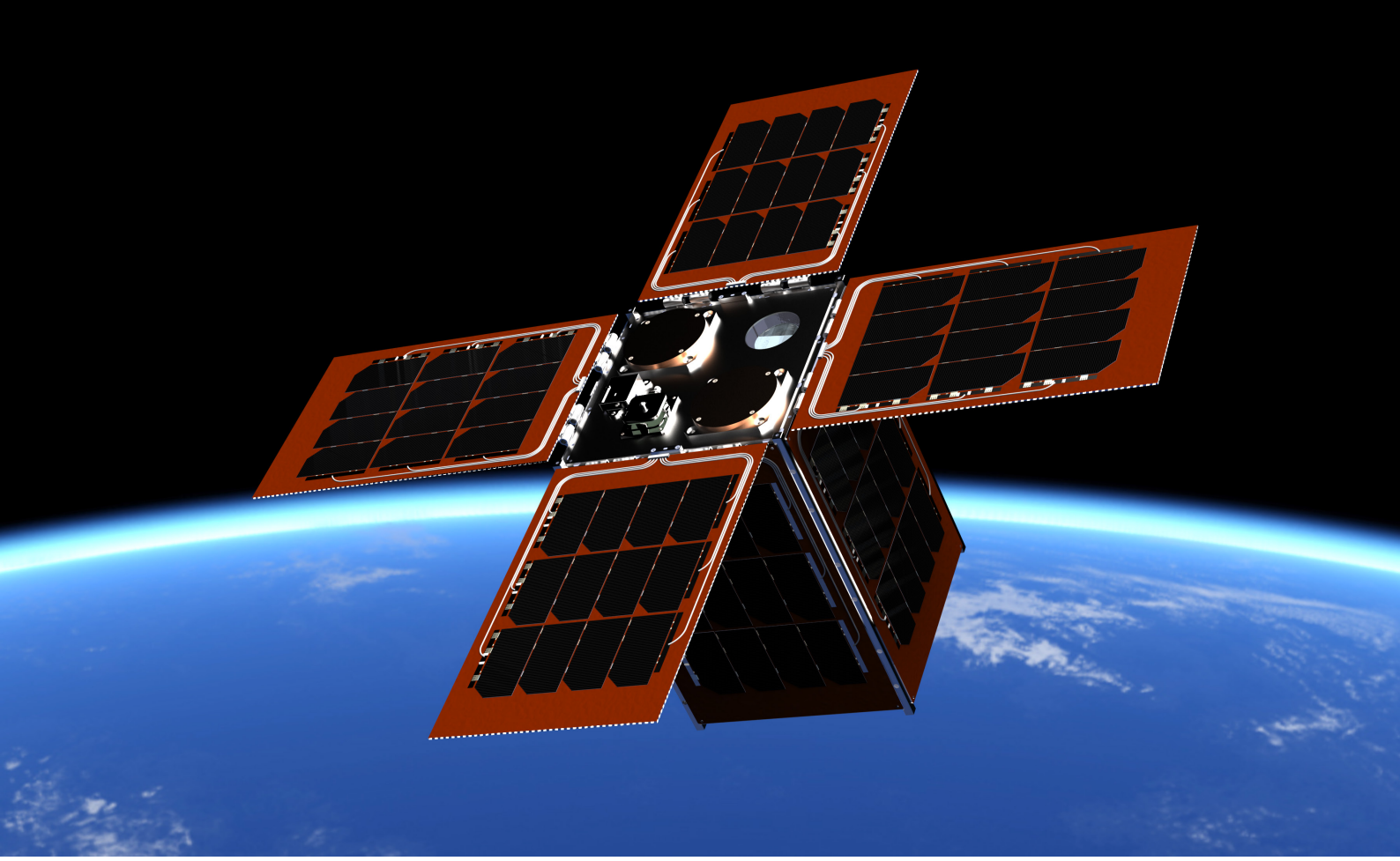
Key Features

- Hands-on Engineering training programme covering satellite system design and testing, satellite integration & in-orbit operations
- On the job training using flight hardware
- Knowledge transfer through 1-1 mentoring throughout the programme
- Optional licence to our technology to rebuild the spacecraft in-country
- Rapid delivery schedule
- Optional PhD or MSc at University of Surrey

Benefits

- Programme based on cubesat standards with SSTL SmallSat engineering principles to ensure reliability, longevity and utility
- Scalable architecture for future microsatellite missions
- Cost effective and tested process approach
- Regular evaluation with feedback on the progress of individuals
- Hosting in our UK facility during all satellite life-cycle phases
- Suitable for customers with no experience or organisations moving up to a more complex space mission

> *Tell me and I'll forget.*
> *Show me and I may remember.*
> *Involve me and I learn.*
>
> *Benjamin Franklin*



SSTL-CUBE

The SSTL-CUBE platform benefits from the SSTL core avionics architecture and heritage. To a large extent it consists of the same modules that SSTL applies successfully in microsatellites, just in a smaller form factor and configuration.

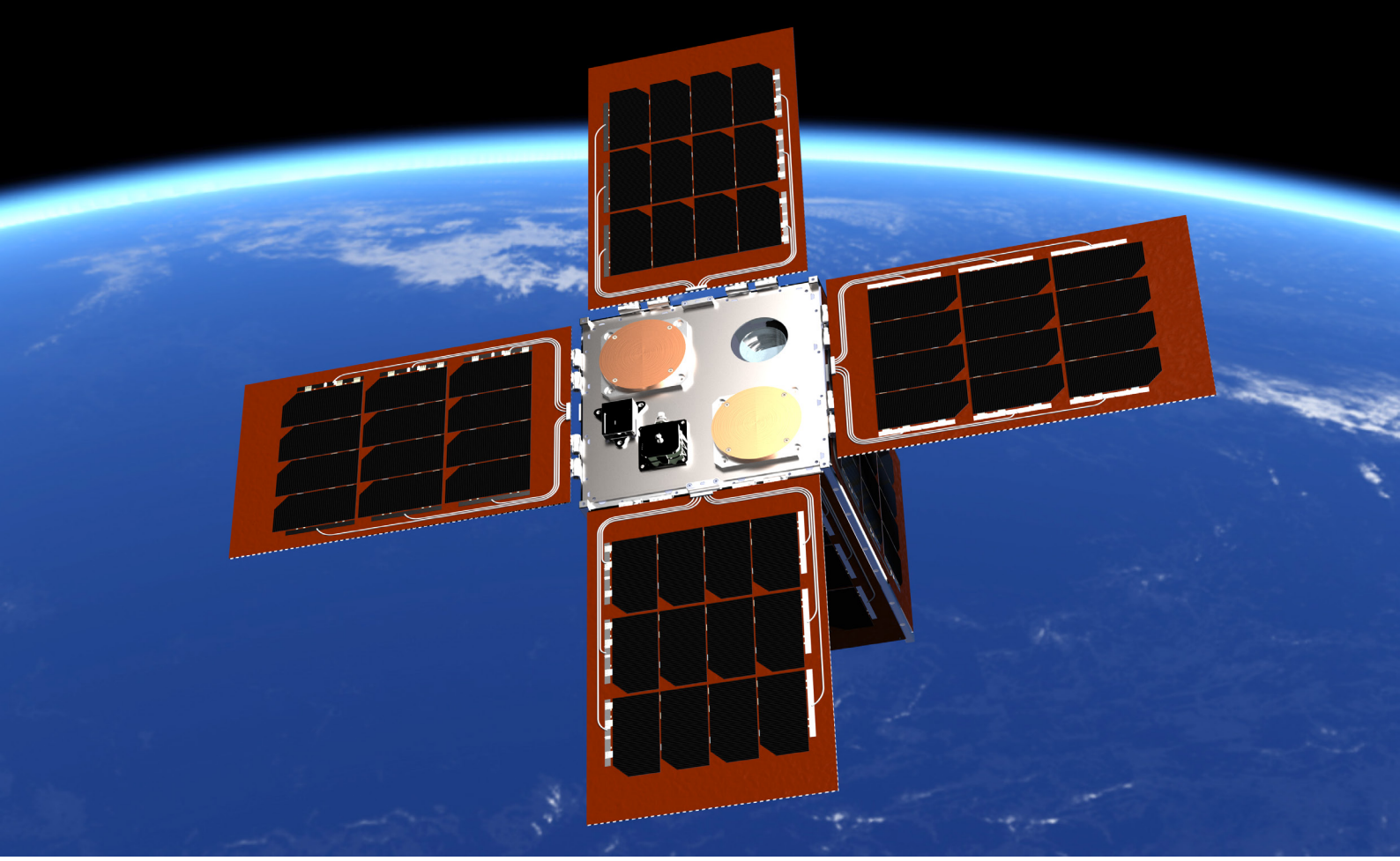
SSTL has designed its CubeSat platform around the needs for low cost and reliable satellite, offering a standard "off-the-shelf" cubesat with the reliability, FDIR (Fault Detection, Isolation and Recovery) and redundancy of more traditional microsatellites. It offers significantly more system level reliability and redundancy than is usually standard for cubesats (*1).

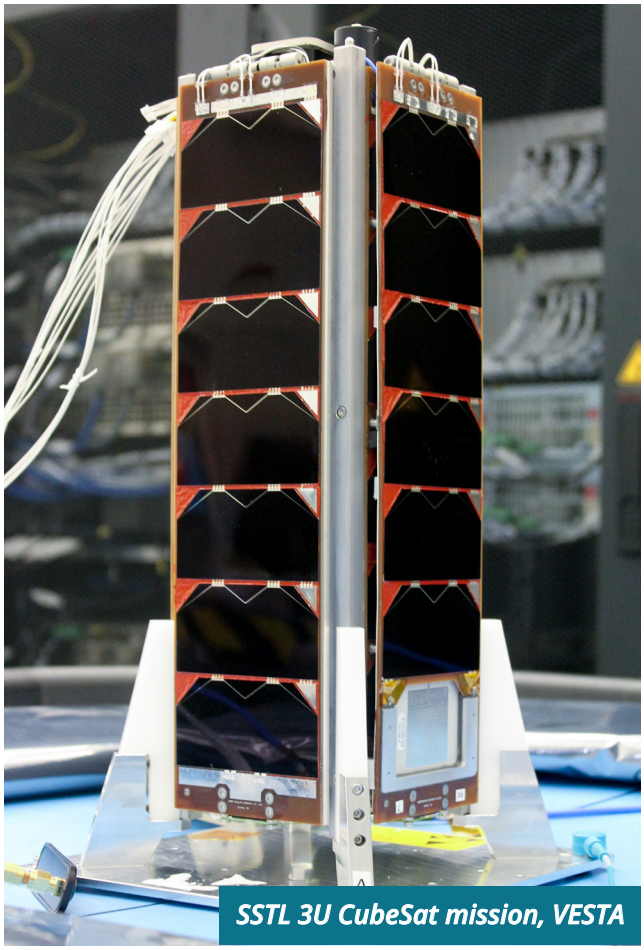
We offer two mission-ready variants of the SSTL-CUBE:

- Cube-Vista for Earth Observation
- Cube-Signal for Communications

Platform details	**Cube-Vista**	**Cube-Signal**
Cube Units	12U	8U
Satellite Mass	12kg	10kg
Redundancy	Dual-string (except payload chain)	Single-string
Design lifetime	3 years	3 years
Downlink	S-band as a baseline X-band as an optional upgrade	S-band
Data storage	32GB	32GB
Geolocation accuracy	250m (CE90 = circular error at 90% confidence level)	

**1 According to research only 33% of deployed cubesats fulfil their mission objectives and the overall success rate of cubesats is around 67%, with University led missions achieving less than 50% mission success.*





SSTL 3U CubeSat mission, VESTA

You can benefit from a programme based around missions: Cube-Vista for Earth observation or Cube-Signal for communications.

Cube-Vista

	Payload Choice	
Payload	NanoView	NanoColour
GSD	5m GSD	10m
Swath	22km	50km
Spectral bands	R, G, B, NIR, Pan	R, G, B, NIR, Pan
Signal to Noise	<100	>100

Cube-Signal

	2 payloads	
Payload	AIS	ADS-B
Channel Frequencies	161.975 MHz, 162.025 MHz	10m
Channel Bandwidth	25 kHz	2.6 MHz
Modulation	GMSK	PPM
Data Rate	9.6kbps	1Mbps

FLEXIBLE APPROACH TO LAUNCH

SSTL has a proven track record in the acquisition and provision of launch and launch related services for both its own customer programmes and third party missions.

SSTL has launched 69 satellites, on 38 launches from 8 launch sites and has first-hand knowledge working with the world's launch vehicle manufacturers and providers.

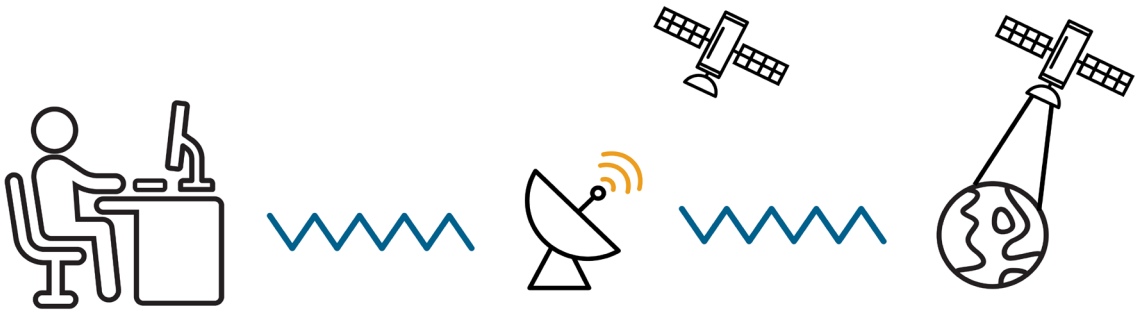
As a part of this turnkey package and to provide best value for money to the Customer package, we recommend that SSTL negotiates an appropriate launch on behalf of the Customer, but the Customer is final signatory on the Launch Agreement.

SSTL has achieved significant savings for its customers in the past through the use of this model and it is a recommended option.

Alternatively, SSTL can further discuss options:

- Customer procures a suitable launch
- SSTL procures a launch and delivers the satellite in-orbit.

SSTL brings the benefit of unique experience, market knowledge and strong connections and is well respected with all the key launch service providers. SSTL is also actively engaging with the 'New Space' launch vehicle companies and those providing rideshare opportunities, identifying credible providers who offer low cost and technically compliance.



IN-COUNTRY GROUND SEGMENT

The ground segments SSTL supply are complete turnkey systems, providing all of the hardware and software necessary to operate, maintain and process the data returned from the satellite.

SSTL ground segments have been successfully installed in several locations around the world and are based upon the highly automated facility maintained by SSTL in Guildford.

The ground segments plan the mission, command the spacecraft, collect housekeeping telemetry and payload data, then process the data in a format that the Customer can use.

The in-country ground segment for operating the SSTL-Cube platform consists of the following elements:

Ground Station

S-band antenna system including its tracking system and up and downlink chains and a Ground Station Modem.

X-band antenna is optional if Customer requires larger data throughput.

Satellite Operations Centre

Satellite Control Software and suitable computers to be located in the local Ground Segment to control the satellite.

Mission Operations Centre

SSTL will provide its own Mission Planning System (MPS) and Payload Processing (including radiometric processor for Earth observation).

TRAINING PROGRAMMES DELIVERED

SSTL has more than 35 years' experience in delivering training and collaborative programmes to space nations across the world, with a focus on trainees gaining technical independence.

NATION
Phillippines, DOST-ASTI
TEAM 13 | PERIOD 2021 | MISSION MULA

NATION
Kazakhstan, KGS
TEAM 24 | PERIOD 2012-2013 | MISSION KazEOSat-2

NATION
Algeria, ASAL
TEAM 18 | PERIOD 2014-2016 | MISSION AISAT-1B

NATION
Kazakhstan, Ghalam
TEAM 15 | PERIOD 2014-2016 | MISSION KazSTSAT

NATION
Canada, Urthecast
TEAM 8 | PERIOD 2017-2019 | MISSION Urthecast

NATION
Thailand, GISTDA
TEAM 48 | PERIOD 2018-2022 | MISSION THEOS-2 SmallSAT

NATION
USA, NASA / MSU
TEAM 3 | PERIOD 2007-2008 | MISSION Magnolia

NATION
Nigeria, NASRDA
TEAM 26 | PERIOD 2006-2009 | MISSION NigeriaSat-2 NigeriaSat-X

NATION
Nigeria, NASRDA
TEAM 12 | PERIOD 2001-2003 | MISSION NigeriaSat-1

NATION
Turkey, Bilten
TEAM 12 | PERIOD 2001-2003 | MISSION BILSAT-1

NATION
Algeria, CNTS
TEAM 12 | PERIOD 2000-2002 | MISSION ALSAT-1

NATION
Chile, FACH
TEAM 8 | PERIOD 1994-1998 | MISSION FASAT-A&B

NATION
Thailand, MUT
TEAM 12 | PERIOD 1995-1997 | MISSION Thai-Paht

NATION
Singapore, NTU
TEAM 2 | PERIOD 1995-1997 | MISSION UoSAT-12 (payload)

NATION
Malaysia, ATSB
TEAM 9 | PERIOD 1996-1998 | MISSION TiungSat-1

NATION
China, Tsinghua University
TEAM 12 | PERIOD 1998-1999 | MISSION Tsinghua-1

NATION
Japan, Fujitsu
TEAM 3 | PERIOD 1992-1994 | MISSION FjSAT

NATION
Portugal
TEAM 6 | PERIOD 1992-1994 | MISSION PoSAT-1

NATION
South Korea, KAIST
TEAM 12 | PERIOD 1989-1993 | MISSION KITSAT

NATION
South Africa
TEAM 2 | PERIOD 1989-1992 | MISSION UoSAT 3/4/5

NATION
Pakistan
TEAM 10 | PERIOD 1984-1988 | MISSION BADR-1

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