G&A Engineering

SPACE

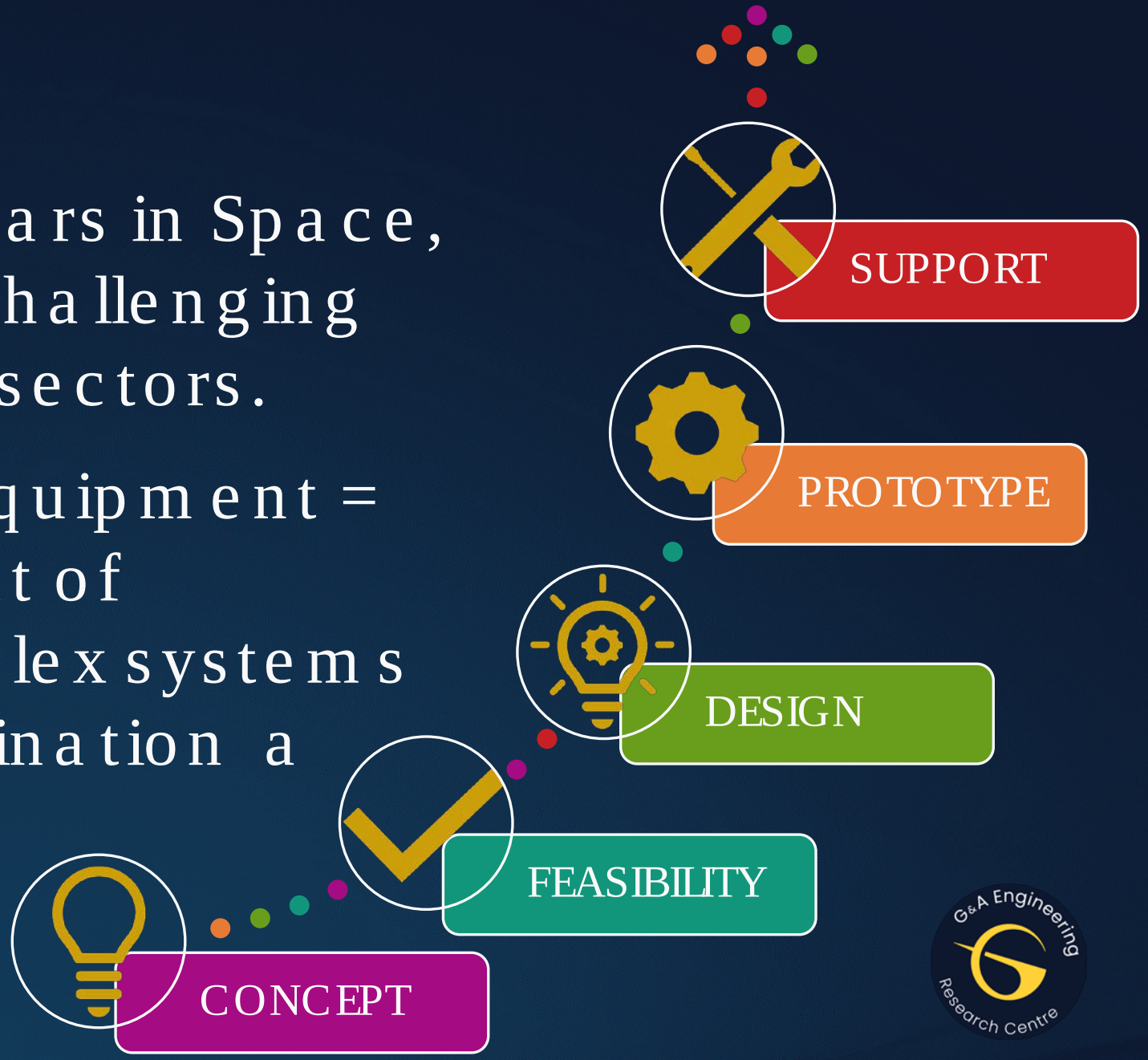
Smart Platform Architecture for Cubesats Easily
scalable & modular

ASI Cubesat Workshop, Roma 04/07/2024

G&A Engineering

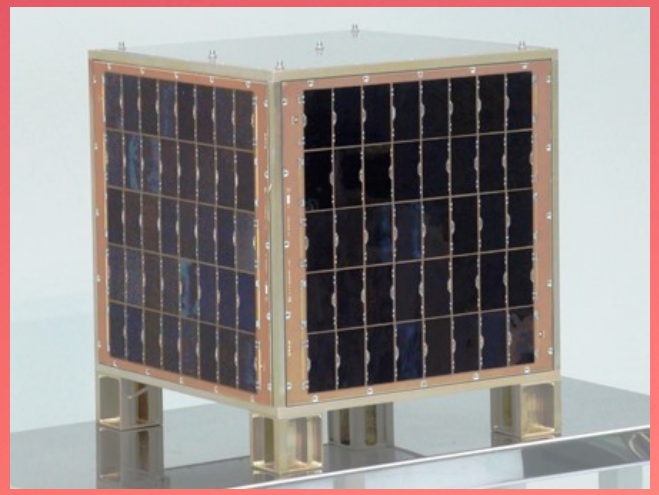
Working from over 45 years in Space, Defense, Automotive & challenging Professional Electronics sectors.

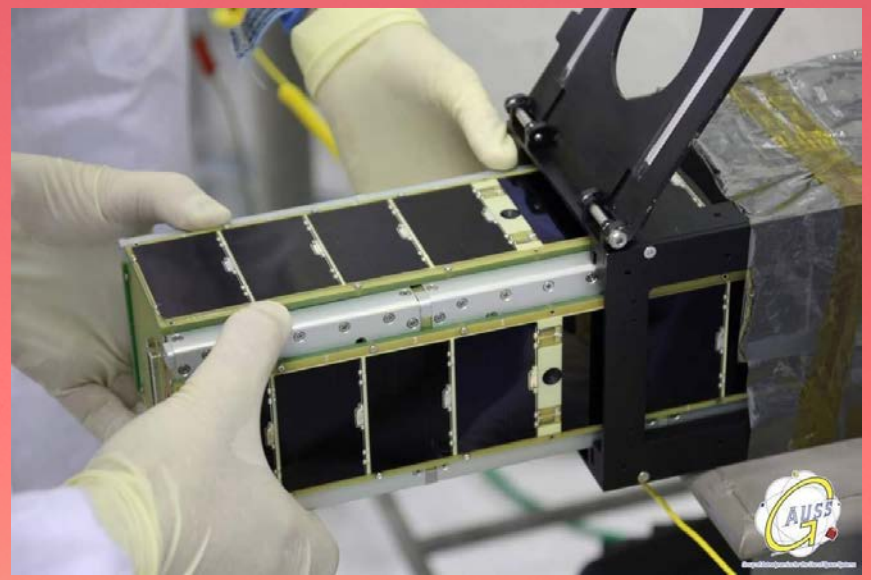
Main Business: Special Equipment = Design and development of sophisticated and complex systems composed by the combination a mix of technologies.

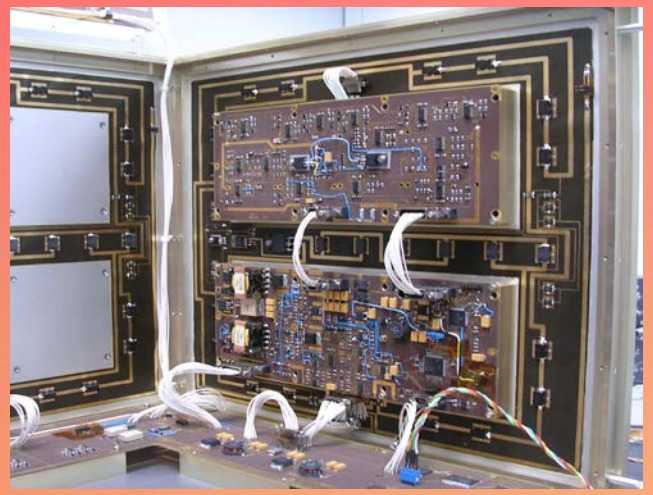


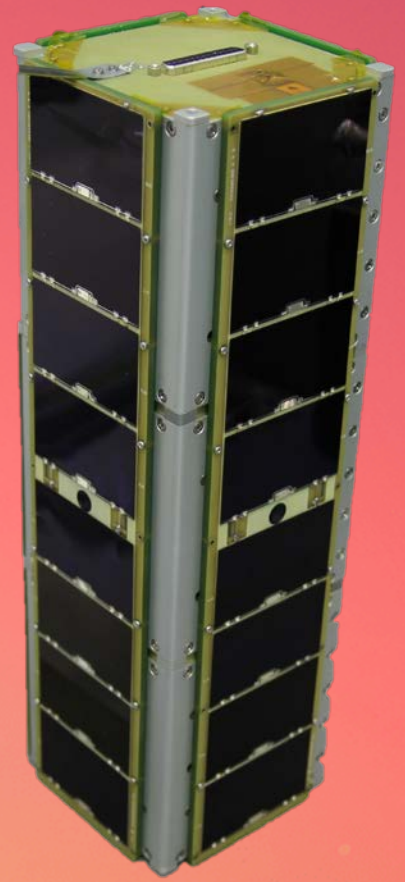
HERITAGE

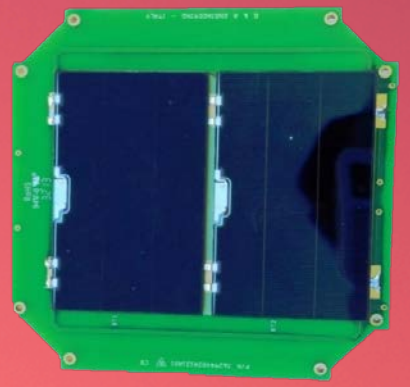
SMALLSAT & CUBESAT DESING, MANUFACTURING & TEST

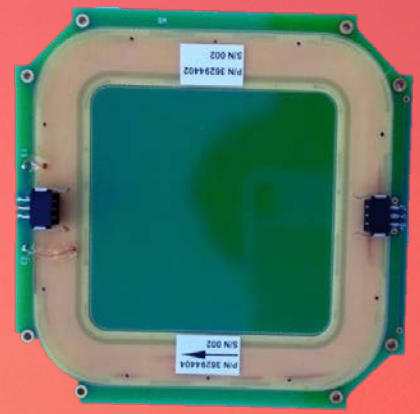












“SPACE” PROJECT

Smart Platform Architecture for Cubesats Easily scalable & modular

A new smart technological satellite platform with a high degree of miniaturization and standardization for the creation of a scalable, technologically advanced CubeSat structure that integrates with microelectronic and micromechanical solutions, miniaturized subsystems such as EPS (Electric Power System) with Solar Cells, Battery Pack, MPPT, Energy Manager and TCS (Thermal Control System) for Thermal Control.

“SPACE” PROJECT

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The SMS demonstrator is a 3U, scalable up and down to any standard CubeSat size.

The walls are made using a multi-layer power-pcb or IMS, Insulated Metal Substrate technology aimed at guaranteeing the necessary structural robustness, the shield functions from the external environment and at the same time the multi-layer wiring necessary to allow the assembly on the internal walls of all possible microelectronic and micromechanical devices.

“SPACE” PROJECT

Smart Platform Architecture for Cubesats Easily scalable & modular

All the components necessary to create the EPS are directly mounted on the internal walls of the structure using SMT, wire bonding and 3D AME if necessary.

Solar panels have been studied and designed using the latest generation state-of-the-art cells and proprietary technologies have been applied for their assembly.

The solar panels are designed both to be housed on the external faces of the Cubesat and to be deployed once in orbit using a particular micro-mechanism.

“SPACE” PROJECT

Smart Platform Architecture for Cubesats Easily scalable & modular

For the power subsystem, the latest low-profile generation lithium-ion storage batteries are used (solid state cells under evaluation), which are also integrated into the walls of the SMS, directly mounted, wired and sealed by micromechanics integrated into the metal surface of the SMS.

“SPACE” PROJECT

Smart Platform Architecture for Cubesats Easily scalable & modular

Micro-breaking points are created in the metal case guaranteeing the opening for internal pressures exceeding a predetermined value, protecting against explosion due to the generation of internal gases.

An MPPT is implemented to obtain the maximum power available from the photovoltaic panels in different lighting conditions.

A microcontroller allows real-time control/management of power subsystems and manages a proprietary BMS.

“SPACE” PROJECT

Smart Platform Architecture for Cubesats Easily scalable & modular

By using 2 EPS, complete redundancy of the electrical subsystem is achieved, and the use of "n" EPS allows the power available on board to be increased in accordance with mission needs.

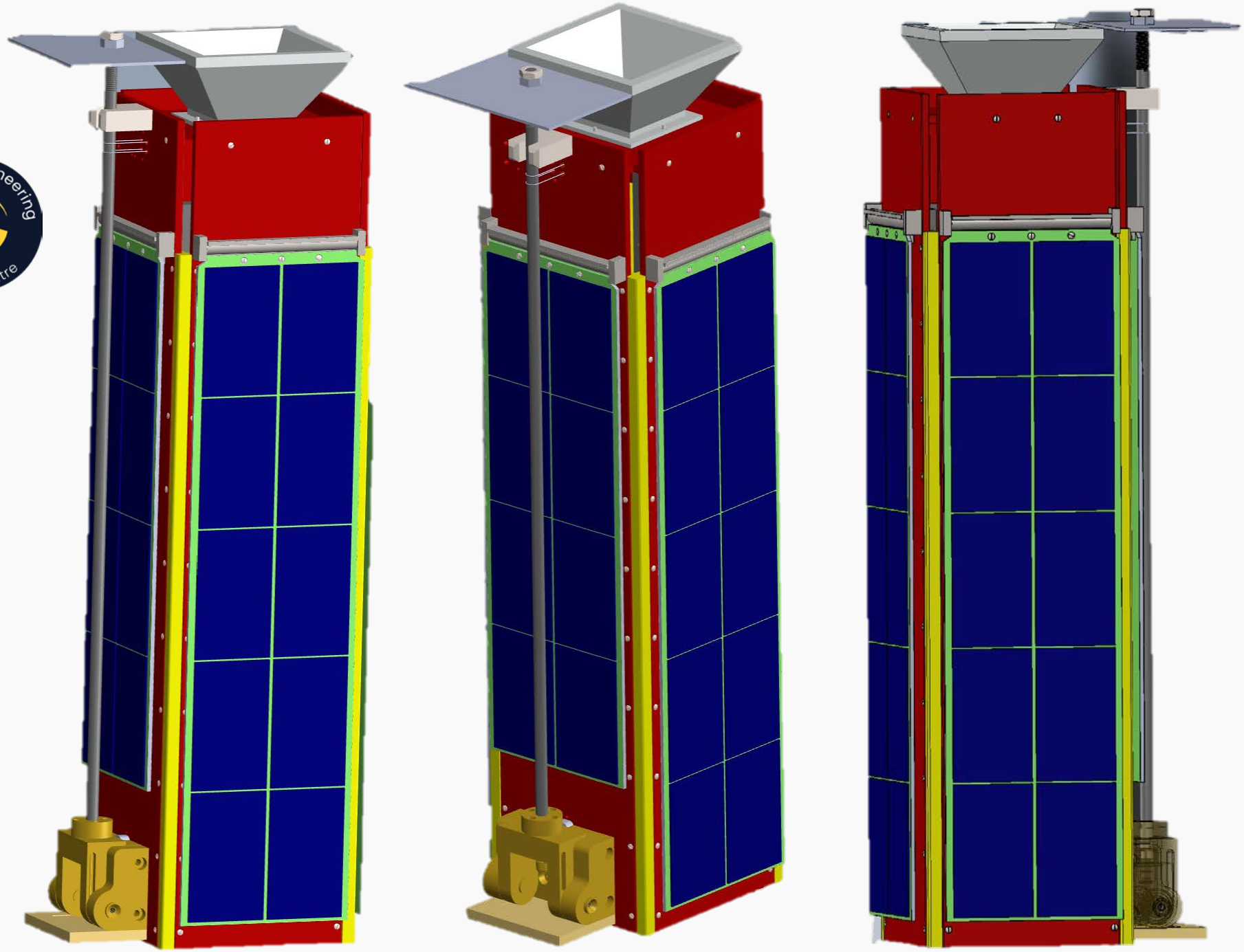
The electrical system guarantees that when the energy supplied by the solar array is insufficient for the bus, the energy need is automatically filled by drawing energy from the battery pack.

“SPACE” PROJECT

Smart Platform Architecture for Cubesats Easily scalable & modular

Everything is oriented towards a standardization that allows scalability within the possible CubeSat configurations.

The goal is to offer alternative and innovative technological solutions on the market, reducing the overall dimensions of the subsystems, maximizing the useful spaces for the payload.

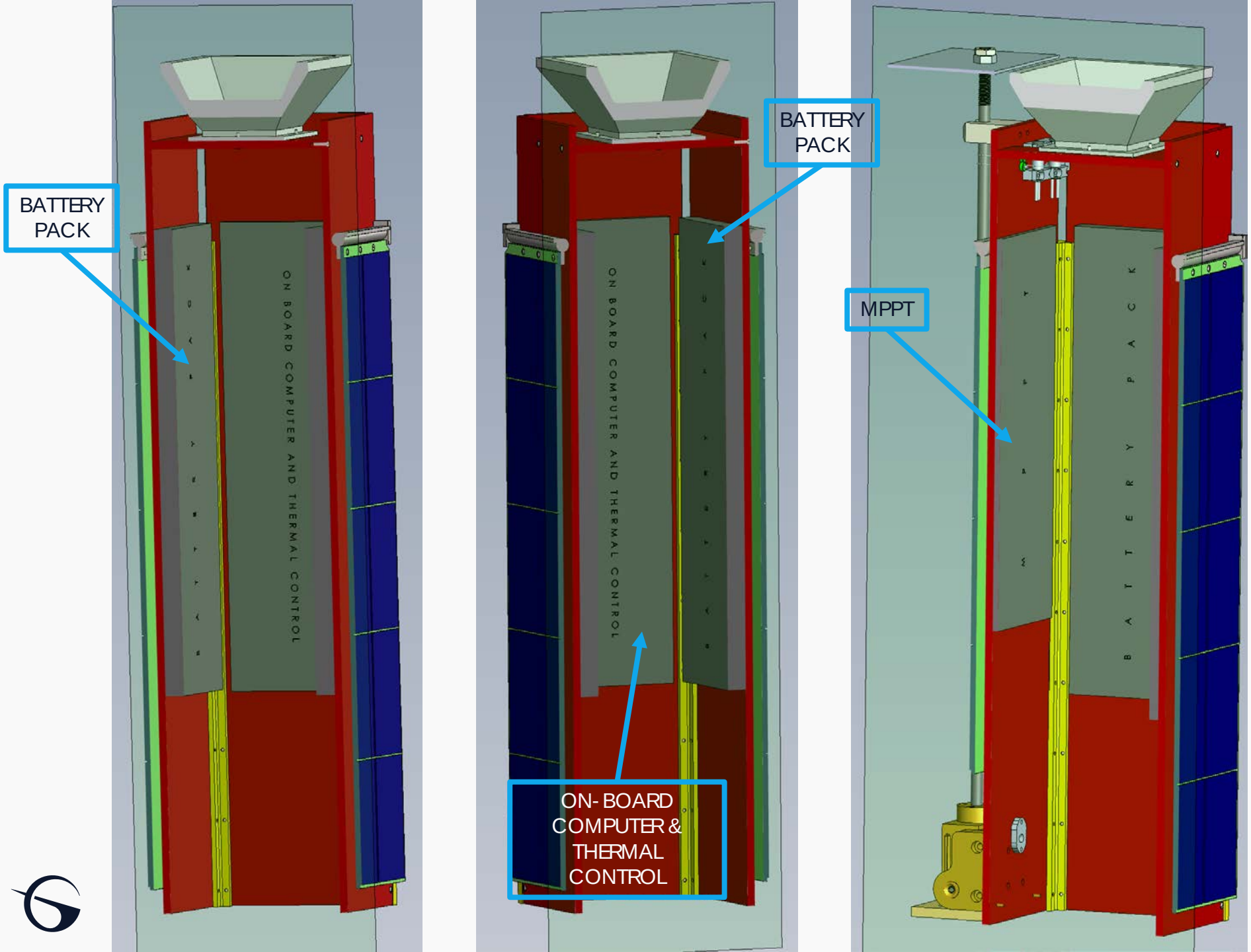


SPACE CUBESAT

At the moment 3U has been designed.

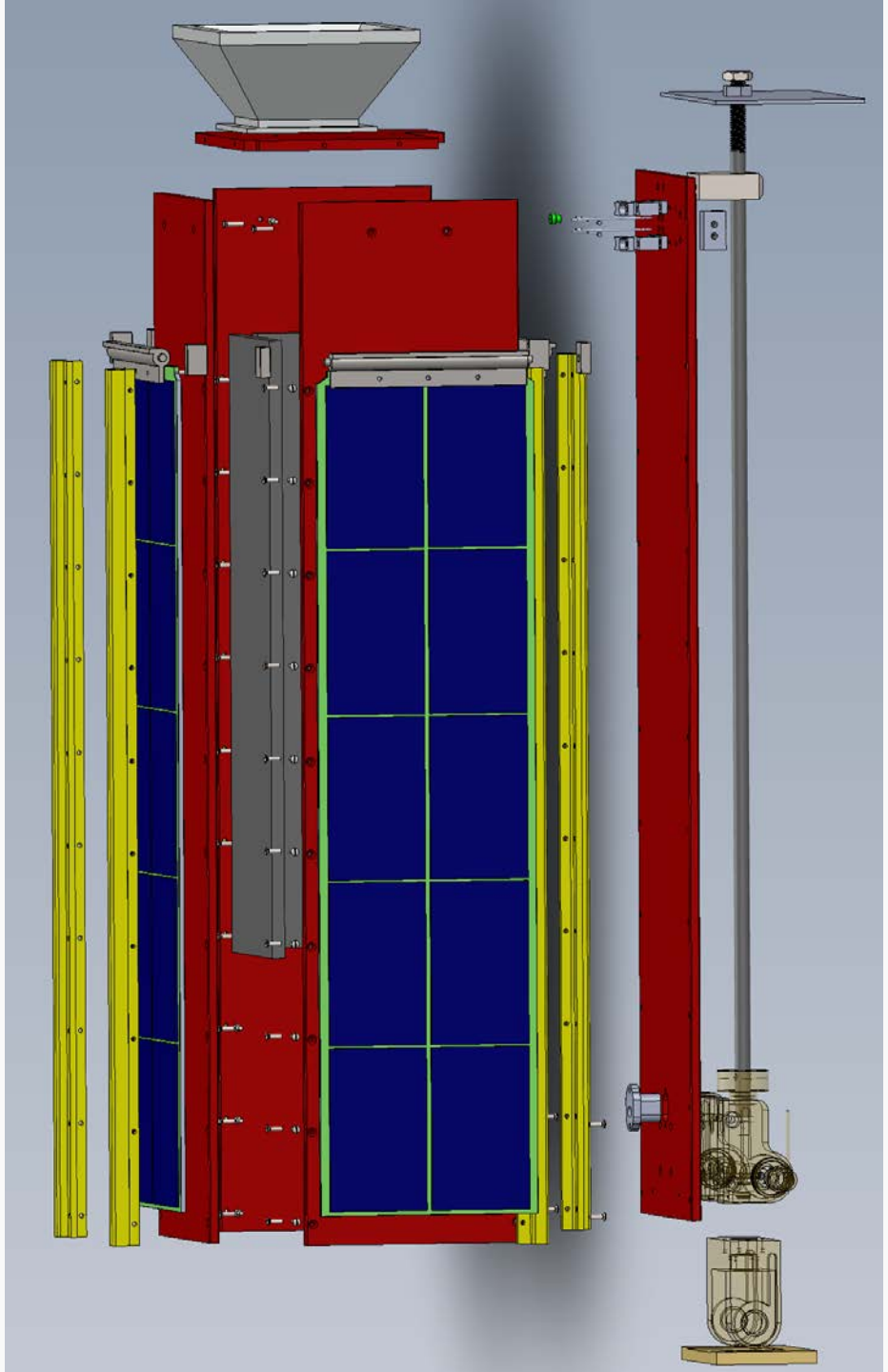
Deployable solar panels.

UHF band deployable antenna & S band antenna.



SPACE CUBESAT

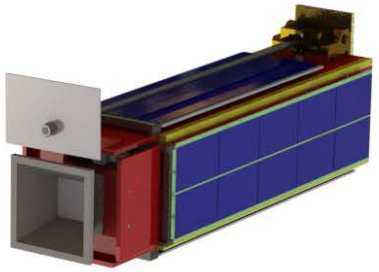
Internal space maximized for payload. EPS, OBDH & TCS directly into the satellite walls.



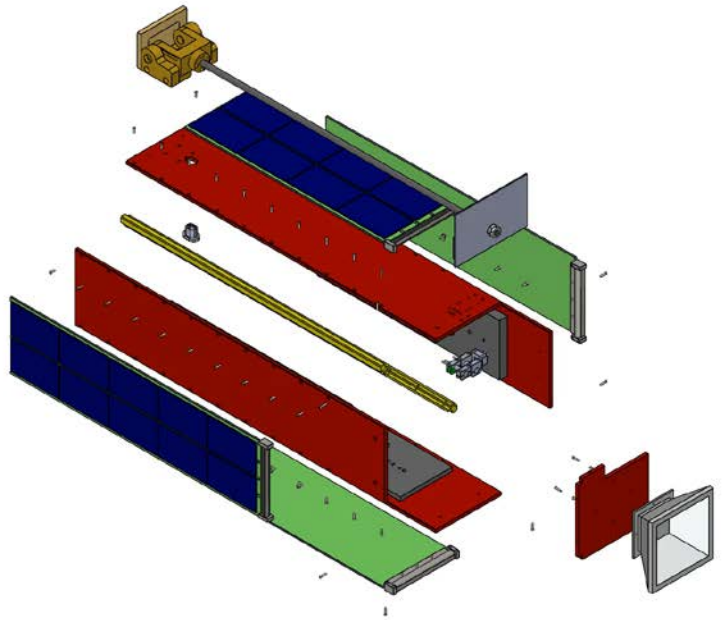
SPACE CUBESAT

Easy to assemble.
Easy to reconfigure.
Easy to scale.

LET'S ANIMATE!



LET’S ANIMATE!



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THANK YOU