



Space Activities in <1 min video
<https://www.youtube.com/watch?v=Jt0HQ2YNdhQ>

Competences & **Experience in Space**

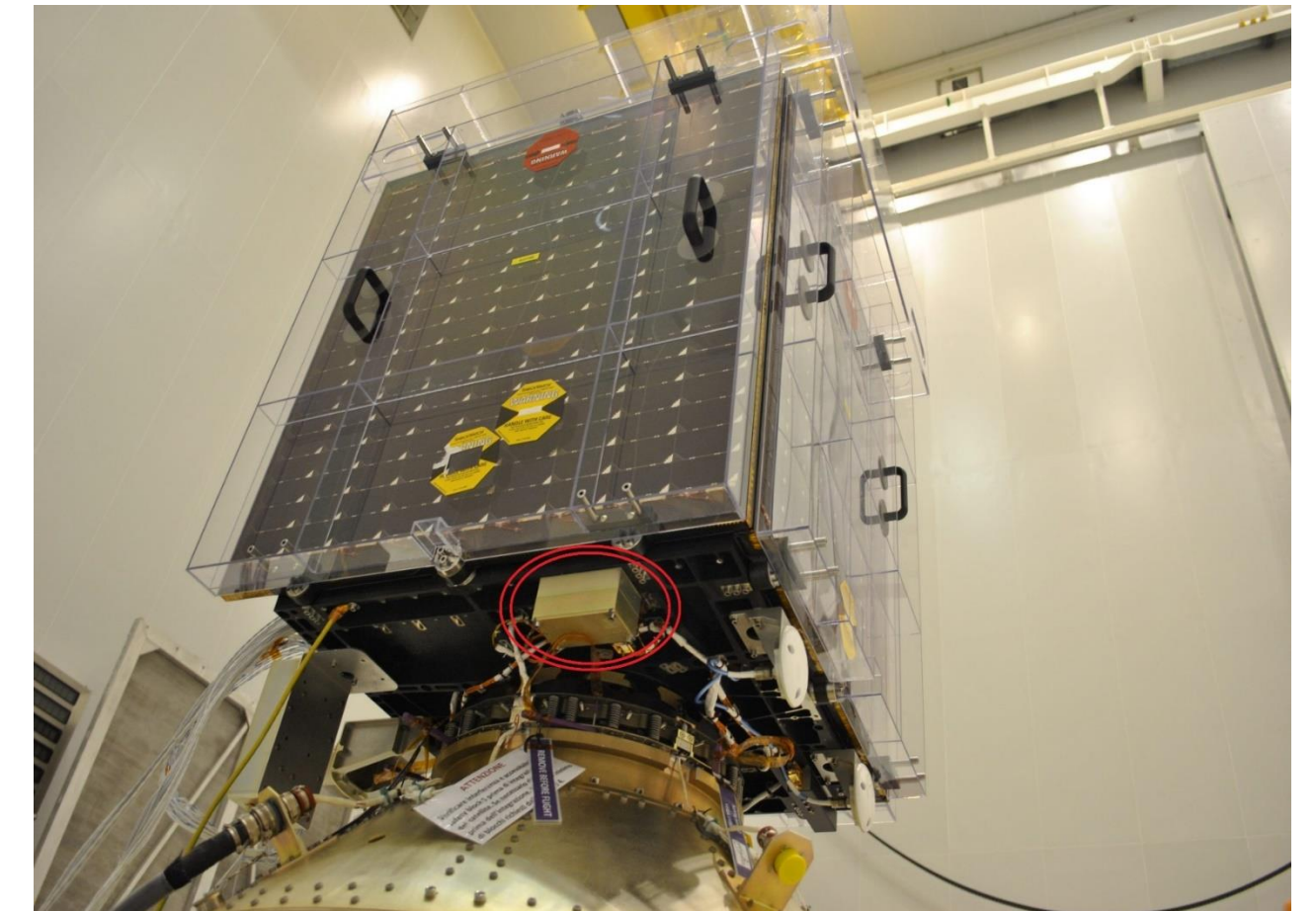
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BD SENSORS CSRC Space Division

Mid-sized Czech Company
located in Buchlovice and Kromeriz

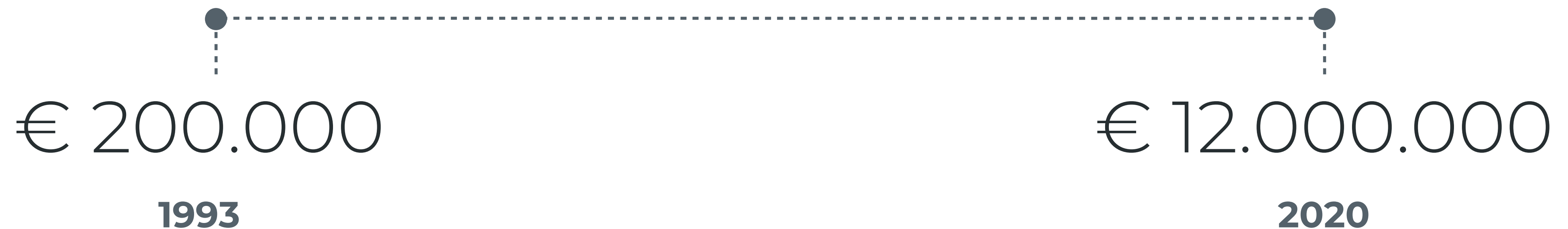
Main capabilities include the following domains:

- Space Electronics / Flight Hardware
- Electronic Ground Support Equipment (EGSE)
- Power & Energy Storage
- Harness & Cabling Manufacturing and Testing
- Propulsions, PEPE Rocket Engine
- Electronic Pressure Sensors for Space and Industry
- High-quality Industrial Electronic Production



2020 Figures

- Number of Employees: 170
- Operating Revenue / Turnover: 11.900.000 EUR
- Total Assets / Liabilities: 16.300.000 EUR
- Capital: 15.200.000 EUR

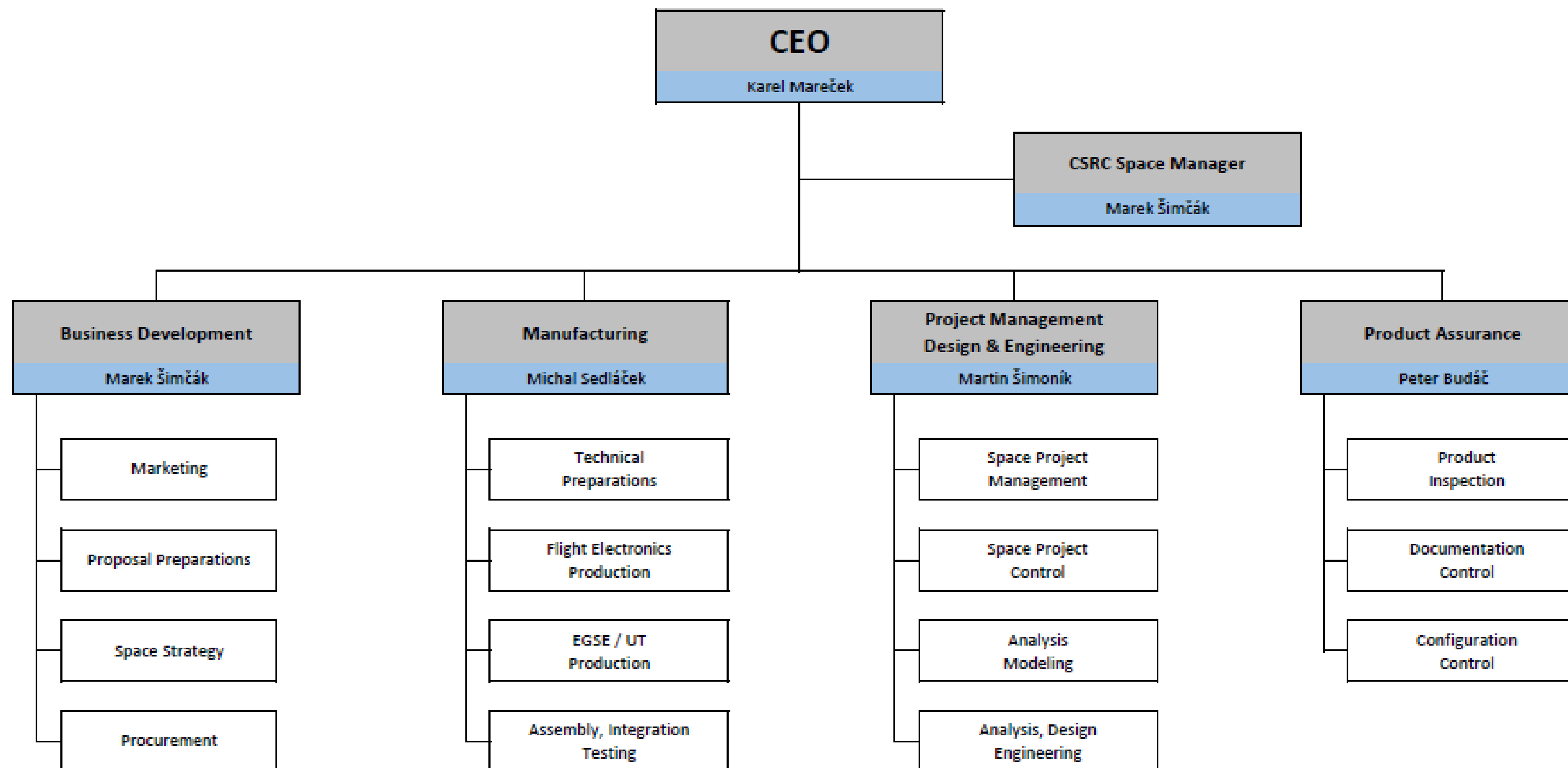


2021 Preliminary Figures

- Number of Employees: 180
- Operating Revenue / Turnover: 13.400.000 EUR

Organigram BD SENSORS / CSRC Space

Internal Organisation for CSRC Space = Unit 1000-1030

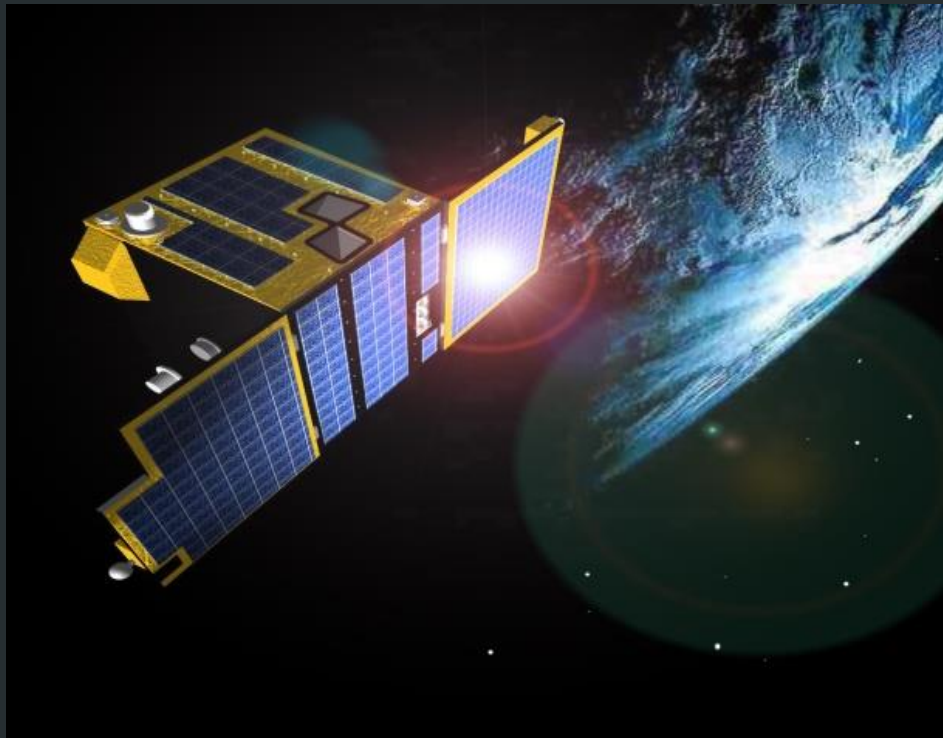


Internal Guideline: OS-203/02

Issue 1: 1.8.2018 / update no.05

Issue 2: 1.12.2020 / update no.09

1.12.2020 / Approved by Karel Mareček, CEO



Electronic Units

Clients:

ESA

Airbus, Thales-Alenia

Description:

Custom made space electronic units
for Power Supply and Data Processing Applications

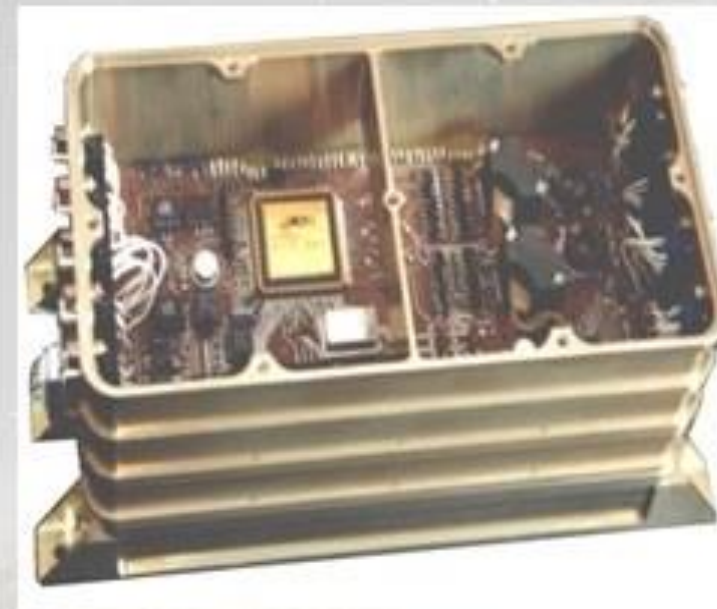
Space Heritage since 1994

More than 100 projects...

CSRC In-Orbit Success



Complex development, design, analyses, manufacturing, testing, delivery
including support in acceptance campaign and integration phase



INTEGRAL - PSAC - 2001
Plastic Scintillator Anti-Coincidence
Flight unit for photomultiplier high-voltage control



DEMETER - I/V Converter - 2001
I/V Converter for Langmuir Probes
pA to μ A current range to voltage



SMART1 - EPDP - 2002
First European Mission to the Moon
EPDP Measuring Unit, CAN bus



PROBA2 - DSLP&TPMU - 2006
Data Processing & Communication Unit
2x I/V Converters for Langmuir Probes



SWARM - MAC - 2011
Microaccelerometer
PWR, DPU, Sensor Units

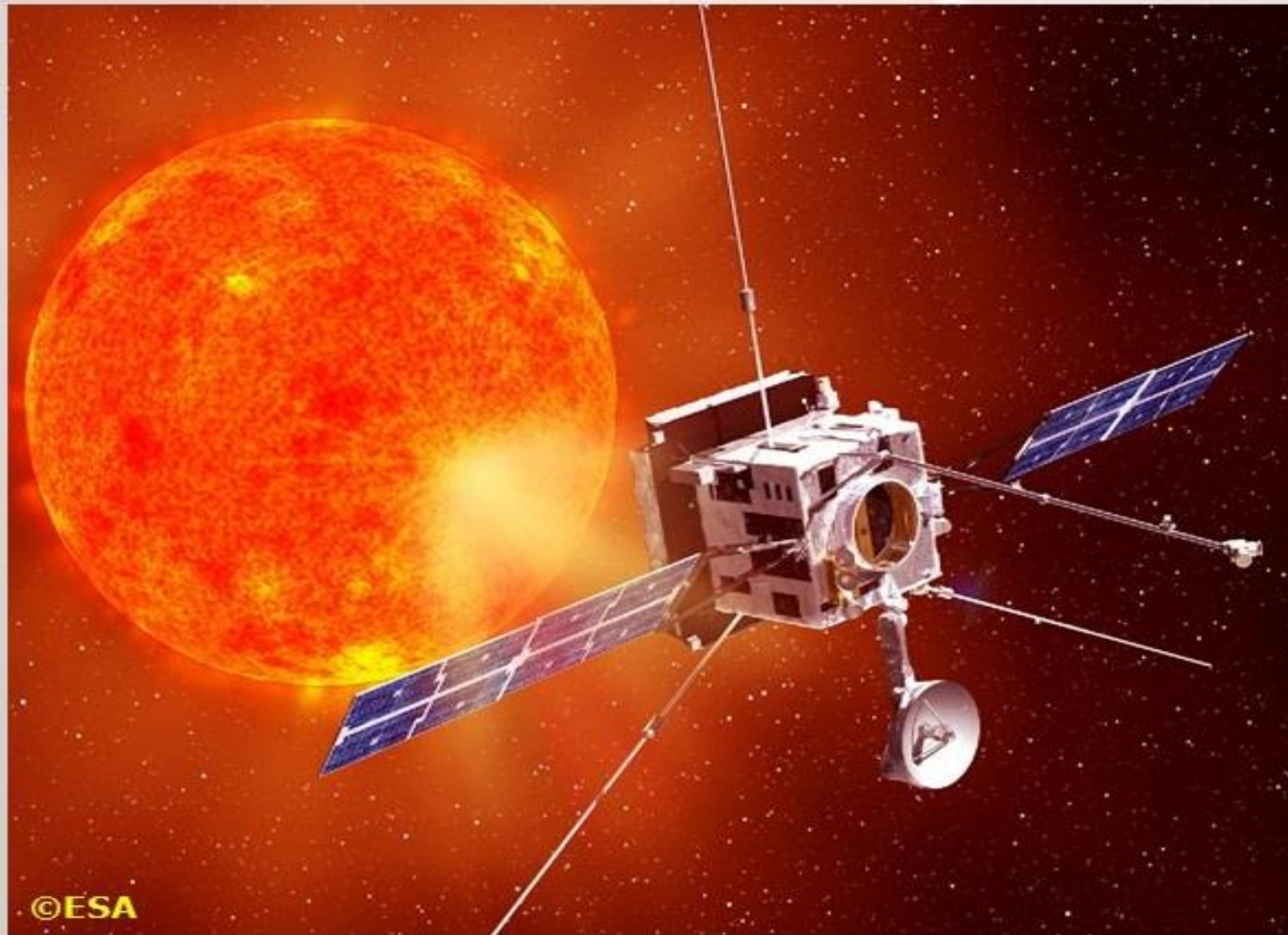


PROBA-V - SATRAM - 2013
Multispectral Earth Observation
Time-Pix Radiation Monitor

Latest In-Orbit Success: SOLAR ORBITER Mission 6

Launched 10.2.2020, 5:03h - Atlas V 411 - Mys Canaveral

BD SENSORS delivered an electronic LVPS Modules
for the SOLO RPW & STIX scientific instruments



Latest Space Activities

Clients:

ESA

Airbus, Thales-Alenia

Jena-Optronik, Sener, Ruag, Honeywell

Projects:

Star Sensors Electronics

Docking Sensors & Rendezvous Electronics

JUICE APME Unit

METOP SG 3MI / FWC

Solar Orbiter RPW / STIX

Banks of Super-Capacitors

ELISA Laser Head PWR / MD

ISS ACES European Laser Timing

NEOSAT EGSE Thermal Vacuum Validation

Current Space Activities

BD SENSORS[®]
Space CSRC

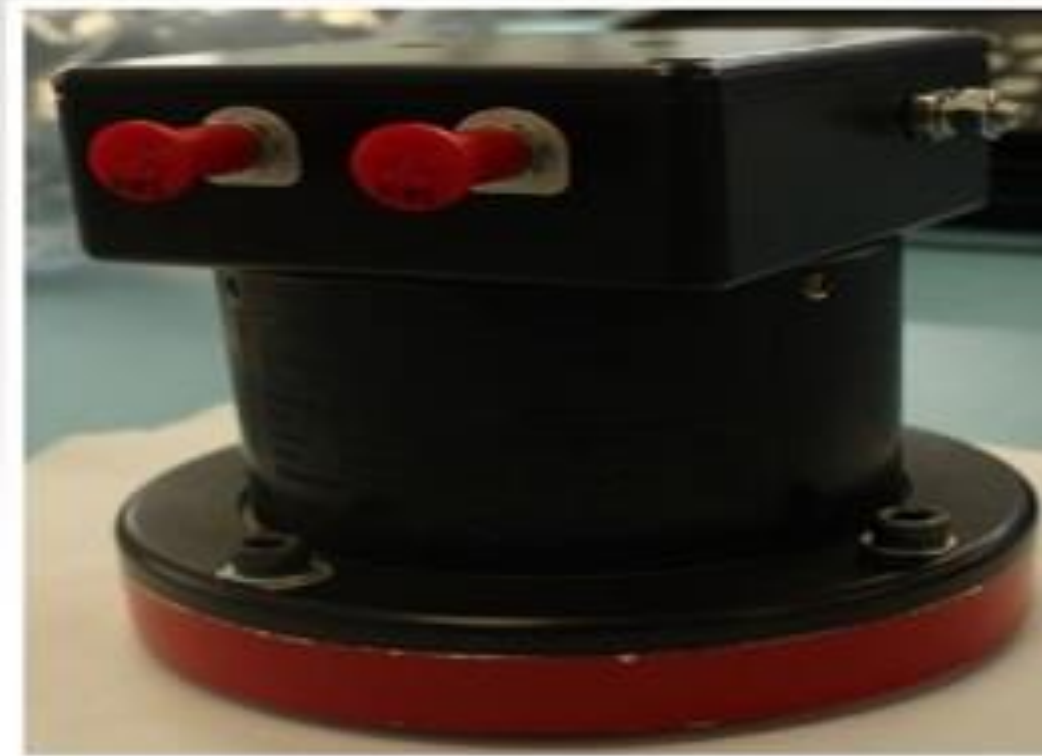


Space Industry: HW Delivery Examples

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SOLAR ORBITER - RPW
LVPS Power Supply Board



ELT – ISS / ACESS
European Laser Timing



SOLAR ORBITER - STIX
LVPS Power Supply Board



ELISA - PWR
Power Supply for Laser Head



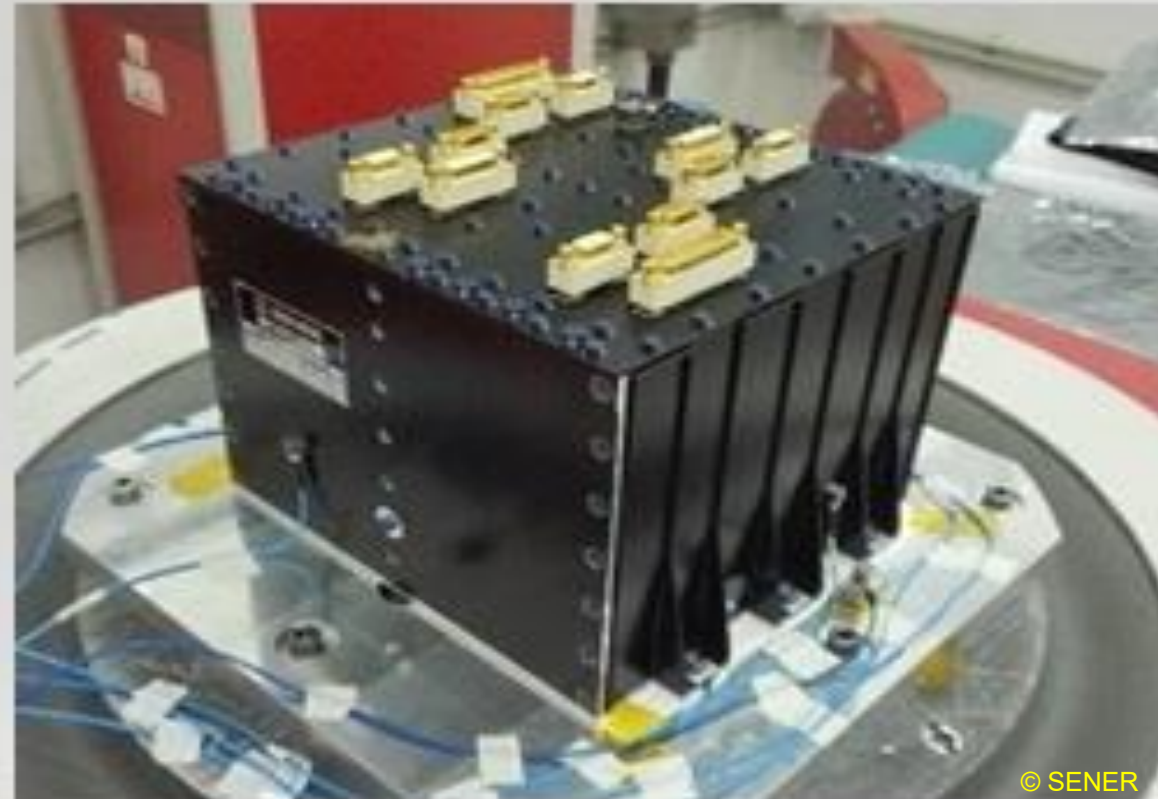
METOP SG - FWC
Unit Tester - EGSE



BOSC - PWR
Bank of Supercapacitors

Space Industry: HW Delivery Examples

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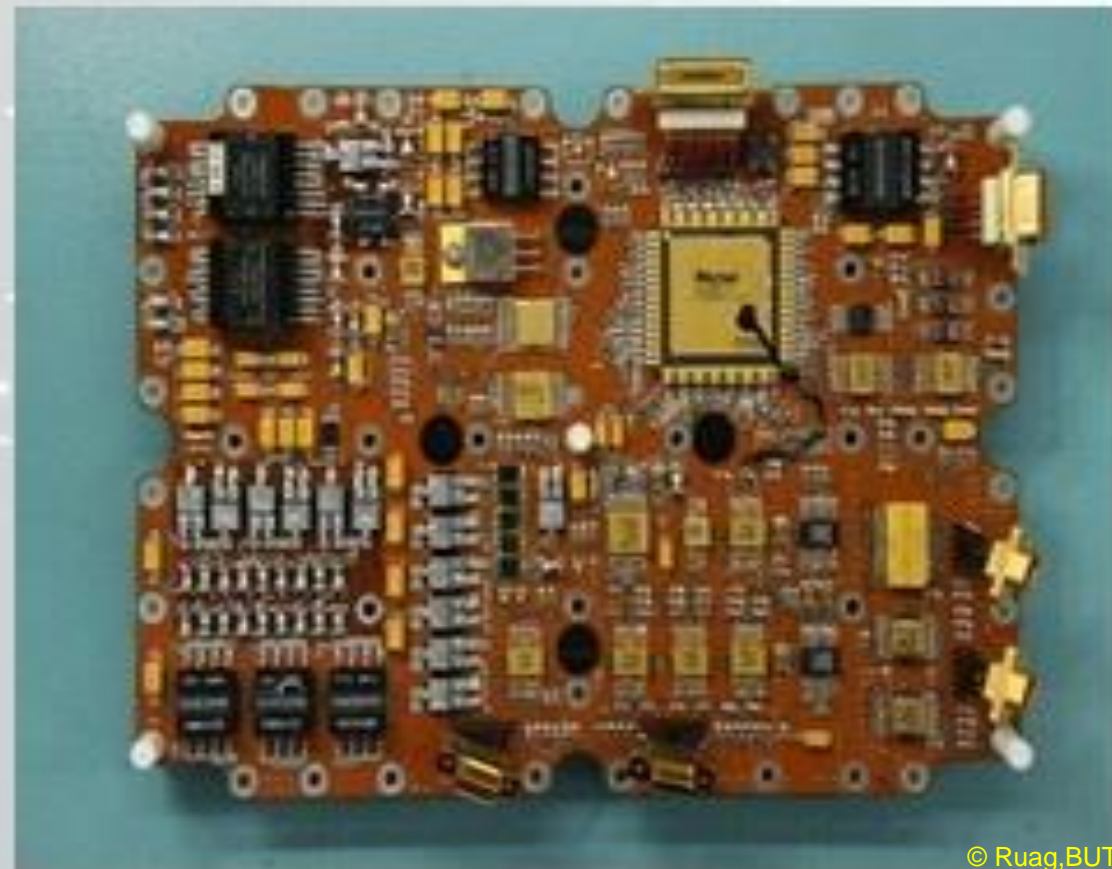
JUICE – Mission to Jupiter
APME Unit



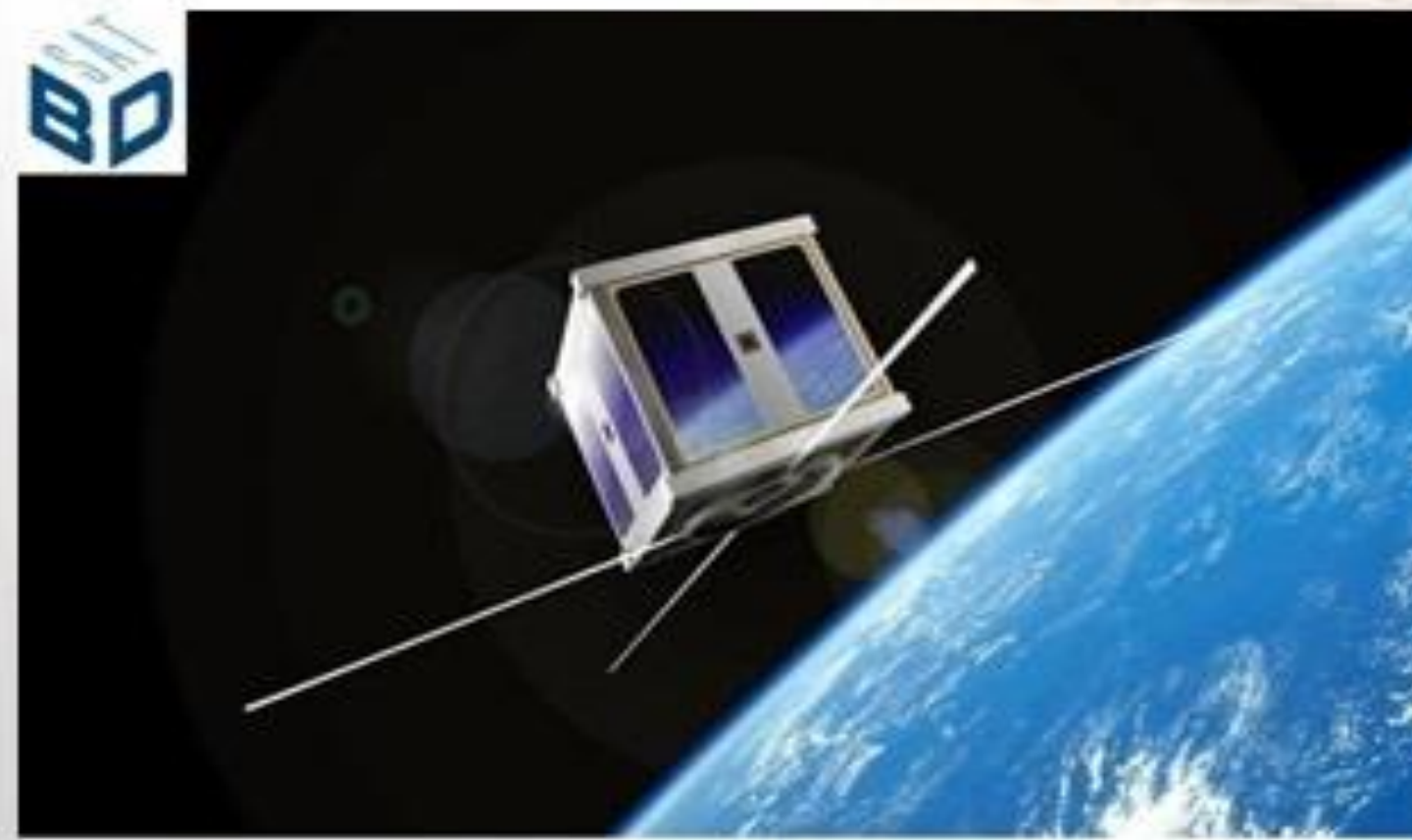
JUICE – Mission to Jupiter
PCB Sensors



SOLAR ARRAY
EGSE / Tester



METOP SG - FWC
PCB EQM



BDSAT CubeSat
Pressure Sensor & BOSC



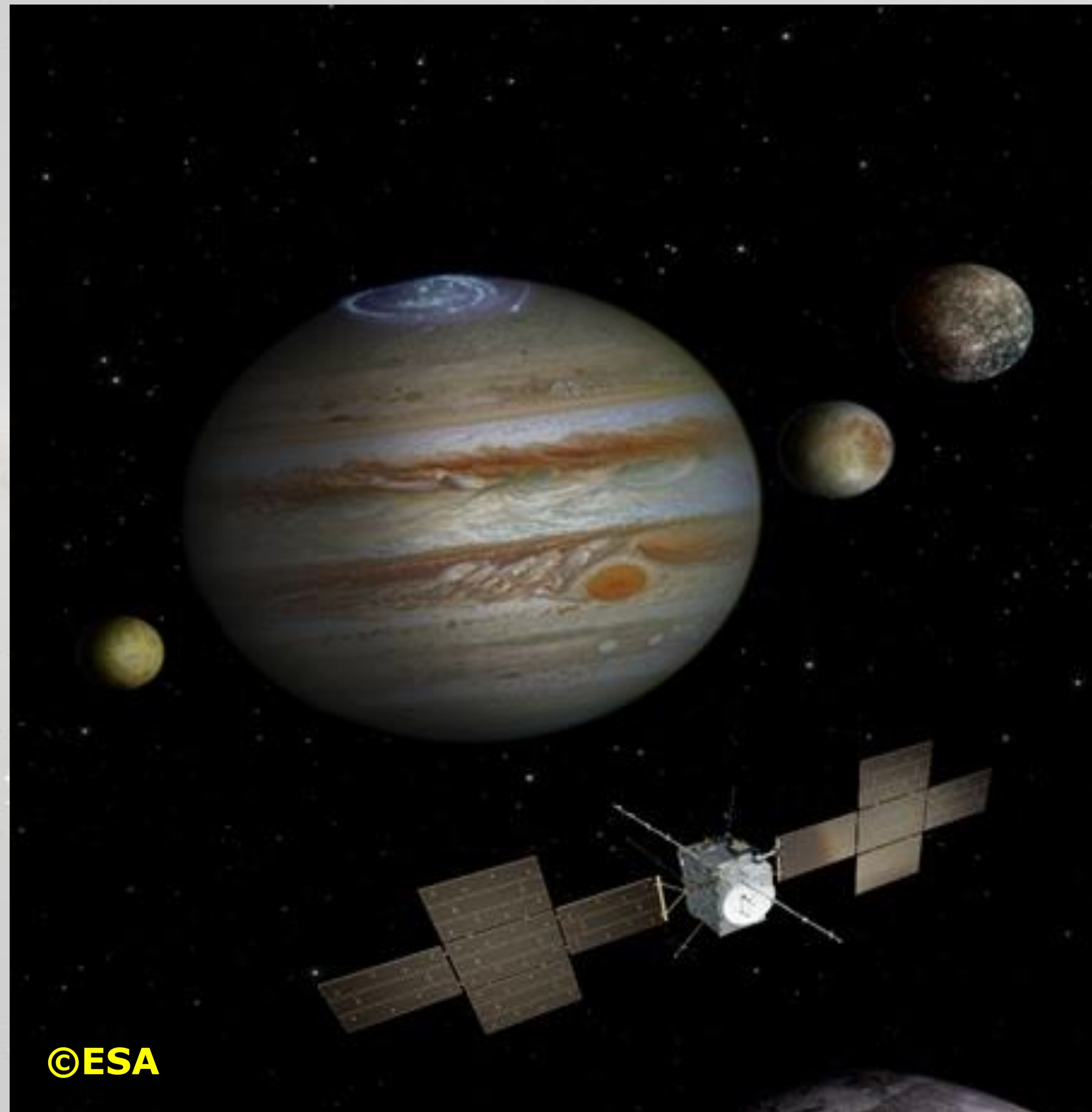
BOSC - PWR
EQM Bank of Supercapacitors

Coming In-Orbit Event: JUICE Mission

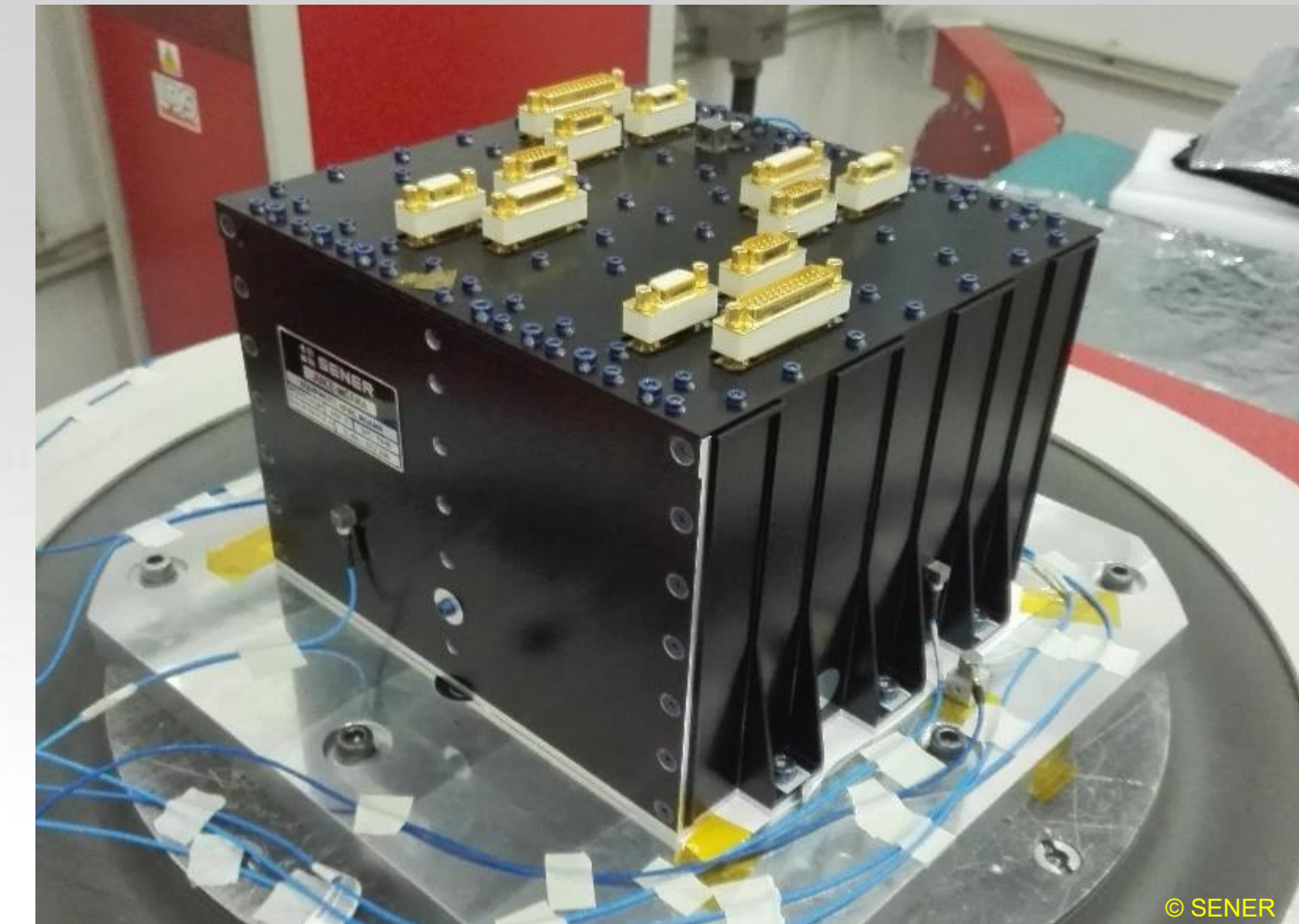
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Launch planned 2022 - Ariane 5 – Guyana Space Centre / Kourou

BD SENSORS delivered electronic APME Unit for the JUICE Mission



APME Unit



APME Board



Capabilities and Resources

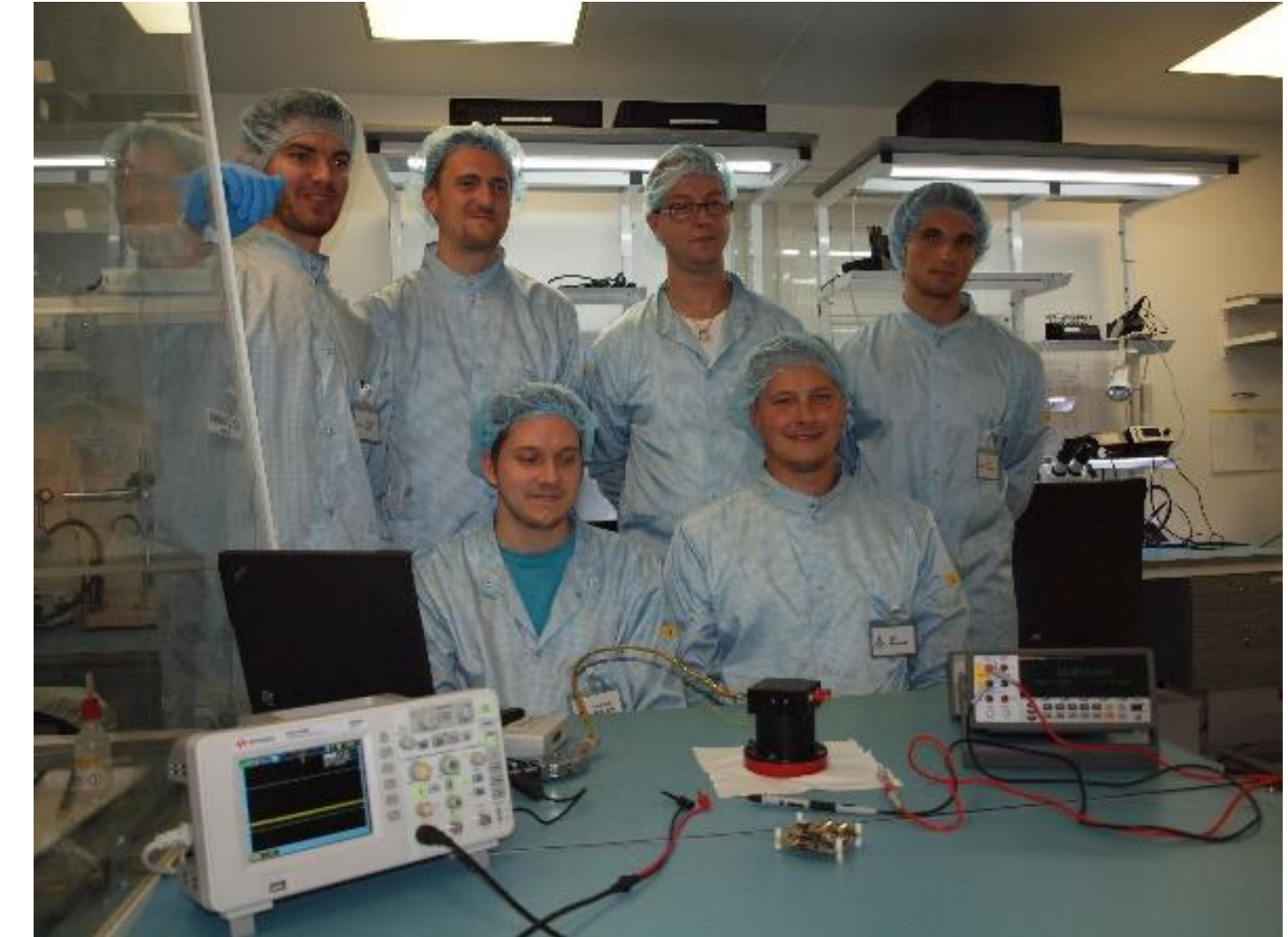
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Resources

- 100.000 Cleanroom for Space Electronics Manufacturing
- 10.000 / 100 Cleanroom for MEMS and Special Applications
- Automated Robotic Nests, Industry 4.0
- Mechanical Machining, Multi axis CNC machines, cutter
- Software Design Tools (Altium Designer, Solidworks)
- Software Analysis Tools (Structures, Thermal)
- Accredited Calibration Laboratory
- EMC Laboratory
- Temperature and Humidity Chamber
- Ultrasonic Cleaning
- Automated Storage

Highly Qualified Staff

- Engineers for Industrial & Space Electronics
- ECSS Certified Operators and Inspectors
- Experienced Product Assurance
- Project Managers



Core Business: Flight PCB Assembly

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Manual Soldering Technology

- Long-term experience with Flight PCB Assembly since 1996 - the Czech pioneer
- Personnel qualification in accordance with the ESA ECSS Standards
- Operators and Inspectors certified for ECSS-Q-70-08, -38, -26 and -28
- SMT Verification Campaign, growing ESA SMT Summary Table

New Automatic Line for Space Electronics Production

- The very 1st existing technology in CZE for ESA programmes
- ECSS qualification in progress
- This assembly line is installed in cleanroom ISO class 8.
- The line covers complex automatic & manual soldering technology
- Minimum of 4 special workplaces established
- Company's private investments and technology installations completed

Machine soldering is based on:

- Vapour phase technology with vacuum unit.
- Solder paste will be applied through stencils on semi-automatic printer
- Semi-automatic pick and place machine

The technology includes also workplaces for all relevant activities necessary for the Flight Unit manufacturing with mechanical integration, gluing, harness, crimping, electrical testing and the others.



Examples of realized EGSE Projects

- EGSE for METOP SG / Filter Wheel Controller (FWC)
- EGSE for NEOSAT / Thermal Test Benches (NEO)
- EGSE for Banks of Supercapacitor (BOSC)
- EGSE for Solar Mechanism (SOME)



FWC



BOSC



SOME



NEO

Certificates and standards

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TÜV SÜD



ISO 9001

SIL



EX ATEX

DNV GL



FDA



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