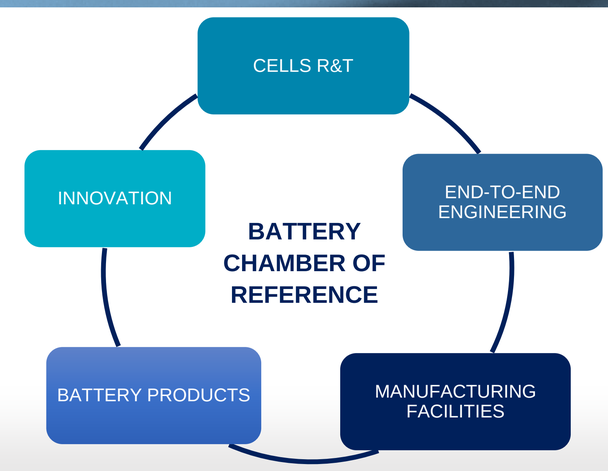
DEFENCE AND SPACE

Powering the future: Space Battery Products

What do we do ?

- **Battery Chamber of Reference** for AIRBUS Group
- **End-To-End** Battery H/W **for Space and Aeronautics**
- Pushing **innovation** to **decrease cost & leadtime** at system level
- More than **20 years experience** with Li-ion cells



End-to-End skills

CELLS	ELECTRICAL SIZING	BATTERY DESIGN	BATTERY MANAGEMENT SYSTEM	MANUFACTURING & TESTING
Continuous cell technology screening and testing Space qualification plan approved by major Space stakeholders	Use of Design Of Experiment and in-orbit data to map batteries behaviors and build ageing models	Mechanical, thermal, electrical, electronical design and simulations Low cell to pack mass ratio	Hardware ECSS / DO254 Software ECSS / DO178 Algorithms & Modelling	Fast prototyping Serial production Environmental ECSS / DO160 Electrical & Safety ECSS / DO311

Our capabilities

ELECTRICAL LAB

- Airbus Group Chamber of Reference (CoR) for electrochemical cells and batteries testing
- **Support programs** and **R&T needs in terms of testing** (batteries, solar cells, super capacitor, electrical system, propulsion, etc.)

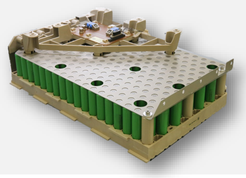
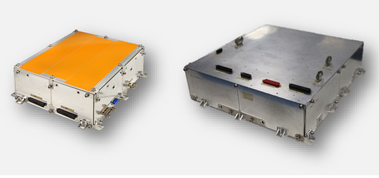
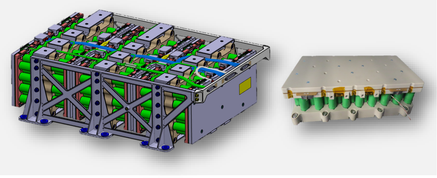
> 300 cells tests channels	20 thermal chambers	2 vacuum chambers	Abusive test facilities
• More than 300 cells individually tested at the same time	• -70 to +200°C • Humidity control • Automatic safety measures	• 1mbar capability • Deep vacuum chamber	• Fire and explosion proof equipment for cells and battery abusive tests

BATTERY ASSEMBLY LINE

- **Dedicated and automatized Battery Assembly Line (BAL)**
  More than **500m²** for assembly and tests, **operated & qualified** since 2019
- Lean 6 Sigma, fully repetitive operations with automated processes, EN9100 quality standards
- **More than 1000 flights battery modules** already manufactured
- **Second Assembly Line** manufacturing on-going
  More than **300m²** ready to operate end of 2025

Our products

- COTS Li-ion cells qualified for Space, well established supply line (LTA)
- Industrial design & modularity
- Optimized lead-times
- Competitive REC prices while keeping a high level of reliability
- Not submitted to export licences

GEO/MEO TELECOM AND NAV. BATTERIES	LEO CONSTELLATIONS BATTERIES	LEO OPTICAL/RADAR SATELLITES BATTERIES	LAUNCHERS BATTERIES
COSMO-BATT	**STELLAR-BATT**	**ASTRO-BATT**	**LAUNCHER-BATT**
			
3 types of modules: o **Small (-S)** – max. EoCV 4,2V, 550 to 960Wh o **Medium (-M)** - max. EoCV 4,2V, 1100 to 2100Wh o **Large (-L)** – max. EoCV 4,2V, 2200 to 2900Wh Passive balancing system, normal and forced mode, voltage and temperature telemetries	**2 types of modules:** o **Small (-S) –** Max. EoCV 37,8V, 1685Wh o **Large (-L) –** Max. EoCV 37,8V, from 900 to 3600Wh Passive balancing, timer, power switch ON/OFF, shunt current measurement, voltage and temperature telemetries, heaters EEE automotive COTS components	**3 voltage configurations:** o **30V** – max. EoCV 33,6V, 3600Wh (-S) or 5400Wh (-L) o **50V** - max. EoCV 50,4V, 5400Wh o **100V** – max. EoCV 100,8V, 5400Wh Passive balancing system, voltage & temperature telemetries	**2 types of modules:** o **Small (-S)** – max. EoCV 33,6V, 260Wh o **Large (-L)** – max. EoCV 63V, 1620Wh Embedded fuses for safety
> 70 modules in orbit **> 250 FM units manufactured**	**> 630 satellites in orbit** **> 1300 years in orbit cumulated lifetime**	**TRL7 - Qualification mid-2024**	**> 140 FM units manufactured** **1st launch mid-2024**

AIRBUS