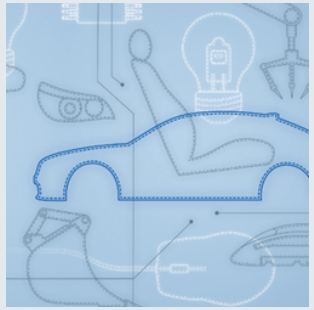
ETAS Solutions for Battery Development

NAATBatt, February 11th 2020

ETAS Solutions for Powertrain Electrification

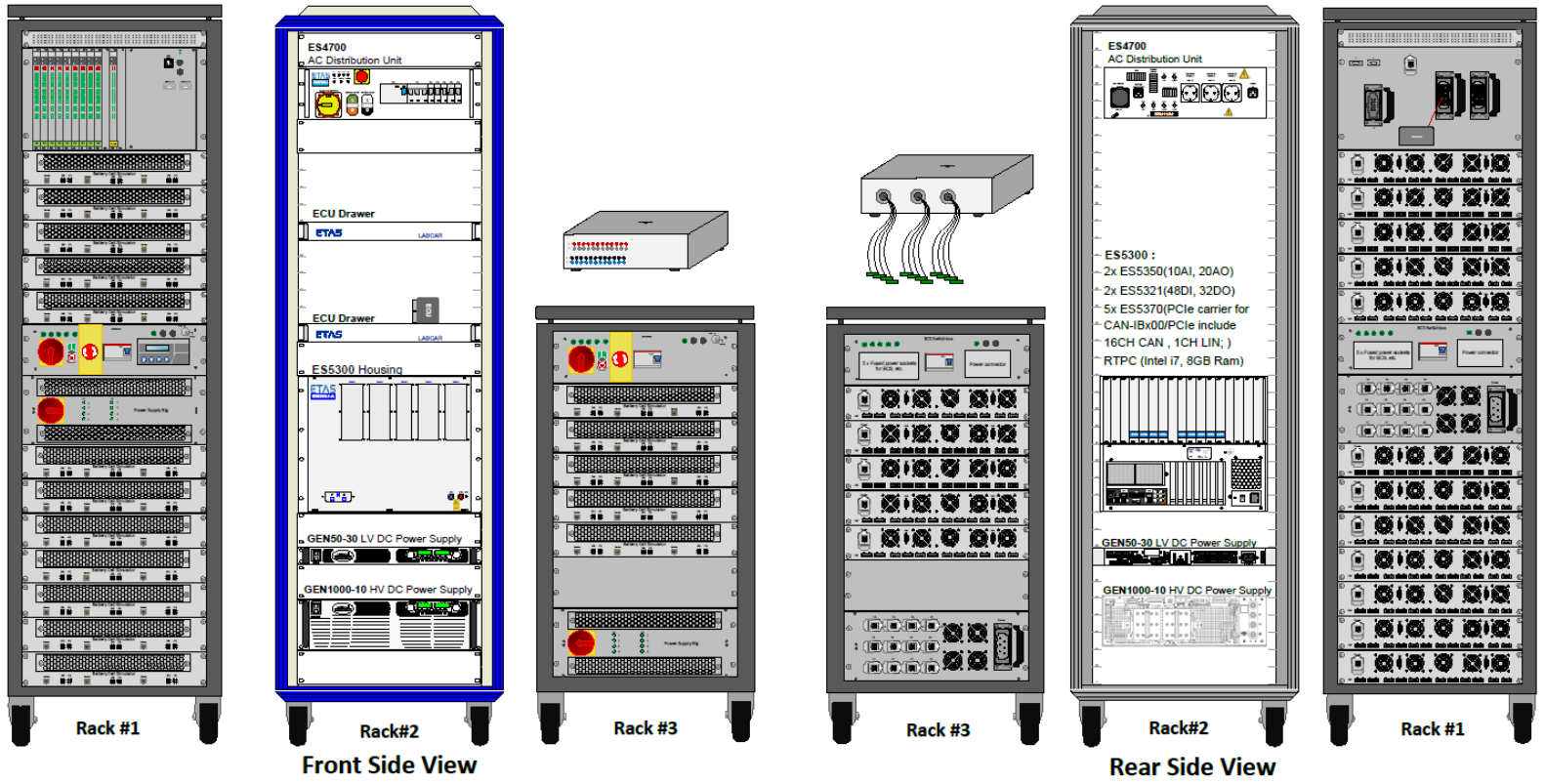
ETAS Solutions Portfolio

Software Engineering	Test and Validation	Measurement, Calibration, Diagnostics	Real Time Applications	Embedded Security escrypt Embedded Security by ETAS
ETAS Products				
Consulting and Engineering Services				
				

BMS test system solution with 200 cells and with 96 temperature emulation channels

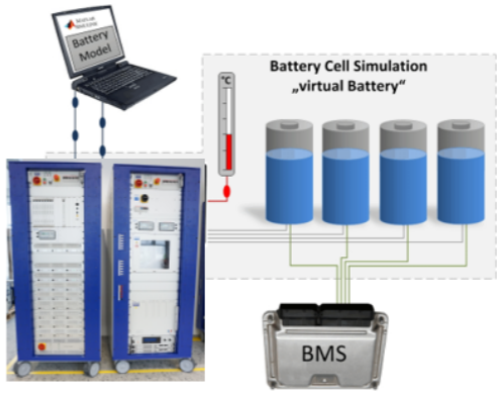
Typical system offering:
- Engineering service
- Training (3 days)
- 200 cells BCS
- 3 x Racks & Harnesses
- AC Distribution Units
- RTPC with 10 CAN controllers
- BMS power-supply (Battery Node)
- ECU Rack appliances (Drawers)
- LABCAR Software

Optional add-ons:
- Temp. emulation channels
- Additional I/O for BMS
- Breakout Box
- High voltage power-supply
- Shunt emulation capability
- Isolation-Check module (2 Channels)
- Plant model



Battery Management Test Systems
Highlights of ETAS BCS system offering

- ✓ The ETAS Battery Cell Simulator **shortens the time required** for BMS test and pre-calibration
  - ✓ **Safe** in office testing, e.g. electrical fault and isolation checks and testing of critical battery states
  - ✓ **Efficient** setup of test situation by the click of a button…
  - ✓ **Cost savings**, i.e. no waste, reduction of hazards, and reduction of development time
  - ✓ **Increased test coverage** through system automation and duplication (different test levels)
  - ✓ **Highly accurate and 100% reproducible** electrical simulation of battery voltages and currents, as well as resistance variations of temperature sensors
- ✓ **Highly flexible and open** system architecture:
  - ✓ Scalable from 4 to 240 cells
  - ✓ Wide range of BCS cards to fit performance AND price expectations of customers
- ✓ **Highest balancing current ranges** with 1 module – with up to 4.9A source and 4.5A sink current
- ✓ Off the shelf on-board **current measurement** (mA / µA / Coulomb Counting) and **fault insertion** capabilities
- ✓ **Highest DC voltage accuracy** +/- 0.5mV also at high currents (sense)
- ✓ Provision of ETAS or Third-Party **battery plant models**
- ✓ HiL system data are **fully synchronized with INCA** measurements (no manual alignment of data)
- ✓ Extensive **global project experience**



The next generation of autonomous and connected vehicles is driving an increase in the use of complex, connected and **electrified** systems with unprecedented **safety** and **security** needs. With over 25 years of **automotive** experience, ETAS, a subsidiary of Robert Bosch LLC, is a single source of reliable, cutting- edge **hardware and software tools and services** that make automotive **embedded systems** safe and secure. ETAS removes the unknown from the development process and delivers **peace of mind**.

For more information about ETAS and its products, go to: www.etas.com