



// BATTERY TEST CENTER BATTERY SYSTEMS ENGINEERING



The mission of the battery test center is to conduct performance, lifetime, endurance, and safety tests on cells, modules, and batteries designed for portable, mobile, and stationary energy storage systems. A great deal of effort is devoted to characterizing batteries under various operating conditions and studying their behavior in response to abuse and crash.

"In the eLaB we investigate, test, and analyze batteries and systems according to standards or by new innovative methods."

Dr. Olaf Böse, Head of Department



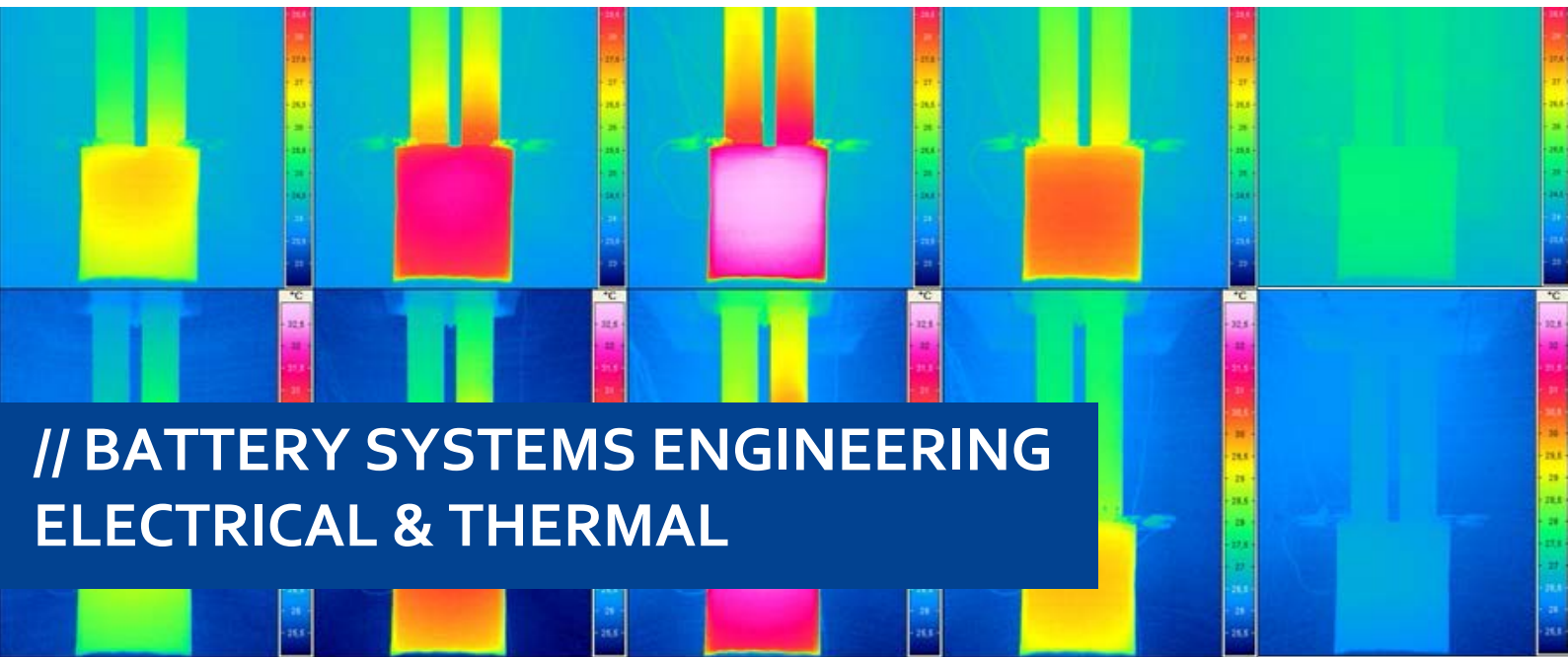
+ eLaB
ZSW Labor für Batterietechnologie

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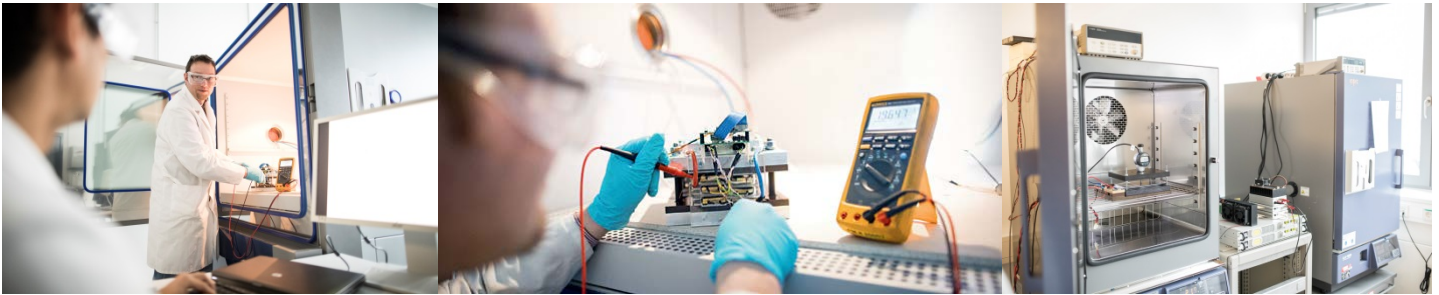
// BATTERY SYSTEMS ENGINEERING ELECTRICAL & THERMAL

Systems Engineering - Electrical

- **Characterization of**
 - Series- and prototype cells
 - Novel battery technologies
 - Cells, modules and packs
- **Test, modeling and simulation of -**
 - Voltage profiles
 - Impedances
 - Degradation processes
 - Ripple current effects on cell aging
- **Method development for controlling, state estimation and the operation of cells, modules and packs**
- **Battery and energy management**

Systems Engineering – Thermal

- **Modeling of single cells and battery systems**
- **Investigation and simulation of**
 - thermal response
 - concepts for temperature control and regulation
 - cooling concepts (air convection, water/oil, air condition)



// EQUIPMENT AND INFRASTRUCTURE

- **6 test rooms**
- **Work stations for modeling and simulation**
- **Cell test units**
 - 3 units 24 x 5V/5A
 - 4 units 12 x 5V/3A
 - 5 units 14 x - 6 ... 6 V/5A
 - 1 unit 11 x 5V/10A
 - 24 x 10V/50A
 - 31 x 7V or 10V/240A, some with linked impedance spectroscopy (EIS)
 - 8 x 5V/250A
- **Multiple cell battery simulator**
- **Tester for battery and energy management**
- **Temperature chambers**
 - Temperature chambers in temperature range -40°C up to 180°C
 - 1 temperature chambers with the possibility of thermograph measurement
 - Cooling systems
- **High frequency measuring area (oscilloscope, impedance spectroscopy, spectrum analyzer)**
- **Thermal camera**
- **Measuring area for heat conductivity**

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