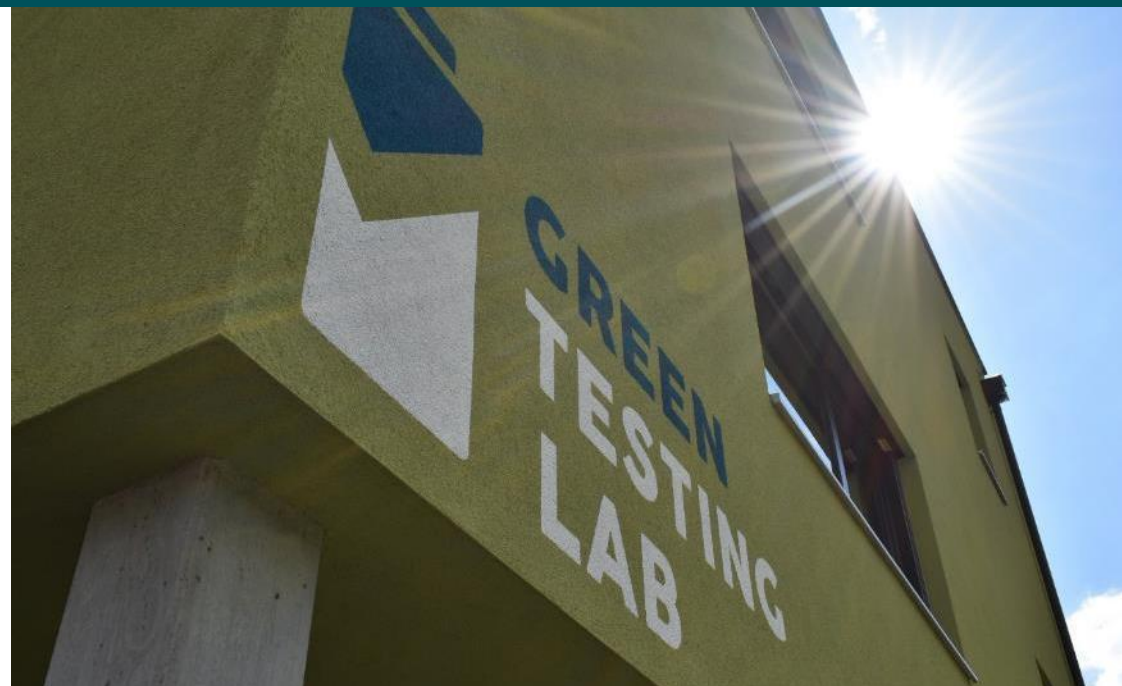
Company Presentation

Green Testing Lab



GREEN
TESTING
LAB

Location and Contact

Green Testing Lab

- Location:
  - Gewerbepark Greinbach Ost 342
  - A-8230 Greinbach
  - AUSTRIA
- Contact:
  - +43 (0)664 18 33 208
  - office@greentestinglab.com
  - www.greentestinglab.com
- Core Business:
  - Development of high-tech battery test rigs and battery abuse testing

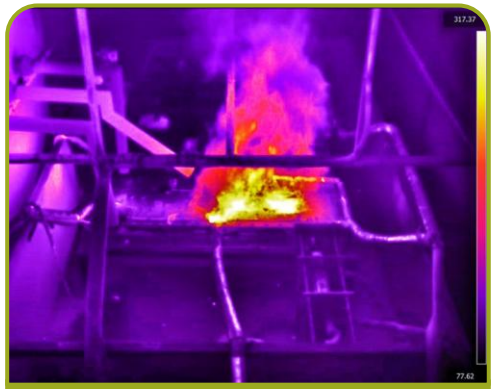
Location and Contact

Green Testing Lab

- Resources:
  - Industrial Park - 22.000 m² ground (7,500 Build-out)
  - 15 Employees
  - 2 x Abuse Chambers (with filtering- and extinguishing system)
  - 1 x Drop-Tower
  - 1 x Immersion pool (with cooling)
  - 2 x Tear-Down rooms
  - 1 x Cell preparation room (with thermal chamber)
  - Safe Prototype Storage

- Foundation
  - Founded: 2020
  - 100% personal owned (GmbH)
  - Continuously growing Service-Portfolio (based in customer needs)

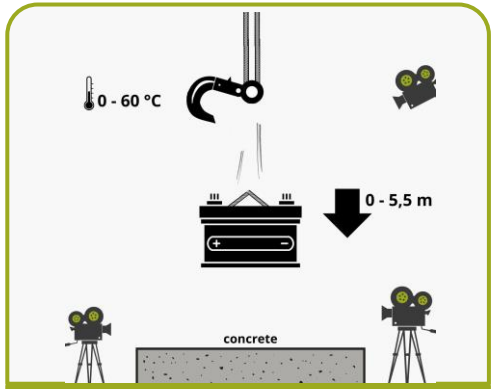
Module/Pack Testing



Thermal Propagation

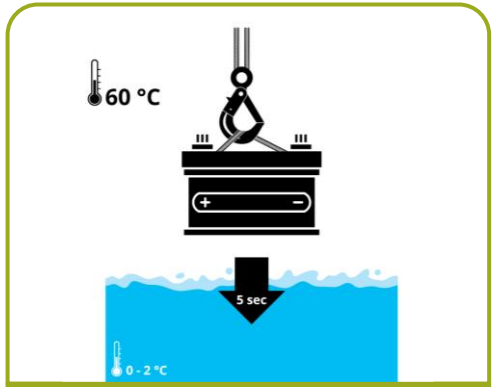
Nail Penetration Test

Mechanical Integrity Test/
Crush Test



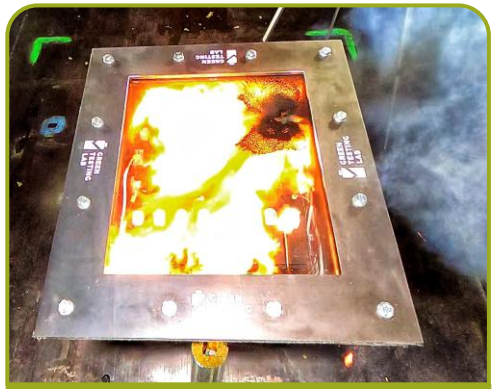
Drop Test

Short Circuit



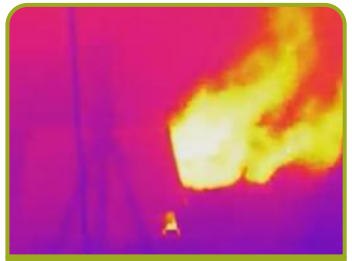
Immersion Test

Coolant Evaluation

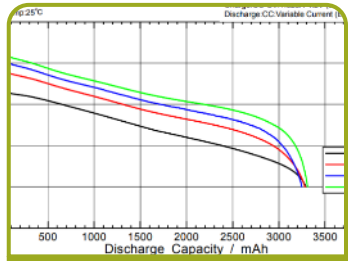


Customized Test

Cell Testing



Overcharge

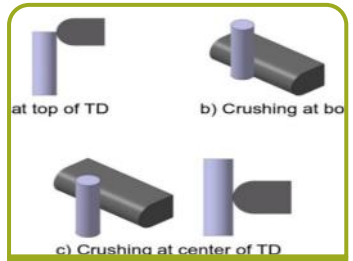


Total Discharge

Reverse Polarity Charging

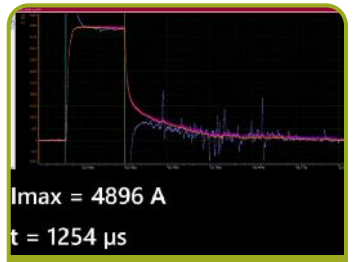
Lithium Plating

Mechanical Shock



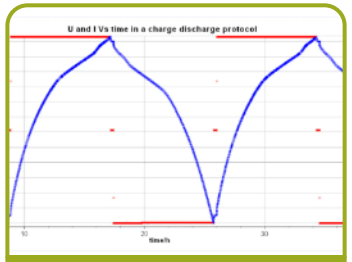
Crush

Forced Intended Short Circuit

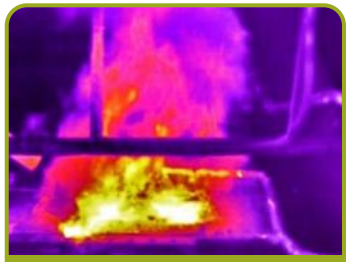


Short Circuit

Thermal Stability



Thermal Stability Cycling



Voltage Limitation Cycling

Vent Gas Analysis

Battery Testing Made Easy

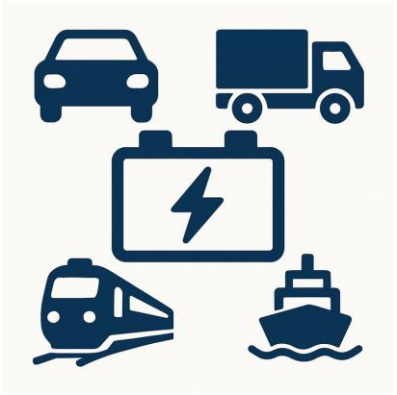
Various Abuse Test Chambers

- Testing up to Hazard Level 7
- Test chamber designed for 250 kWh batteries
- Size of batteries is up to 2200 mm x 3500 mm
- Filter system for clean testing
- Climatizable (Heating, Cooling)
- Max. 2000 kg
- Safety during performing the tests is always given
- Explosion protection and fire protection
- Configurable to the needs of the customer

Teardown Rooms

- Amount of available rooms: 2
- Room size: 5.75 m x 2.8 m
- Teardown can be performed by the customer itself or by GTL employees
- Various teardown methods like photo documentation, torque measurement, cell weight etc.

Business Segments



MOTIVE Batteries

Automotive
(OEM/Supplier)

Trucks and Train

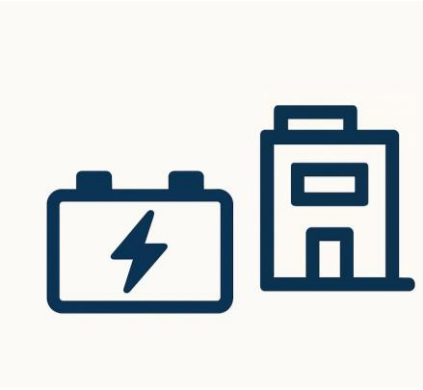
Marine

Motive Power

Cell Manufacturers:

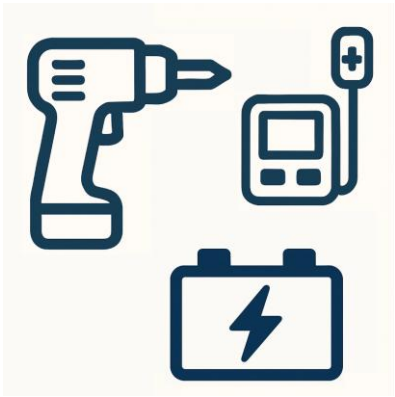
Pouch
Prismatic
Cylindrical

NMC
LFP
NFPP



Stationary Batteries:

BESS
UPS
Home-Storage Systems



Special Applications:

Power Tools
Mobile Medical Devices
Aviation
Aerospace

Annual events: BATTERY SAFETY TALK

- At Green Testing Lab "Safety is *not* a Secret"
- We are actively involved in organizing and hosting Safety talks within the Battery community for
  - Safety of Batteries
  - Battery Management Systems
  - Recycling

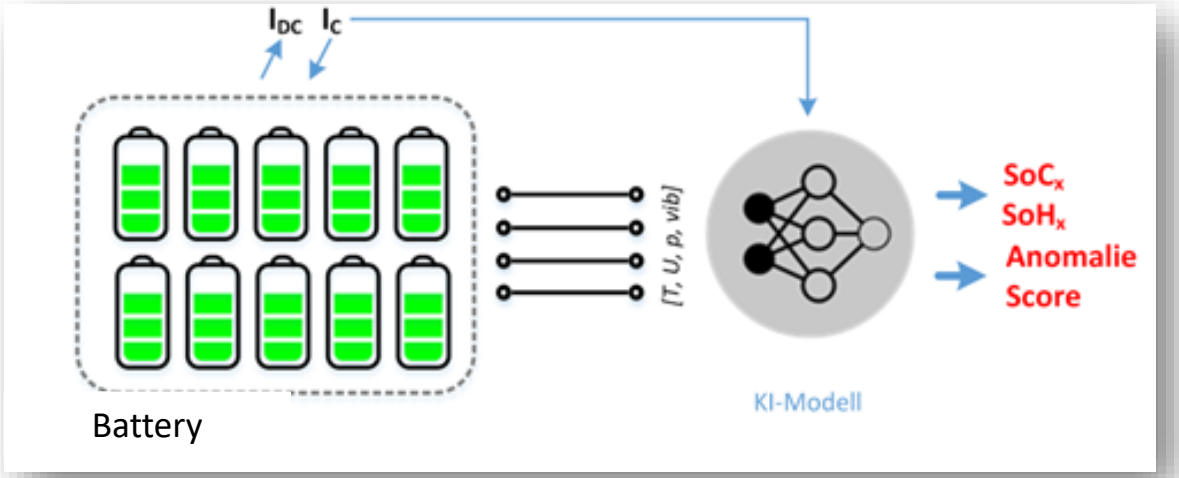
Development-accompanying battery testing

R&D Projects

GREEN TESTING LAB

BATTMON

Goal: Increase the usable capacity, lifespan, and safety of battery storage systems

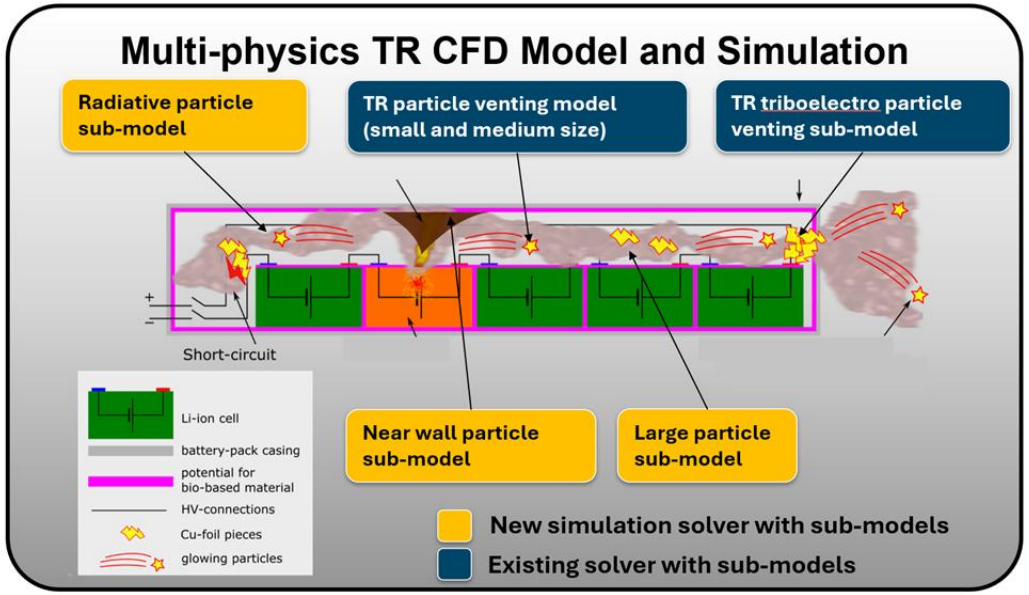


- Duration: 11/2024 – 10/2027
- Development **novel flexible-film sensors** integrated directly into battery modules to measure **temperature and pressure** across cells for detailed monitoring
- **AI algorithms** analyze the data to more accurately estimate **State of Charge (SoC) and State of Health (SoH)**, improving battery capacity utilization and extending lifespan
- Early **detection** of risks like **overheating or thermal runaway** reduces fire and explosion hazards, and the system will be tested in real conditions to validate its performance in urban energy storage

SafeSustain

Goal: Develop safe and sustainable battery-pack designs with improved recyclability and reduced environmental impact

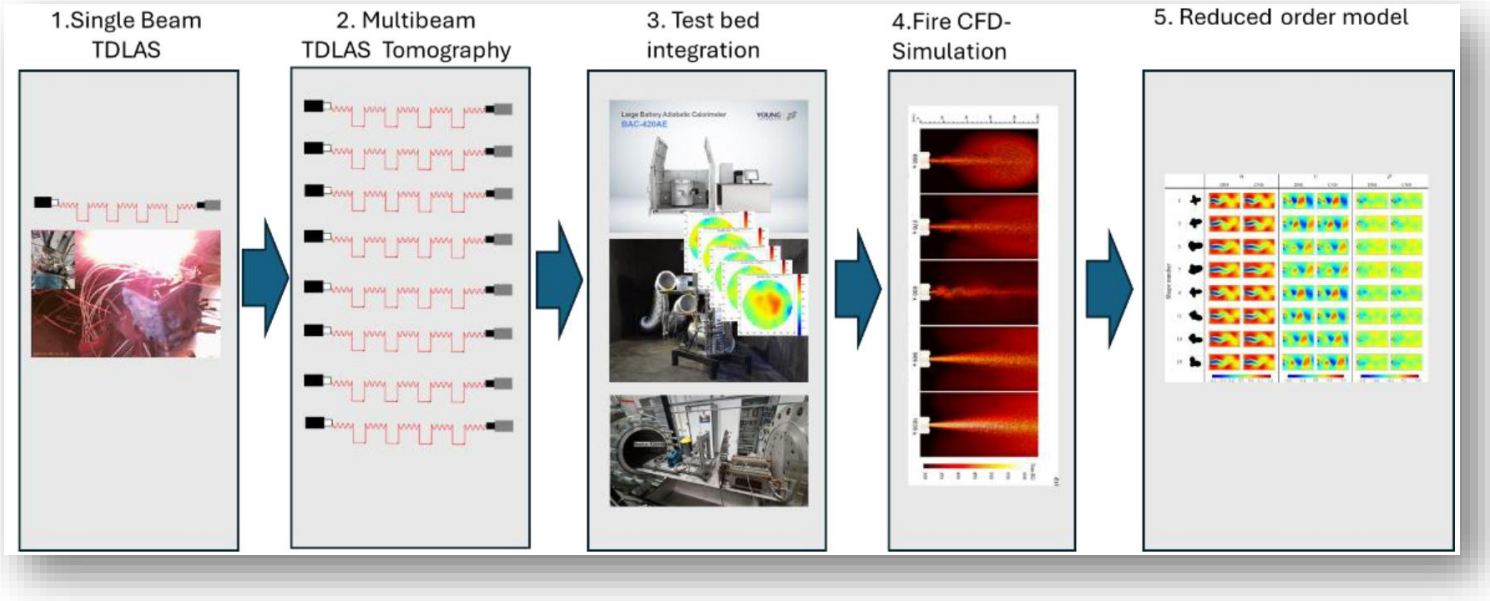
- Duration: 05/2025 – 04/2028
- Study thermal runaway (TR) mechanisms, especially the **behavior** of hot **particles in venting gas**, to improve battery safety
- New **simulation models** and experimental test methods to analyze particle venting and safety-material performance
- Development of battery designs and tools that enable **easy dismantling and recycling**, supporting circular economy goals
- Application of **bio-based materials** as fire-retardant insulation material



THOR

Goal: Increase battery safety by measuring the heat introduced by venting gas in failure case

- Duration: 12/2025 – 11/2028
- Develop a **tomographic temperature measurement** method for hot venting gas from failing lithium-ion batteries
- Use temperature-dependent absorption of water molecules to determine gas temperature during venting events
- Validation the method with calorimetric measurements to ensure accurate heat and temperature analysis



SENSICharge

Goal: Enable safer, longer-lasting, and faster-charging batteries for future electric mobility by monitoring and intelligently controlling battery charging

- Duration: 06/2026 – 05/2028
- Develop **printed pressure and temperature sensors** that can be integrated directly between battery cells to monitor internal battery conditions
- Generate **high-resolution spatial data** on temperature and mechanical stress inside the battery during charging
- Use these data to develop **adaptive fast-charging protocols** and early detection methods for critical processes such as lithium plating

R&D Topics

Besides our testing portfolio, we are interested in the following topics:

- Innovative battery design (Sustainable- and Safe-by-Design)
- Advanced materials, novel cell chemistry
- Aging/Degradation (cycling)
- State-of-Health monitoring
- Development of diagnostic tools and test methods
- Battery dismantling and recycling

Thank you!

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