



VIRTUAL VEHICLE is a leading international R&D center for the automotive and rail industries. The center focuses on advanced virtualization of vehicle development. This linking of numerical simulations and hardware testing leads to a powerful HW-SW system design.

Master Thesis

“Characterize the influence of internal-short-circuit caused by nail insertion on the failing of Li-Ion batteries”

Ref.Nr. E_135

Master Thesis

In the recent years both, the electromobility and the Li-ion battery technology showed impressive progress. The cell manufacturer achieved an increase of the energy density of mass-produced cells above 300 Wh/kg. With higher energy density new safety challenges arise. In the worst-case failure of a cell, the Thermal Runaway (TR), the stored energy is released in an exothermic reaction. The heat is released through heat conduction to adjacent elements, through outflow of gas and through ejection of hot particles.

The goal of the thesis is to understand how the internal short circuit influences the failing of large Li-Ion cells. An experiment series will be done in an already existing test-stand and with existing methods. Short circuit will be caused by insertion of a nail with different speeds. The outcomes of the experiments will be compared.

Your Tasks

- Prepare the experiments using existing tools
- Adapt the sample holder to insert the nail with different speeds (0.001 to 10 mm/s)
- Assist during Thermal Runaway experiments
- Analysis of the experiments
- Compare the experiments, find correlations

Your Profile

- Studies in chemistry, physics, mechanical engineering or similar
- Interest in mechanical assembly of the test stand, working in Laboratory and workshop environment
- Interest in automatization and data analysis (Labview, Python)
- Interest in Li-ion battery technology

What we Offer

- Collaboration and contribution in an engaged, dynamic team
- Interesting work in an international research center
- **Paid Thesis**
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