

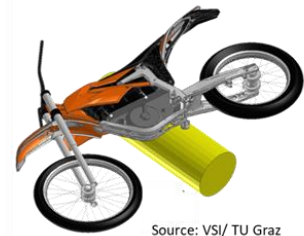


MSc/BSc Thesis – Numerical modelling of the mechanical battery cell's behaviour

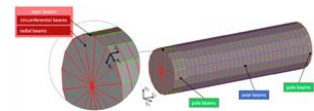
Background

Li-Ion battery cells significantly influence the crash safety of an electric vehicle. E-Motorcycles are particularly affected by this because of the missing deformation-free zones. Therefore, virtual crash simulations are used to analyse the crash safety of electric vehicles. Here, accurate simulation models are crucial to investigate the vehicle, traction battery and cell behaviour during the crash. While the mechanical behaviour of new battery cells is investigated in detail, the behaviour of pre-damaged cells (high accelerations without visible deformations in a minor crash or overturn) is widely unknown. Therefore, the influence of pre-damaged cells on crash safety is unclear.

FE crash simulation



FE cell model



Your goal in this thesis is to develop an innovative numerical approach to describe the deformation behaviour of new and pre-damaged Li-Ion batteries.

Tasks

- **Get familiar** with the subjects of numerical simulation approaches.
- **Understand** the mechanical deformation behaviour of new and pre-damaged battery cells.
- **Develop** an innovative numerical approach regarding accuracy and quality.
- **Implement your ideas** in a numerical model and compare it with an existing model.
- **Cooperate** with renowned industry partners.

Desired qualifications:

- Interest in the research area of E-Mobility
- Knowledge of FE simulation, preferably LS-Dyna
- Structured and independent way of working

Recommended as

- Master thesis for Mechanical Engineers
- Bachelor thesis is also possible

Organisational

- Start: March 2023
- Scholarship: min. € 2.500,- for successful completion of the master thesis. No scholarship for bachelor thesis.
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