

VIRTUAL VEHICLE develops solutions for the mobility of the future - and offers you the chance to already be part of it during your studies.

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Master's Thesis

“Development of an automated process chain for generating, optimising and simulating parametric FE battery cell models”

Ref.Nr. V_01

Master's Thesis

Energy storage systems in modern electric vehicles are predominantly based on a large number of battery cells. Battery simulation models are used in the early stages of development to assess safety in the event of a crash.

In order to cover a wide range of crash scenarios in a short period of time, end-to-end automation of modelling, simulation and subsequent evaluation of battery deformation (thermal, mechanical) is essential.

This master's thesis focuses on the development of a software process chain that automatically creates and optimises a battery FE model, exports it to a solver-specific format, simulates it and evaluates its deformation behaviour.

FE mesh generation is fully automated based on defined geometric parameters such as dimensions, level of detail, or number of subcomponents. This enables the modelling of both individual components and complex assemblies.

Mesh optimisation should be performed to ensure numerical stability in subsequent simulations.

The FE model is then exported to a common simulation format and simulated in predefined scenarios.

As an optional part of the work, the subsequent evaluation of the simulation results enables efficient analysis and visualisation of stresses, displacements or energies (further optimisation of the FE model if necessary).

The aim of this thesis is to develop a fully parameterisable software process chain that covers the entire process from network generation and optimisation to simulation.

Your Tasks

- Development of a fully automated process chain for battery crash simulations (e.g. in Python)
- Investigation of the mechanical deformation behaviour of battery cells
- Familiarisation with FEM

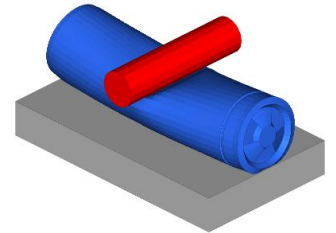
What we expect from you

- Interest in e-mobility
- Basic programming skills or willingness to learn, e.g. Python
- Basic knowledge of FE simulation or willingness to learn
- Ability to work in a team and in a structured manner
- Recommended as a master's thesis for software developers / ICE / mechanical engineering students

What we offer

- Collaboration and contribution in an engaged, dynamic team
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FE-Simulation Batterie Test



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