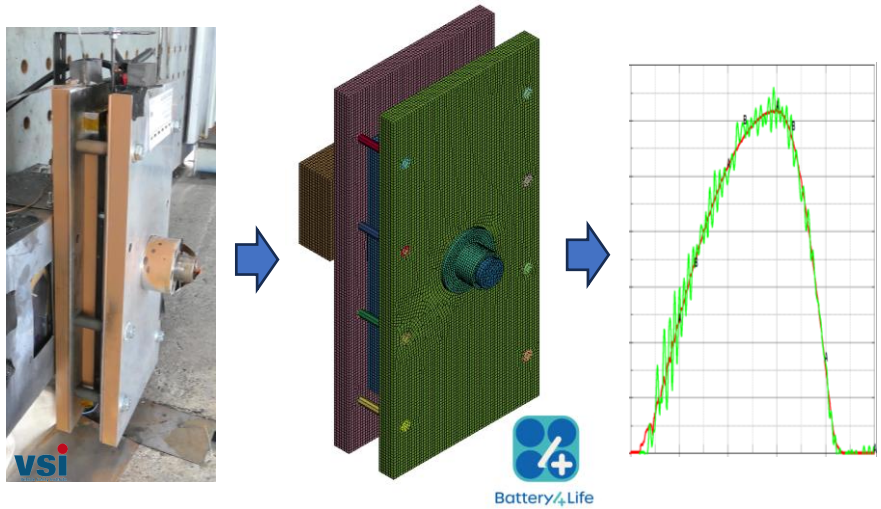
MSc – Thesis:

Development of Digital Twins for Dynamic Abuse Testing of Advanced Battery Systems

Battery4Life

Background:

- Mechanical abuse testing remains a key element for the safety assessment of battery systems in vehicles - both for conventional Li-ion and next-generation technologies such as solid-state batteries.
- Modern battery concepts often require specific boundary conditions (e.g., high pre-compression), leading to comparatively massive test rigs compared to the cells mass. At the same time, crash-relevant scenarios involve highly dynamic loading, where strain-rate effects are critical.
- In such high-speed tests, the inertia and test setup itself influence the measured response of the battery cell. This effect is not yet fully understood and may lead to systematic deviations in experimental results.



Objective:

- **Develop digital twins of different test rig configurations to quantify how the setup influences measurement results in dynamic battery abuse testing**

Tasks:

- Literature review on dynamic battery testing and modeling approaches
- Familiarization with numerical simulation methods (LS-DYNA)
- Development/Improvement of digital twins for test rig configurations
- Design of simulation studies (e.g., variation of mass and velocity)
- Comparison of the test setups and evaluation of the resulting influence on measurement results
- Collaboration with industry partners in future battery technologies

Your Profile:

- Interest in e-mobility and working on safety for cutting-edge battery technologies
- Basic knowledge of finite element simulation (preferably LS-DYNA)
- Structured and independent working style

Organizational Details:

- Start: anytime
- Duration: approx. 6 months
- Scholarship: €3,500 upon successful completion
- Contact: Alois Jauernig (alois.jauernig@battery4life.at)
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