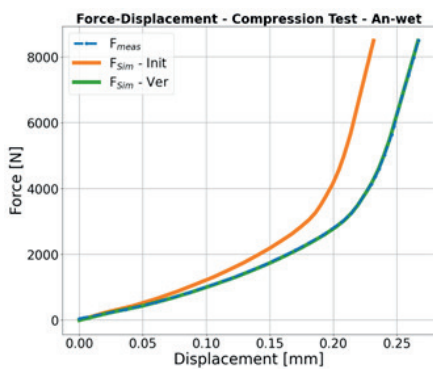
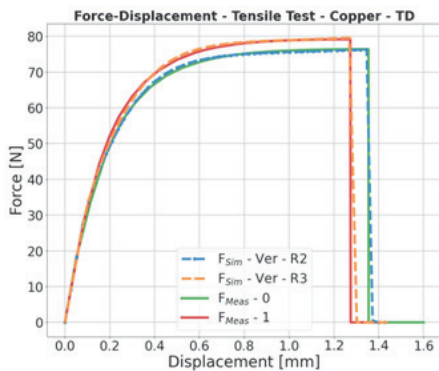


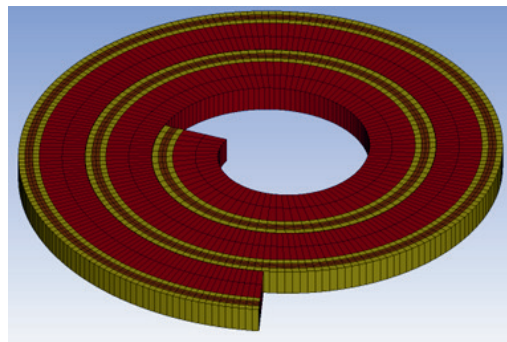
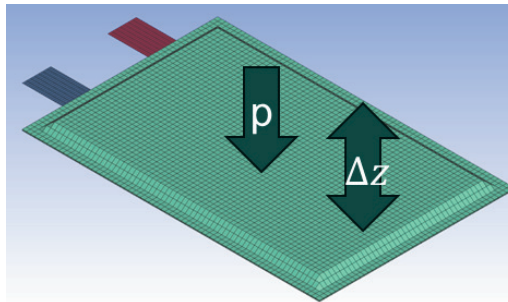
CELL SIMULATIONS & VIRTUAL UPSCALING



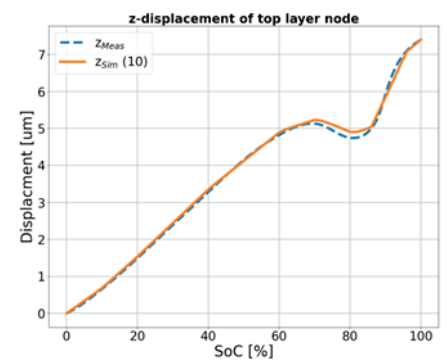
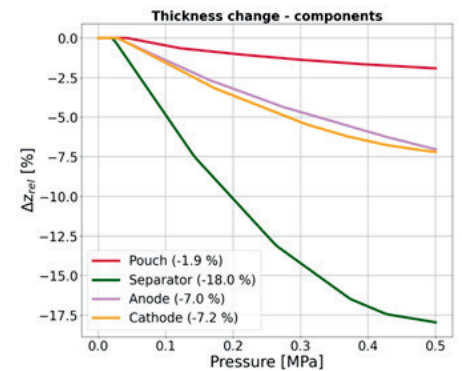
Input Material Data



Cell Geometries (Pouch, Cylindrical)



Simulation Results



Lead:

virtual vehicle

Partners:

BMW GROUP



speira



VARTA

AVL

Automotive Requirements

Material Testing

Cell Specifications

Upscaling Support

Overall Goal

- Obtain information about the consequences of cell compression and anode expansion on the mechanical stresses in the cell.
- Do a virtual upscaling to cylindrical cells for providing information for cell production.

Contact for Further Information

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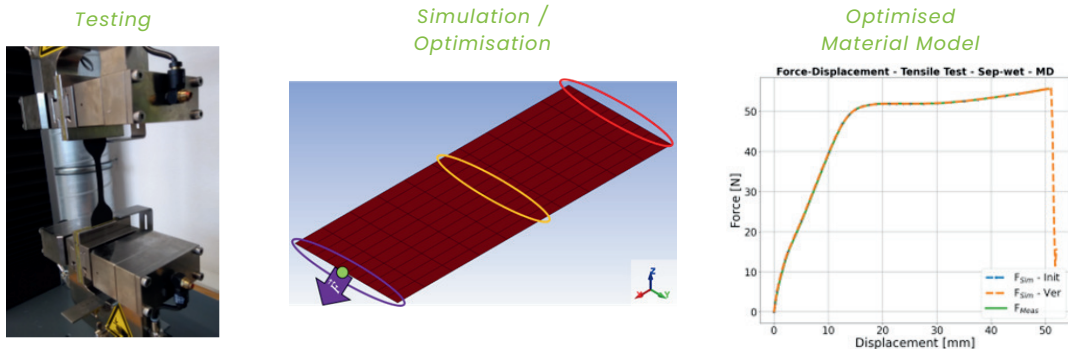
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CELL SIMULATIONS & VIRTUAL UPSCALING



Mechanical Tests and Cell Expansion Measurements

- **Goal:** Obtain knowledge about the mechanical behaviour of cell components and the expansion behaviour of the pure Si-anode.
- **Methodology:**
 - Tensile & compression tests for all relevant cell components
 - Dilatometry measurements for pouch cells
 - Optimisation of material models via FE simulations of mechanical tests
- **Example:** Optimisation of tensile test data



Cell Simulations and Virtual Upscaling

- **Goals:**
 - Build digital twins of battery cells and investigate the influence of cell compression and expansion on mechanical stresses in the cell stack.
 - Do a virtual upscaling to cylindrical cells for an early simulative assessment of stress and strain distributions for different cell designs.
- **Methodology:**
 - FE simulations on different cell meshes (pouch and cylindrical cells) with different boundary conditions
 - Application of optimised material models
 - Application of an expansion model to the anode
- **Example:** Compression and charging for a bi-layer pouch cell with a pure silicon anode

