SmartBatt

Smart and Safe Integration of Batteries into Electric Vehicles

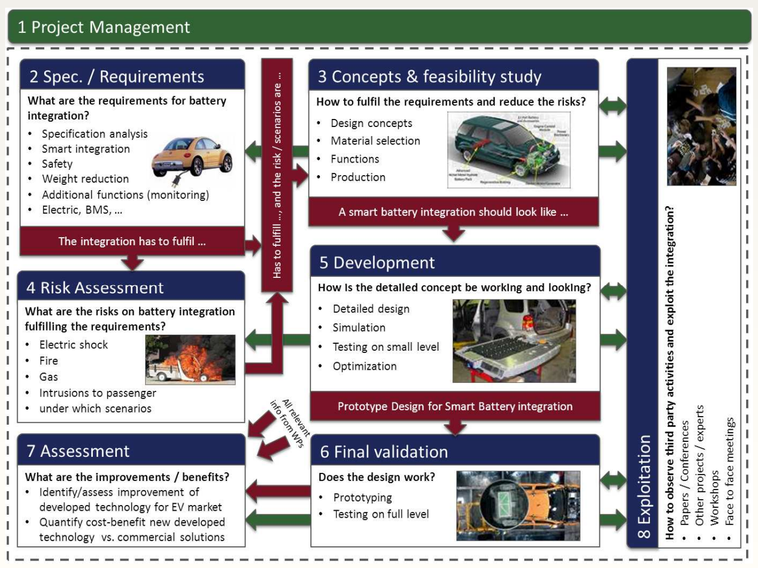
OBJECTIVES

- Development of an electric vehicle battery
- Minimization of weight
- Optimization of safety
- Minimization of costs
- Design capable for series production

REALIZATION

- Battery for an A-class BEV with 100km NEDC Range
- 15 % lighter than SotA (75 % weight ratio between system and cell)
- same static and dynamic requirements as SLC BIW required

WP1: PROJECT MANAGEMENT



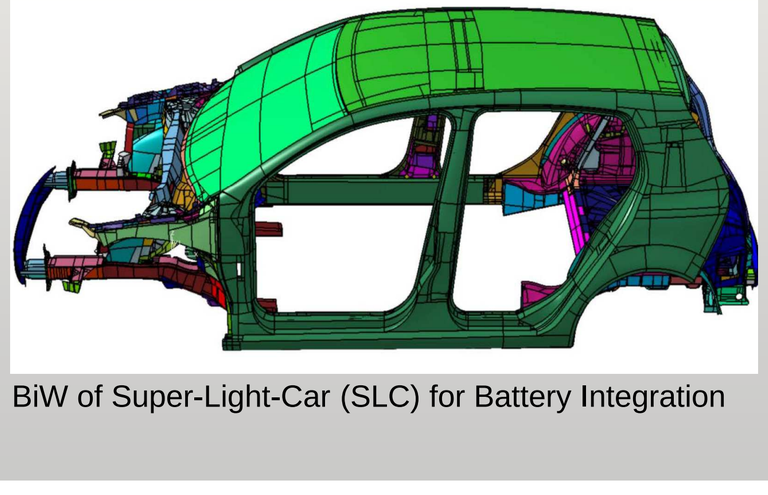
WP2: SPECIFICATION ANALYSIS/REQUIREMENTS

Definition / analysis of system constraints

- ~20 kWh energy content
- 15 % lighter than SotA systems
- Same crashworthiness as SLC
- Identification of existing standards
- IEC/ISO, FMVSS, SAE, ECE R100

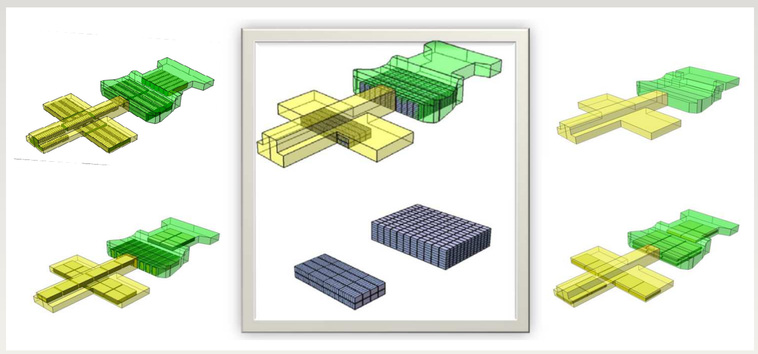
WP3: CONCEPT & FEASIBILITY STUDY

- Definition of interfaces / BMS
- Cell selection and characterization
- Simulation of driving cycle and thermal behaviour (Artemis Cycle)
- Package room/battery housing
- Accident statistics
- Structural solution of EV body



BiW of Super-Light-Car (SLC) for Battery Integration

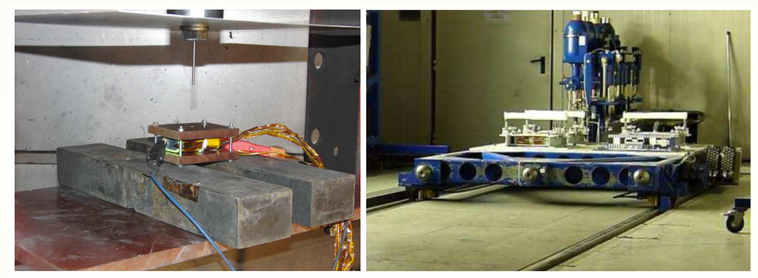
FE and ME side pole crash simulation for evaluation of safe design room



Design room and different package solutions

WP4: RISK ASSESSMENT

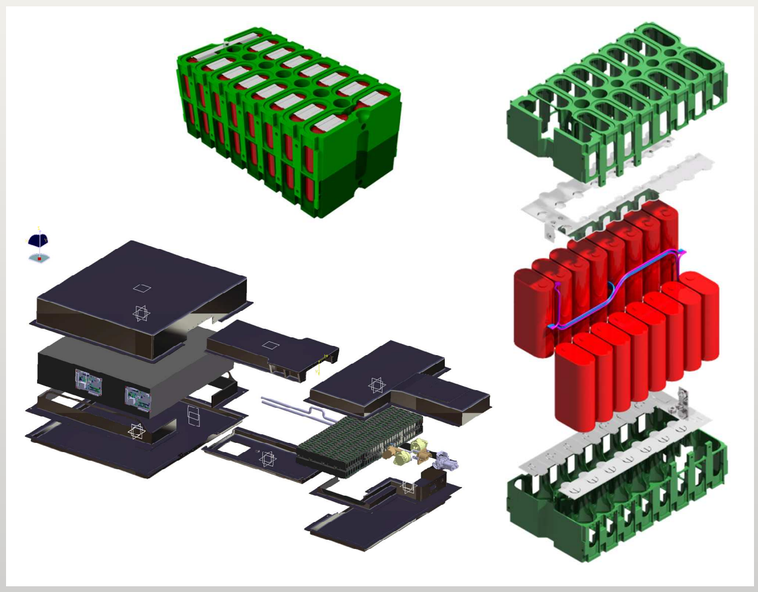
- Theoretical risk and failure analysis
- Acceleration pulses derived from simulation of NCAP crashes
- Experimental analysis on cell and module level like sledge tests, nail penetration, overcharge, short circuit



Nail penetration and sledge test

WP5: DESIGN & DEVELOPMENT

- Design of housing and modules by simulation based optimization of strength and fatigue behaviour.
- Die cast polymer module housings also act as a structural part
- Aluminium hybrid foam sandwich structure
- Target of 169 kg outperformed by 9 kg

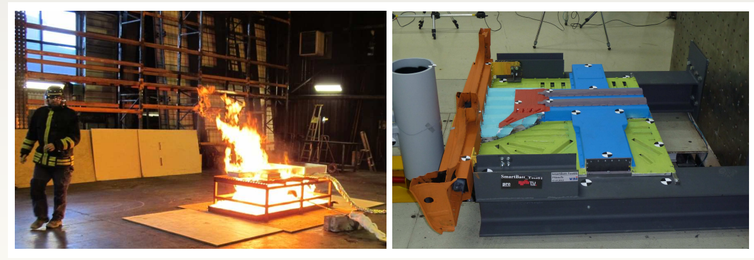


CAD of assembled and disassembled battery module and of the whole battery package

WP6: HARDWARE BUILD-UP & FINAL VALIDATION

- Testing on pack level
- Mechanical, electrical and environmental tests
- Performance and EMC tests

Prototype of the SmartBatt battery package



Fuel fire test and side pole crash test

WP7: ASSESSMENT

- Range improvement
- Cost savings
- Impact on Standardization (e.g. new materials)
- Life Cycle Analysis

WP8: EXPLOITATION

- Knowledge Transfer
- Battery Integration Workshop with 4 other EU-Projects
- Presentations & Workshops: Fire-fighter Workshop, EARPA, EGCI
- Publications: EEVC 2012, ECCOMAS 2012
- Exhibitions: Aluminium2012
- Input for Standards (e.g. ISO SC21)

SOLUTION

- High grade of BiW structural integration
- New materials like Al hybrid foam sandwich
- 23 kWh with a total mass of 155 kg
- ratio between cell- and total mass over 80%
- housing mass just 8.5 kg
- Energy density of 148 Wh on system level

FACTS

- 3.1 million EUR overall budget
- THEME GC-SST.2010.7-4. Smart storage integration
- 2.25 million EUR funded budget
- January 2011 – December 2012
- 9 Partners from 5 European countries

PROJECT COORDINATION

Hansjörg Kapeller

AIT Austrian Institute of Technology GmbH
Giefinggasse 2 | 1210 Vienna | Austria
T +43(0) 50550-6606
hansjoerg.kapeller@ait.ac.at | http://www.ait.ac.at

Project Website: **www.smartbatt.eu**