
DEMOBASE PROJECT PRESENTATION

24th May 2018

General Information

Objectives

- At battery level will be achieved by massive digitalization, substituting the today sequential cell development then battery system development by a parallelization of these activities. This new process can be achieved only using enhanced cells models including safety features to define the cell conception for manufacturing and realizing in the same time frame battery management.
- Objectives at vehicle level will be achieved with a novel approach to design light-weight chassis. It will be demonstrated on a urban demo vehicle that will integrate the advanced battery pack and novels wheel-tire systems with low suspension mass and low rolling resistance.
- To secure project deliveries and reinforce collaborations which are an innovation key factor, DEMOBASE will be an original closed-loop project. In a first loop of the EV development, building blocks and their integration processes will be investigated and their efficiency assessed using Key Performance Indicators. Then the most efficient bricks and processes will demonstrate their added value in a second step in 6 months run starting from new high performances cells to operational EV. The DEMOBASE EV will be then evaluated on tracks.

Type of Action: RIA

Duration: 36 month

URL:

Estimated Project Cost:

Requested Contribution:

Grant No: 769900

Start Date: 01 Oct 2017

www.demobase-project.eu

7,451,520.00 €

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DEMOBASE	Year 1												Year 2												Year 3																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36					
WP1 System requirements, use cases and validation methodologies																																									
T1.1 Definition of software platform & gateway requirements																																									
T1.2 Definition of battery parts requirements																																									
T1.3 Definition of car & recycling performance																																									
T1.4 Specification for the 6 months EV development																																									
WP2 Simulation & modelling for seamless integration																																									
T2.1 Simulation platform																																									
T2.2 Modelling & Simulation EV bricks																																									
T2.3 Vehicle model incl. recycling																																									
WP3 Safety																																									
T3.1 Cell safety and aging characterization																																									
T3.2 Safe vehicle and recycling																																									
WP4 Integration																																									
T4.1 Model integration																																									
T4.2 Battery system parts integration and manufacturing																																									
T4.3 Design and feasibility study of new wheels																																									
T4.4 EV recycling for spot effective and safe disassembly																																									
T4.5 Manufacturing of DEMOBASE vehicle																																									
WP5 Validation & KPI																																									
T5.1 Software test benches, validation and KPI																																									
T5.2 Performance validation and KPIs of EV battery system bricks																																									
T5.3 Vehicle performances validation and KPIs																																									
T5.4 DEMOBASE EV & process validation																																									
WP6 Dissemination & Exploitation																																									
T6.1 Dissemination																																									
T6.2 Exploitation and standardization																																									
WP7 Management and Coordination																																									
T7.1 Overall project coordination																																									
T7.2 Operational project management																																									
T7.3 Quality assurance and risk management																																									

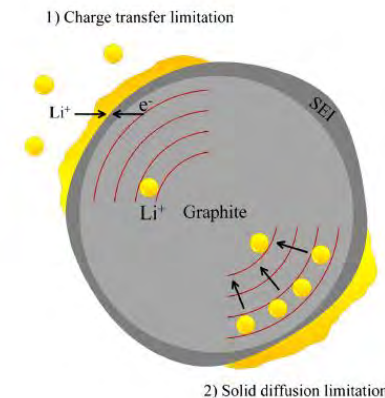
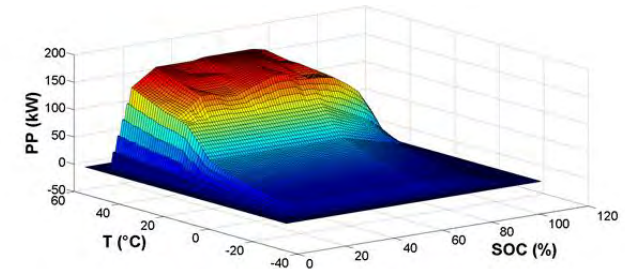
Consortium

SAFT SAS, Accurec Recycling GmbH, Fraunhofer IISB, INERIS, Infineon Technologies AG, Modelon AB, IFPEN, Jülich GmbH, I-FEVS SRL, K&S GmbH, MA S.p.A

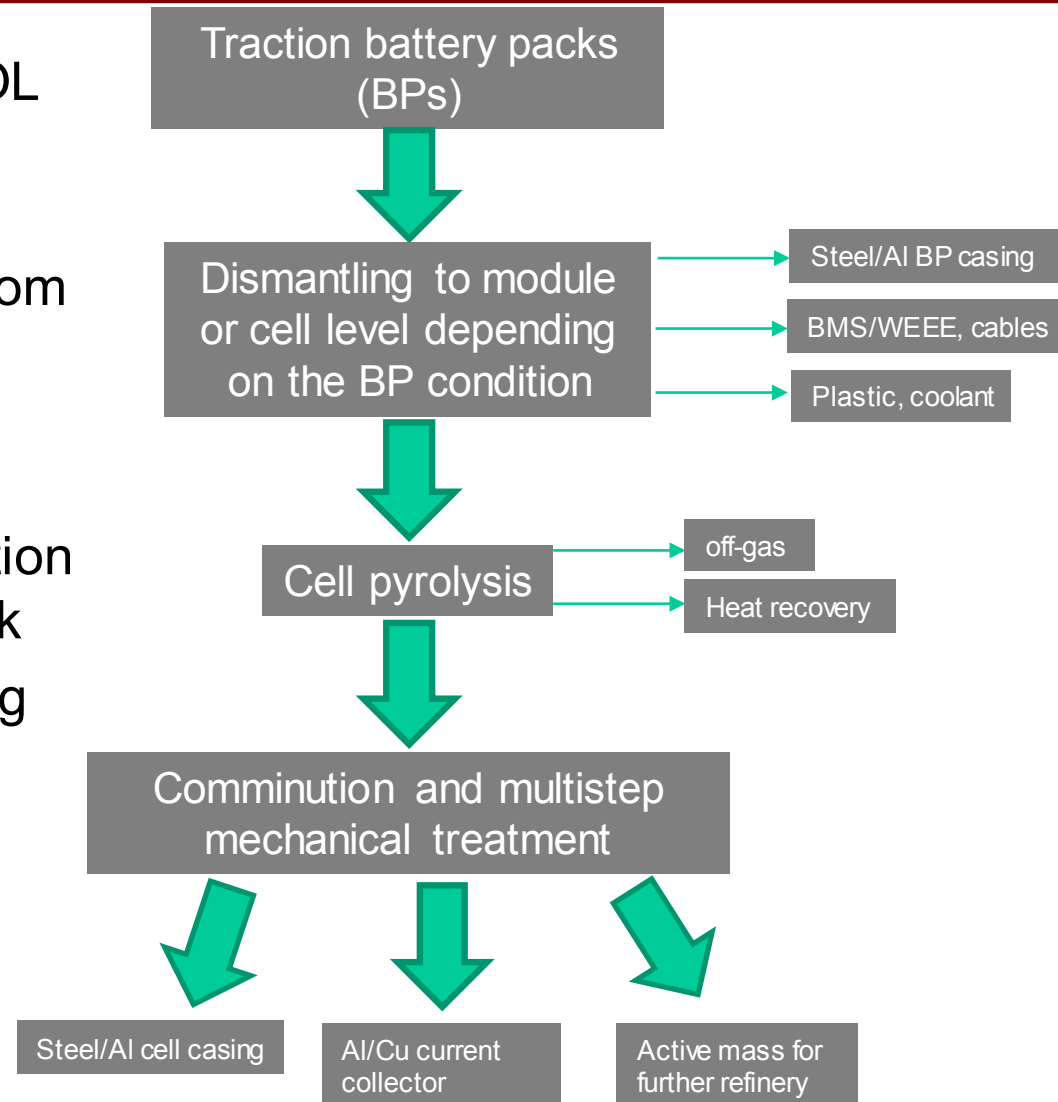
SAFT SAS

SAFT

- Battery parts manufacturing & expertise
 - High performance Pouch cells manufacturing
 - Post-mortem analysis
- Simulation & modelling for seamless integration
 - Electrochemical model
 - CAE 3D battery safety models
- BMS functions
 - Observer based on electrochemical models
 - Algorithms for safety management
- Recycling



- Electric vehicle market and EOL batteries prognosis
- Specification regarding cell recycling, dismantling of cell from battery pack
- Off-gas, packaging material investigation and safety assessment during transportation and dismantling of battery pack
- Design and develop a recycling simulation tool
- Practical Validation of DEMOBASE battery pack by selected Recycling Route

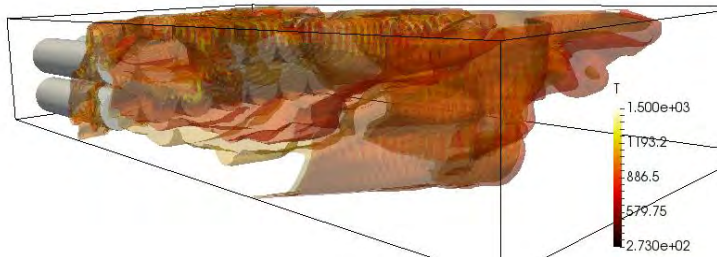


- Development of behaviourist models to determine battery state (e.g., State-of-Charge)
- Development of the Battery Management System (BMS) that will be used in the DEMOBASE demonstrator
 - Based on open-source BMS foxBMS
 - Adapted to the project's needs based on developments of the partners
 - Runs models developed by partners



Leader of safety activities in the project:

- Active materials, cells and modules characterization under abuse events with analysis of emitted gases and data exploitation for toxicity and flammability assessment
- Risk analysis of the automotive battery value chain (from conception to recycling)
- Cell and battery safety 3D models development and evaluation of the influence of parameters (design, fire geometry, confinement...)



Exemple of a fire development modeling in a battery module



INERIS battery safety tests platform

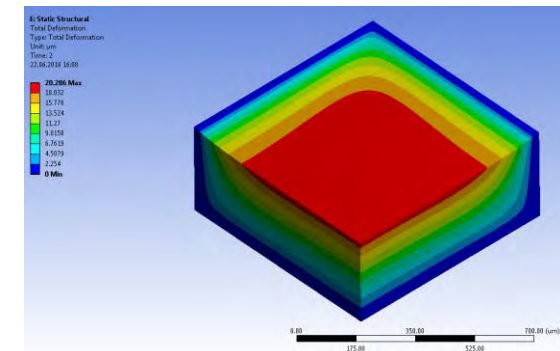
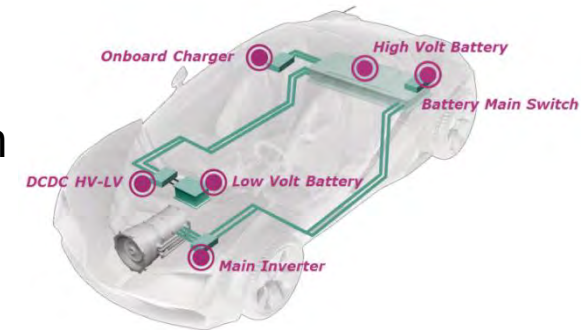


Infineon Technologies AG

Infineon contributes two developments to DEMOBASE:

- Battery Main Switch in CoolMOS™ Technology
 - Electronic replacement of current mechanical switch
 - Drastic reduction of switch size & weight
 - Improves switching speed by 3 orders of magnitude
 - Enables new safety solutions

- Pressure Sensor
 - Optimisation of a capacitive pressure sensor to measure battery cell pressure
 - Calibrated simulation of the silicone gel, which chemically protects the electrical active sensor
 - Experimental valuation of different configurations

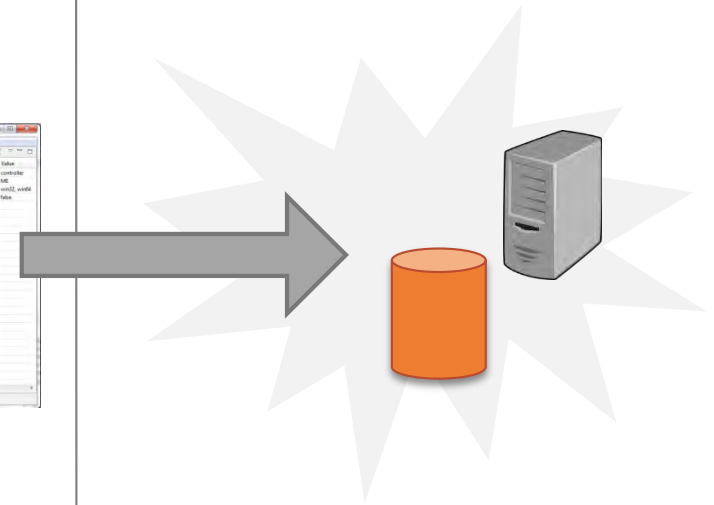
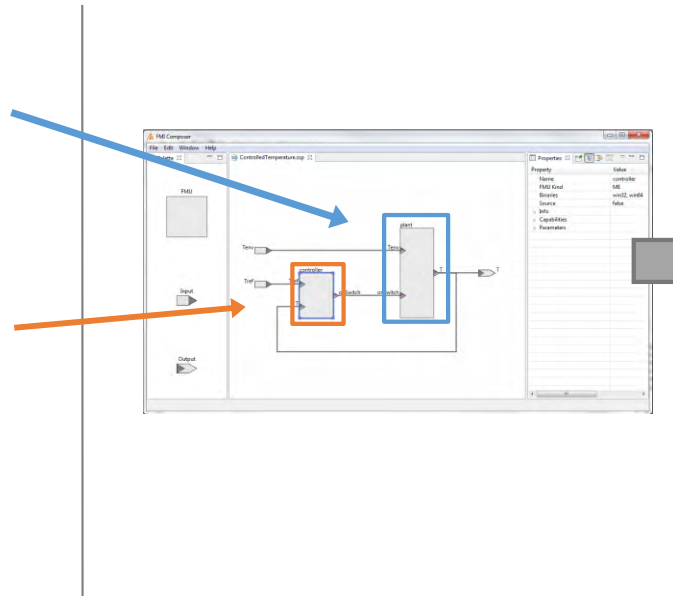




Modelon AB



develops collaborative FMI-based simulation platform



The **FMI standard** allows simulation models from many **different tools** to be exported on a common format

Project partners provide **simulation models** of components as FMUs

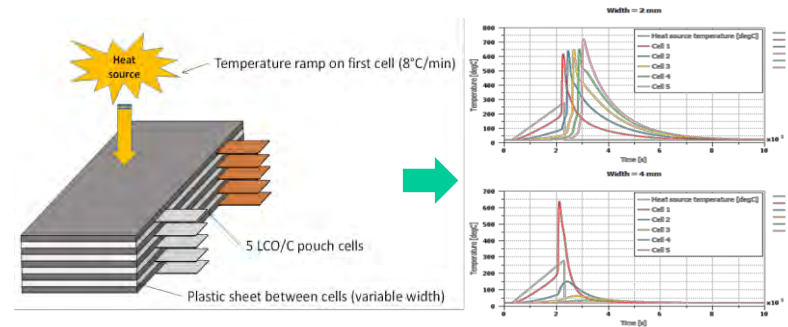
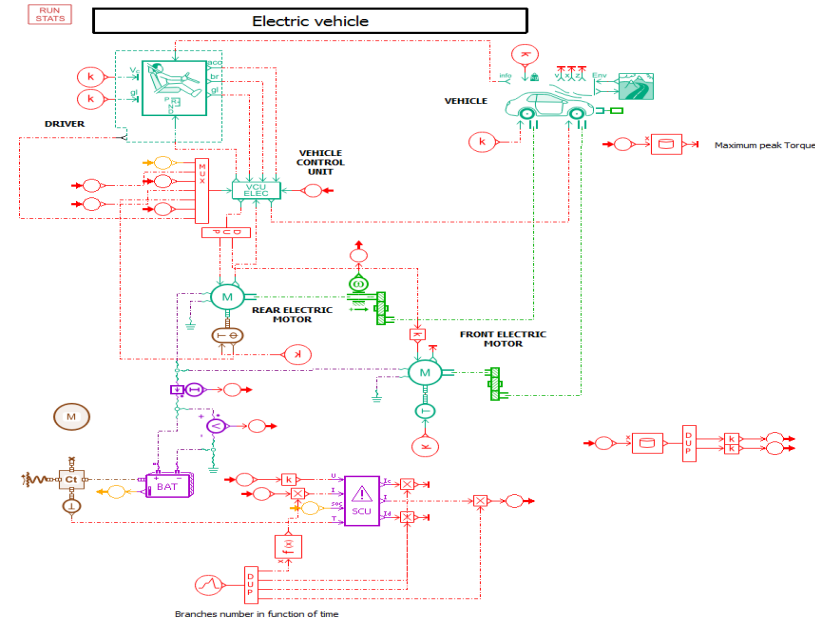
Continuous **integration** and regression testing of simulations Jenkins server ensures correct and **consistent results**

IFP Energies nouvelles



- Vehicle simulator:
 - Calibration of the electric vehicle simulator under Amesim platform.
 - Calibration of behavioristic cell models for the vehicle simulator.
 - Generation of power profiles according to various EV use.
 - Implementation of HIL one cell tests using the vehicle simulator.

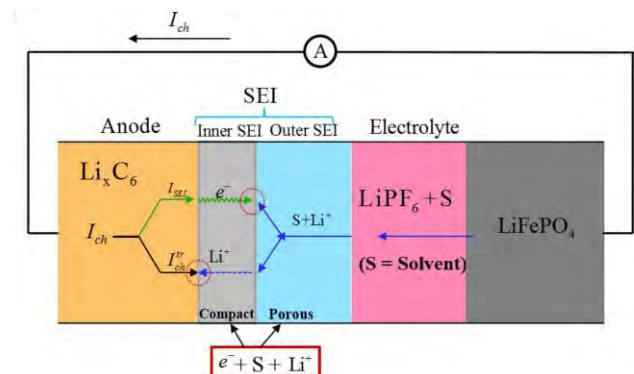
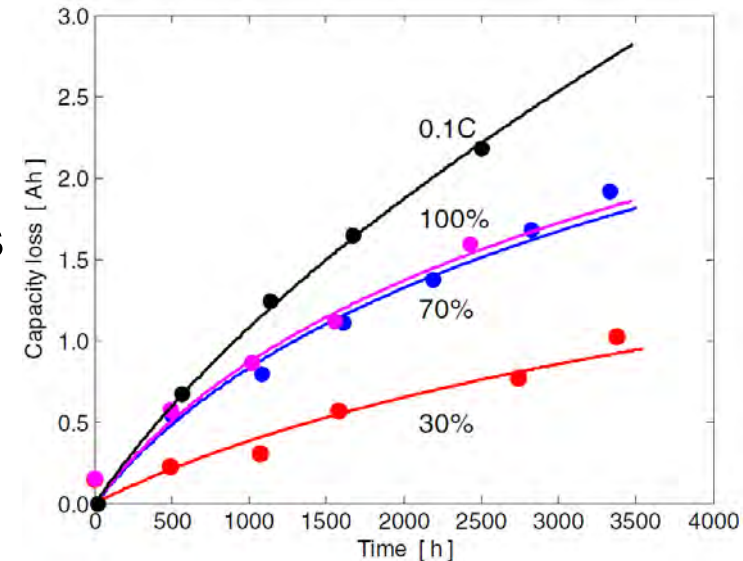
- Models development:
 - Development / reduction of thermal runaway models under Amesim.
 - Implementation of a module simulator and study of the pack safety
 - Ageing tests.





- Experimental investigation of Li-ion batteries
 - Cycling and calendar ageing experiments
 - Ageing characterization
 - Investigation of capacity degradation and power fade

- Electrochemical modelling
 - Modelling of ageing processes
 - Accelerated prediction of ageing development
 - Relation between capacity degradation and power fade in process of ageing





Interactive Fully Electrical Vehicles SRL



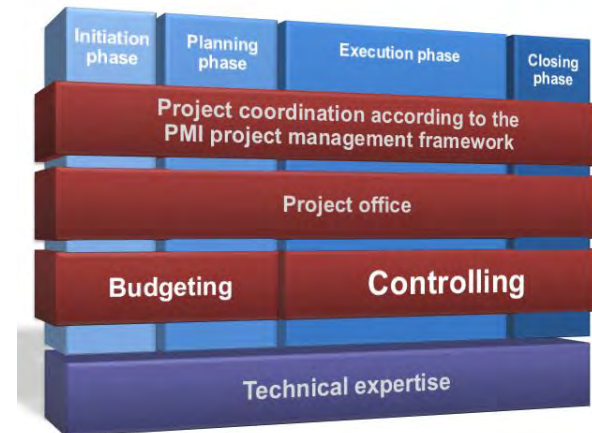
- Fast design of safe and high performing chassis
- Flexible Low Investment Manufacturing
- Integrated Battery Tray into Chassis
- LightWeight Tireless Wheels
- Vehicle Demonstrator



K&S GmbH Projektmanagement



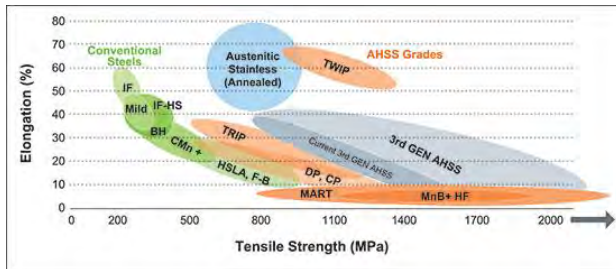
- Coordination and execution of dissemination activities
- Maintenance of the DEMOBASE project website
- Operational project management
- Definition and implementation of suitable quality management processes
- Project-internal risk management related to the project



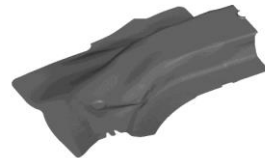
MA S.p.A



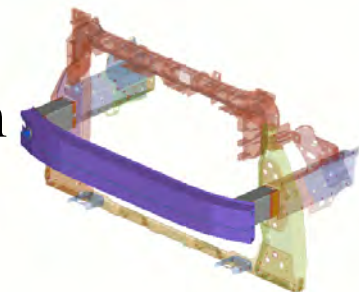
- Suggestion of the best materials for the best structural performance on vehicles
- Evaluation of new designs for wheels
- Tubular chassis made by Advanced High Strength Steels as per parametric design



- Process Simulation
- ✓ Cold / Hot stamping



- Structural Simulation
- ✓ Subsystem



Electromobility is moving forward, driven by drastic cost reductions, higher performances and improved availability to support new business models of autonomous driving passenger cars and new vehicle fleets. DEMOBASE falls within this context with the main objectives to cut down development and testing efforts for e-drivetrains at least by a factor 2 and to improve their efficiency by 20%. Safety will be fully managed and new concepts developed for fleet applications. DEMOBASE is composed of 11 leading European partners with activities ranging from cells to vehicle to recycling. The main gain at vehicle level will come from global optimization taking into account interaction of the different specialties.

Objectives at battery level will be achieved by massive digitalization, substituting the sequential cell then battery system development by a parallelization of these activities. This new process can be achieved only using enhanced cells models including safety features to define the cell conception for manufacturing and realizing in the same time frame battery management. Objectives at vehicle level will be achieved with a novel approach to design light-weight chassis. It will be demonstrated on a urban demo vehicle that will integrate the advanced battery pack and novels wheel-tire systems.

To secure project deliveries and reinforce collaborations which are an innovation key factor, DEMOBASE will be an original closed-loop project. In a first loop of the EV development, building blocks and their integration processes will be investigated and their efficiency assessed using Key Performance Indicators. Then the most efficient bricks and processes will demonstrate their added value in a second step in 6 months run starting from new high performances cells to operational EV. The DEMOBASE EV will be then evaluated on tracks.

Project data

Coordinator:	Philippe Desprez, Saft SAS
Project Office:	K&S GmbH Projektmanagement
Type of Action:	RIA
Grant No:	769900
Duration:	36 month
Start Date:	01 Oct 2017
Estimated Project Cost:	7,451,520.00 €
URL:	www.demobase-project.eu
Contact:	info@demobase-project.eu

DEMOBASE

DEsign and MOdelling for improved BAattery Safety and Efficiency



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The contents of this publication are the sole responsibility of the authors and do not necessarily reflect the opinion of the European Union.

Project Coordinator

SAFT

- » Battery parts manufacturing & expertise
- » Simulation & modelling for seamless integration
- » BMS functions and recycling

Partner



- » Battery main switch in CoolMOS™ technology
- » Pressure sensor



- » Risk analysis of the automotive battery
- » Characterization under abuse events
- » Cell and battery safety 3D models

ACCUREC

- » Specification regarding recycling and dismantling of end-of-life battery pack
- » Safety assessment during transportation and dismantling of end-of-life battery pack
- » Development of a recycling simulation tool for different types of Li-ion batteries



JÜLICH
FORSCHUNGSZENTRUM

- » Experimental investigation of Li-ion batteries
- » Cycling and calendar ageing experiments
- » Investigation of capacity degradation and power fade
- » Electrochemical modelling



- » Fast design of safe and high performing chassis
- » Vehicle demonstrator
- » Chassis integrated insulated battery pack



- » Suggestion of the best materials
- » Evaluation of new designs for wheels
- » Tubular chassis made by advanced high strength steels



K&S GmbH
Projektmanagement

- » Project-internal risk management and operational project management
- » Maintenance of the DEMOBASE project website
- » Definition and implementation of suitable quality management

DEMOBASE

Design and MOdelling for improved BAttery Safety and Efficiency



Fraunhofer
IISB

- » Development of the Battery Management System (BMS)
- » Development of seamless battery modeling methods



ifp Energies nouvelles
INSTITUT CARNOT
IFPEN Transports Energie

- » Vehicle simulator and implementation of HIL cell tests
- » Reduction of thermal runaway models, implementation of module simulator, study of pack safety and ageing tests



Development of collaboration FMI-based simulation platform

