Challenges for electric mobility

The paths of development in the automotive industry have not been this diverse in a long time. The electrification of the powertrain and the fields of action that come with it are among the most important driving forces that create several new challenges for automobile manufacturers, their suppliers and original equipment manufacturers.

Our services

The Fraunhofer Automobile Production Alliance is the place to go for companies to take on challenges together. The institutes of the business unit electric mobility offer competences in problem-solving, and complete solutions for the following key subjects:

- **Powertrain, energy storage and vehicle**
  
  This key subject focuses on the research and development of innovative technologies and concepts under consideration of the demands of the whole vehicle.

- **Powertrain and hybrid systems**
  
  Development of new engine and drive components | Testing of electric machines and powertrains in the complete vehicle | Simulations of the system behavior of electric drives and design of regulatory concepts | Design of highly integrated electronic components for drive system solutions | Development of cooling concepts for electric powertrain components | Analyses of electromagnetic behavior (EMV, EMZ) | Concepts for “Energy Harvesting” to optimize thermal dissipation | Realization of prototype vehicles with electrified powertrains

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Energy storage
Prototypical development of electrochemical storage concepts and processing technology
Electrochemical analysis and testing of storage components for electric energy
Simulation of material and modeling of battery systems
Reliability optimization for mechanic and thermal stress
Design of intelligent and allocated battery management systems
Development of sensors for better status diagnostics
Concepts for secondary use of batteries (Second Life)

System integration
Development of Smart Materials
Weight optimization of mechatronic systems
“Virtual Prototyping” for stressed (sub-)systems
Maximization of robustness and reliability
Methods for functional designs of hybrid vehicle concepts
Data and process management for integrated, interdisciplinary development

Vehicle concept and chassis
Assessment and guarantee of mass production capability of new vehicle concepts
Optimization of production
Testing of innovative vehicle architecture and utilization concepts in virtual environments
Technology developments
Concept realization
Realization and assessment of prototypes
Design and assessment of acoustics

Energy provision, supply and use
Conception of energy management concepts
Integration of charging stations and temporary storages into independent networks
ICT solutions for the integration of system components
Efficiency technologies of production
Energy balance and carbon footprint

Networking and security
Development of wireless sensor networks
Secure communications architecture
Fleet tests with electric vehicles to research business models
Development of maintenance, repair and overhaul (MRO) systems for electric vehicles

Autonomous driving
Vehicle-pedestrian interaction
Development of service and business models
Intralogistics and unmanned transport systems
Acceptance and road safety
Development of sensor and actuator systems
Vehicle concept and design
and communications architecture

Factory and production planning, and logistics concepts
Solutions for an intelligent construction of car bodies
Realization of ultrashort process chains
Development of holistic energy and resource management systems
Planning of intra and extra logistics systems
Development of mobile logistics-robot systems and intelligent security concepts

Production technologies and quality control
New production and assembly technologies
Development of innovative joining technologies
Process automation and mobile robot use
“Design for Manufacturability” for cost-efficient production of electric components and systems
Extensive quality tests of components
Recycling and return systems

Material selection
Material lightweight design (hybrid materials, 3D metal printing)
Lightweight structures (hollow shafts and axles, high-strength compact gearing)
Functional layer and surface technology (CVD, LPD)

Vehicle and environment
This key subject deals with comprehensive questions of mobility concerning the vehicle and its environment.

Technology and earned value management
Technology and product planning
Added value analyses
Roadmapping and scenario analyses
Profitability assessment of production and assembly concepts

Identification of effects on employment and added value