

**Powertrain**

**Researching**

**Consulting**



**Batteries**

**Fuel Cells**

**Engineering**

**Presentation HMI 2021**

**12. to 14.04.2021**

# Consulting

## Studies / Technology Evaluation

- Execution of studies for efficiency and future-oriented technologies
- Investigation and comparison of suitable solution approaches
  - Technical feasibility
  - Costs
  - Prognosis of future impacts on technology and cost development
- Decision model presentation
- Concept development
- Project management, planning of resources and costs

## Consulting on Business Transition

- SWOT-Analysis
- Transfer of manufacturing expertise
- Development of product competence

# GREENING



# Engineering

## Engineering Powertrain

- Technical Design
- Packaging
- Conception
- Prototype Construction
- Commissioning
- Testing

## Projects

- eSwingo
- E-City bus
- ISELV 1.0 - 3.0
- REM 2030
- InnoROBE

# GREENING



Quelle: HET, Terberg, Busfahrermagazin

## Engineering

### Battery development

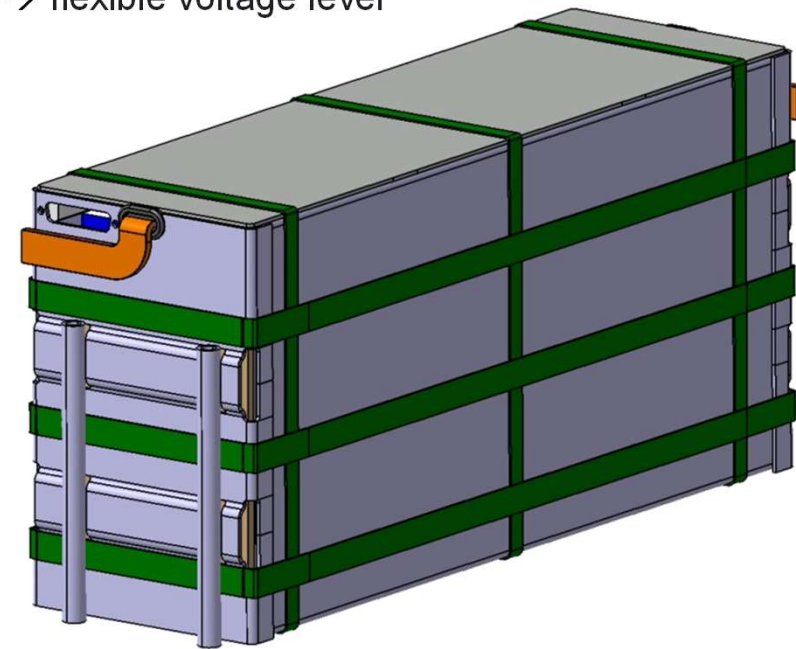
- Requirements management
- System layout
  - Module configuration (cell layout)
  - Design of the peripherals (electronics, thermal management, insulation coordination and functional safety)
  - Dimensioning of fuses and electric conductors
- Packaging
  - Definition of interfaces (connectors, equipotential bonding, assembly and media routing)
- Design
  - Housing and conditioning
  - Module
  - Power Distribution/Harnesses



## Greening Standard Battery Module (GSB)

### Characteristics

- Cell chemistry: Lithium iron phosphate (LFP)
- Module voltage level < 60 V
  - The low voltage range enables simplified service
  - Electrical contacting at module level can be adapted to the specific application → flexible voltage level
- Scalability
  - Cell geometry (50 Ah / 105 Ah / ... Ah)
  - Number of cells (12 to 16 Cells per module)
- Certification
  - Protection of the relevant ECE-R100 (Rev. 3) tests already at module level  
→ Reduced scope of testing for customers
  - UN38.3

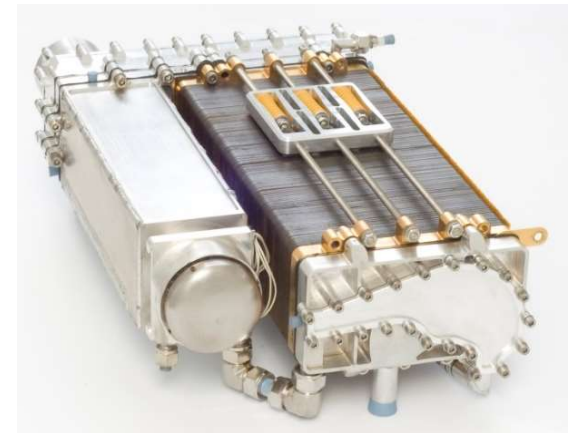


## Engineering

### Fuel cell integration

Low-floor city bus and midibus with hydrogen-powered PEMFC

- Elaboration of the technical requirements of the individual components
- Complete design of the thermal management
- Deriving the sensible system layout
- Packaging of all components taking into account the above-mentioned work results
- Hydrogen-compatible construction for the integration of all components, media ducts and HV installation and safety
- Construction of the brackets
- Design and manufacture of the PDUs
- Selection of suppliers and procurement of the components, structure of the system and installation in the respective vehicles, as well as commissioning





# ResearchIng

# GREENING

**InnoROBE** Innovative Regenerative On-Board Energy Converter for Driving Range Optimisation

**ThoREx** Thermally optimized Range Extender

**OptiFeLio** Optimized Design and Product Concepts for the production of Lithium Ionen Battery Housings

**InnoDeLiBatt** Innovative Production Technologies for the Production of Lithium Ion Batteries suitable for Disassembly

**BiLawE** Bidirectional, Inductive Charging System Economically Efficient within the Power Grid

**HylightCab** Hybrid Lightweight Technology for Cabin Compartments –

Multi-material Systems for Weight and Cost-optimized Commercial Vehicle Cabins

**InnoTherMS** Innovative Predictive High Efficient Thermal Management

Systems for Increased Recuperation Rates

**InnoEKom** Innovative total energy system for an electric municipal vehicle

**DeMoBatt** Industrial dismantling of battery modules and e-motors to save on raw material for e-mobility

GEFÖRDERT VOM



Bundesministerium  
für Bildung  
und Forschung



Bundesministerium  
für Wirtschaft  
und Energie



# THE EFFICIENT WAY OF ENGINEERING

# GREENING

10 years of experience within developing and assembly of **customized solutions**

**Dimensioning, Integration, Design and Prototype Construction of and with HV components**

Years of experience in the field of **battery safety** and battery testing

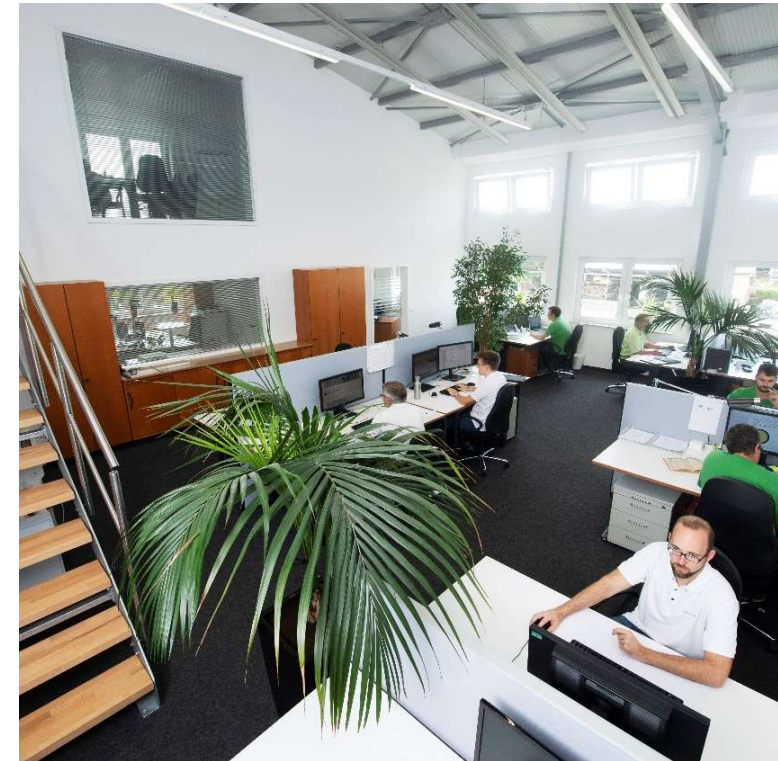
**Light-weight Design** through Functional Integration and Topology Optimisation

**Short Distances** to our Customers and Suppliers

**Short-term Availability** of Specialists through our 3-pillar-model

„Engineering - Researching - Consulting“

**Strong Network & Lean Structures**





**„We develop efficient technologies!“**

**GREENING**

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