

# FEV Co-Simulation Platform for Fast Charging Optimization

FEV SIGNATURE SOLUTIONS

## Your shortcut to reliable fast-charging solutions

### FEV offers

- ▶ **Flexible co-simulation platform** delivering fast-charging insights within weeks, accurately reflecting real-world battery, thermal, BMS, and charger interactions to accelerate development decisions.
- ▶ **Offered as a customizable tool or as expert FEV engineering support** tailored to your specific fast-charging development challenges.
- ▶ **Optimized charging strategies** balancing speed, efficiency, temperature, and battery health, including advanced features such as pre-conditioning and dual-gun charging.
- ▶ **Virtual safety assessment** predicting critical scenarios and ensuring compliance with fast-charging and battery-safety standards before hardware investment.
- ▶ **Seamless MiL/HiL integration** with optional charging-station database and acoustic analysis for comprehensive validation and infrastructure-aware development.



## Why FEV

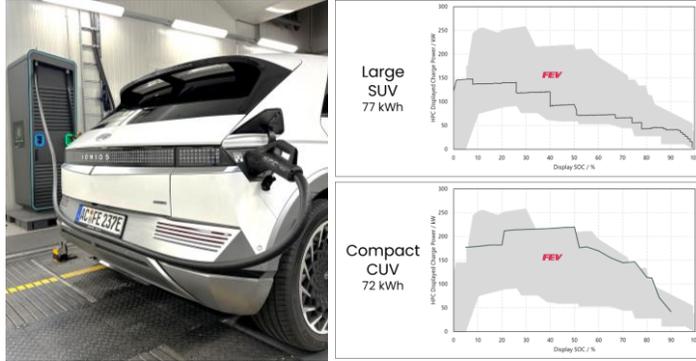
- ▶ 45+ years of automotive engineering excellence and 20+ years of charging domain experience ensure reliable, validated methodologies.
- ▶ From concept to series maturity: design, simulation, safety, MiL/HiL validation, and industrialization – one partner for your entire fast-charging development chain.
- ▶ Open, configurable models and workflows that integrate seamlessly with your existing toolchains and scale with your program needs.

# Real-world applications of FEV's fast charging simulation platform

## 01

### EV OEMs: Optimize charging strategies

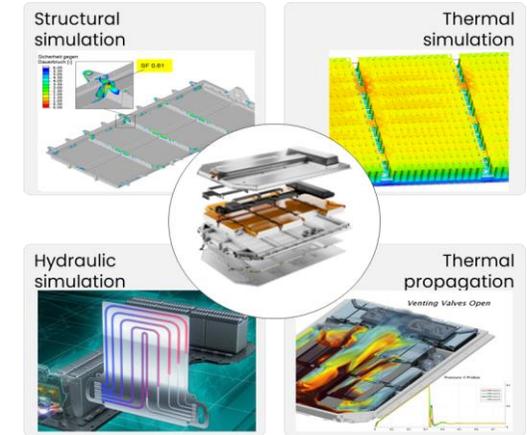
- ▶ The tool allows rapid evaluation of charging curves, thermal limits, and battery degradation



## 02

### Battery Manufacturers: Accelerate R&D

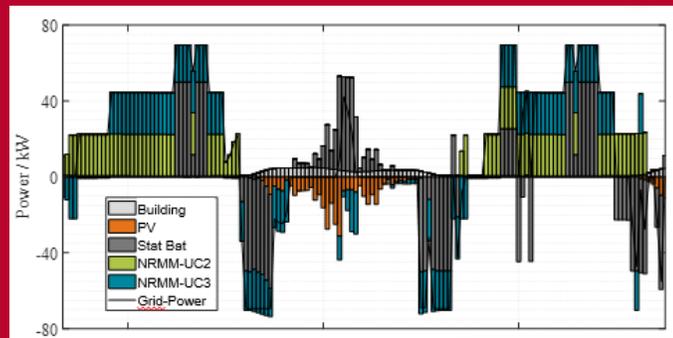
- ▶ The integrated environment enables evaluation of thermal, structural, and electrochemical parameters.



## 03

### Grid Operators: Assess impact of fast charging on infrastructure

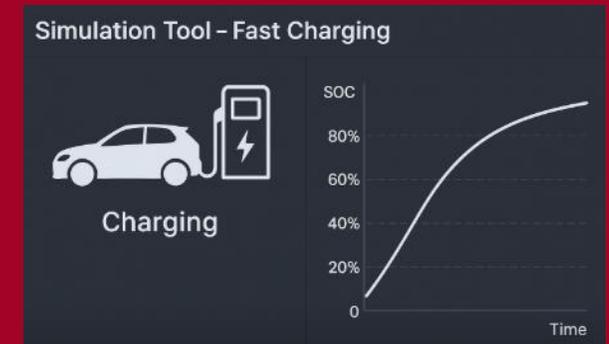
- ▶ Our tool supports scenario analysis to develop load management and mitigation strategies.



## 04

### Academia: Research and teaching tool

- ▶ It supports both teaching and cutting-edge research in electrochemical systems and EV technologies.



# Key features of FEV's fast charging simulation platform

## Modular and scalable architecture

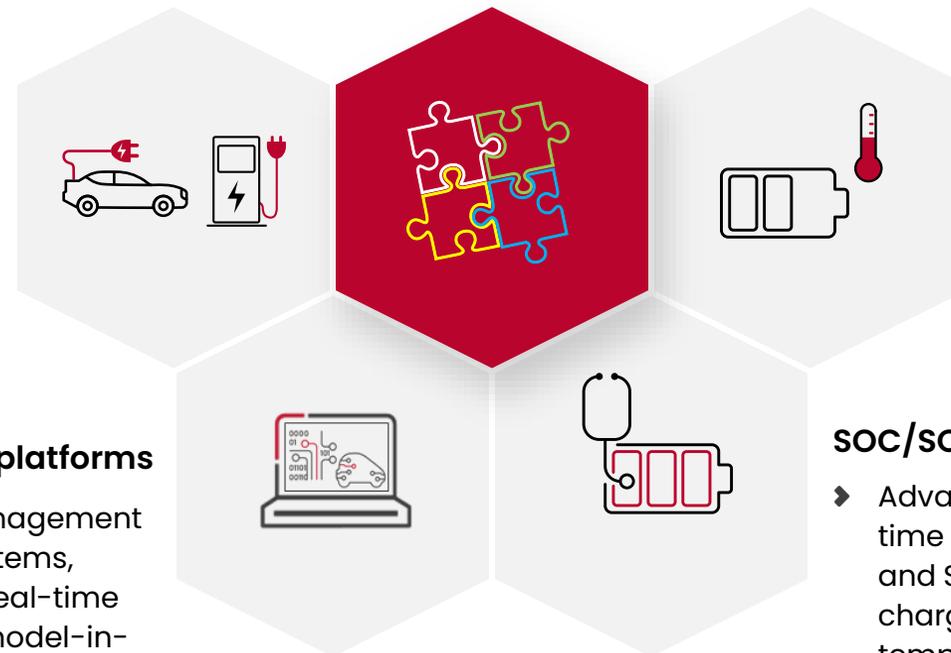
- ▶ Our modular simulation platform scales from single cells to full vehicles and grids. Customize electrical, thermal, and degradation components for any battery application, from EVs to energy storage.

## Real-time simulation of charging profiles

- ▶ Our tool supports real-time simulation of industry-standard and custom charging profiles, including Constant Current-Constant Voltage (CC-CV), pulse charging, and dynamic strategies. It enables engineers to visualize battery response and system performance

## Integration with BMS and digital twin platforms

- ▶ Seamlessly integrates with Battery Management Systems (BMS) and digital twin ecosystems, enabling closed-loop simulation and real-time data feedback. This feature supports model-in-the-loop and hardware-in-the-loop workflows.



## Thermal runaway prediction

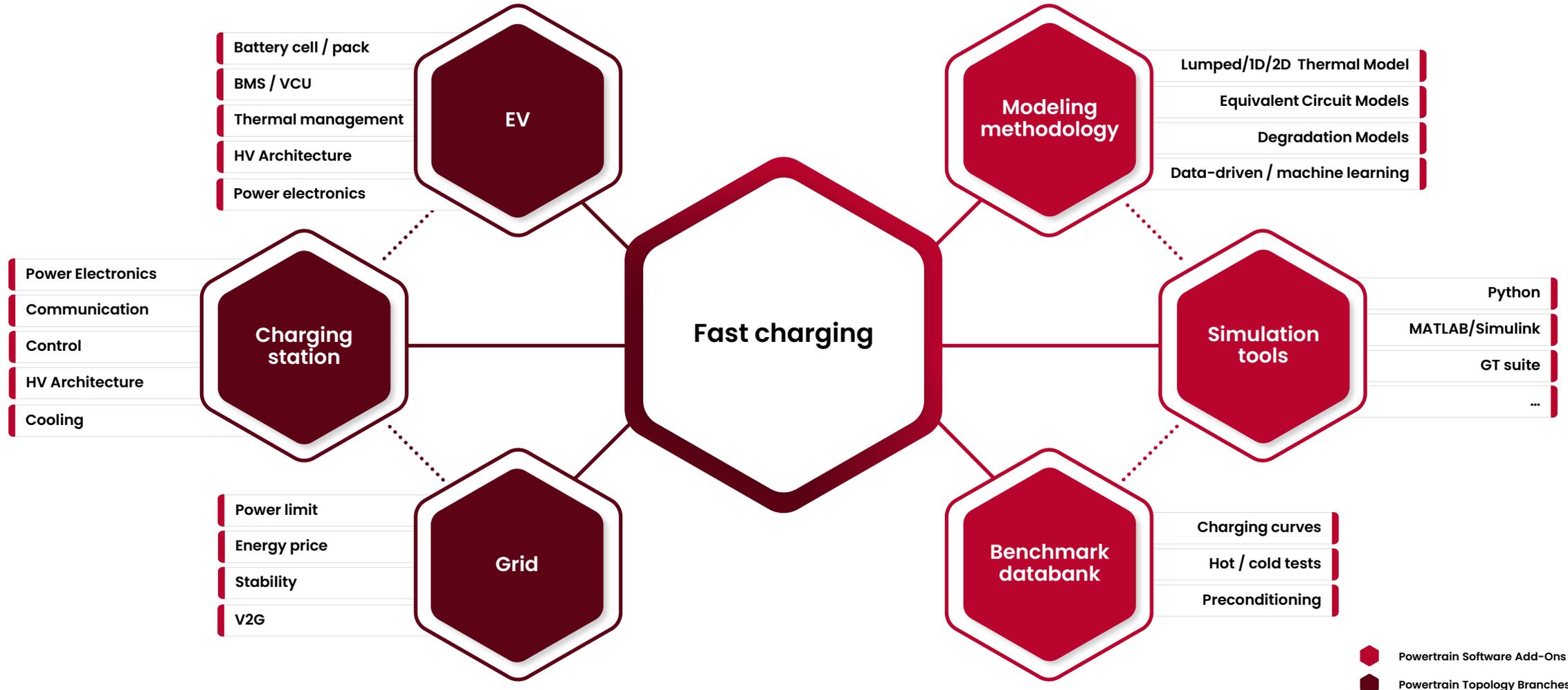
- ▶ Built-in thermal models identify critical conditions that may lead to thermal runaway under fast charging. Early warning detection helps mitigate safety risks and optimize thermal design.

## SOC/SOH estimation

- ▶ Advanced algorithms provide accurate, real-time estimation of State of Charge (SOC) and State of Health (SOH) throughout the charging process. The tool accounts for temperature, C-rate, and degradation effects.

# Co-Simulation framework to optimize fast charging performance

A HOLISTIC APPROACH INTEGRATING THE VEHICLE, CHARGING STATION, AND POWER GRID



# Get in touch with us for further information



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