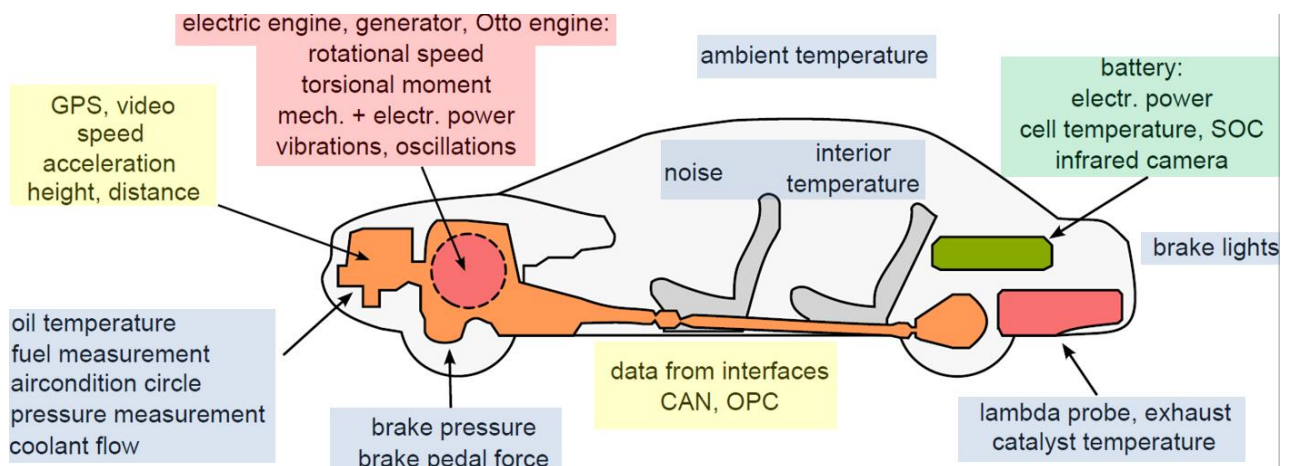




## ***E-Mobility Test bench*** **Application Example**

**Customer:** Technology University

The customer is a Institute for Powertrain and Automotive Technology at a Technical University. They have a test bench for analysis of the longitudinal dynamics of hybrid and electric vehicles. For this project a Dewetron measurement system was chosen for this project because of its modular system architecture, which enables the synchronous acquisition of different input types. The heart of the testbed consists of two DEWE-2600-E-Mobile measurement systems. Together, they are able to measure and store synchronously more than 100 signals with different sampling rates. The input signals comprise, among others, voltage, current, SOC, rpm, torque as well as noise, vibration and consumption and emissions data. Additional data of the testbed and the control unit of the vehicle can be imported into the software via a special interface.



For its comprehensive longitudinal dynamic analysis, TU Vienna used the mathematic library for calculating more than 200 parameters from the input signals.

One of the university's objectives was to determine the efficiency of the electrical powertrain. With Dewetron's measurement software, it is possible to create several power modules to calculate the power at different frequencies for several direct, alternating and three-phase current systems at the same time. In this way, it is possible to acquire currents and voltages at 14 different measuring points at the testbed synchronously. Among others, they acquire engine, generator, heating, air-conditioning and low-voltage systems to create an entire power balance. To guarantee the highest quality of power measurement, the sampling rate and the analog bandwidth are vitally important. Modern frequency converters for electric vehicles work with a pulse frequency up to 30kHz. To acquire these signals for precise power measuring, it is necessary to choose a high sampling rate to guarantee an analog bandwidth up to 600kHz. Dewetron's galvanic isolated amplifiers with a bandwidth up to 2MHz ensure this.

The battery is the central element in the electrical powertrain and strongly influences the performance and range of electric vehicles. As such, the lifetime of the battery is a problem. Therefore, TU Vienna also analyzed the cell characteristics, aging, as well as warming and temperature dispersion to evaluate the long-term performance of the battery. To this end, it analysed more than 40 measuring points in the battery system. The performance balance of the entire powertrain is determined directly in the measurement software. Hence, it is possible to





identify the recuperation energy, energy consumption, efficiency factor, and so on, during the tests. The analysis can also be performed in the post-processing phase.

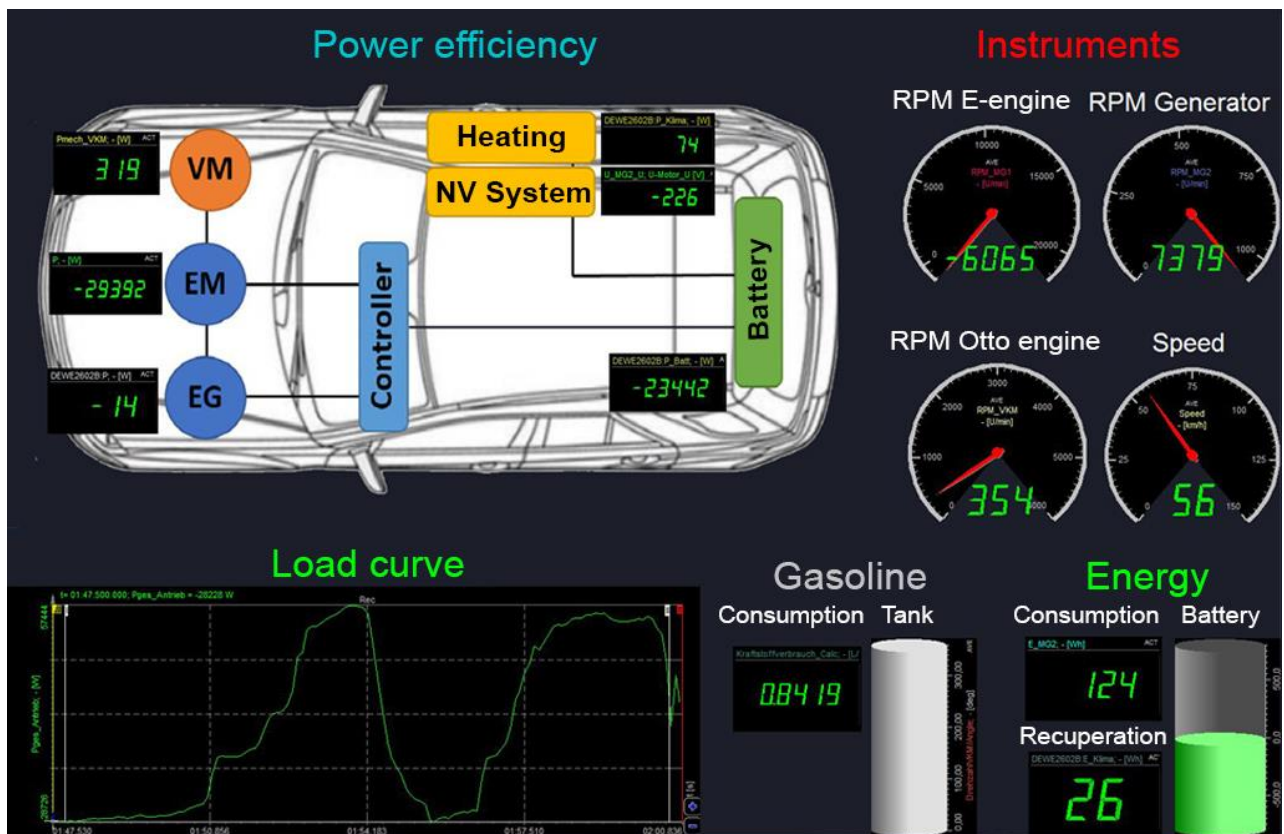
Using the same Dewetron measurement system, it is even possible to measure during real driving conditions. The DEWE-2600-E-Mobile measurement system has two battery packs that supply the sensors as well as the system with enough power to guarantee a reliable measurement. For measurements during driving, further sensors such as GPS or video can be connected to the system.

### Challenges and Requirements

- Synchronous acquisition of multiple channels (voltage, current, rpm, force, torque, noise, vibration, emission data, temperature, pressure, etc.)
- 14 x Power module
- CAN, Video and GPS
- High Bandwidth of whole measurement chain
- High Sampling rate (up to 10 MS/s)
- Online - Efficiency Determination and calculation of different parameters (Math)
- Post-Processing and Export functionality for detailed analysis

### Software:

- Dewesoft





### Hardware:

- 2 x DEWE-2600 measurement unit
- 4 x 1 MS A/D card with 16 channels
- 14 x Full-isolated high voltage Inputs (1400V rms)
- 8 x Full-isolated low voltage Inputs (50V rms)
- 40 x MDAQ inputs
- 8 x CM 400 zero-flux current transducers incl. Shunt
- 8 x 150 DC Current Clamp
- 8 x power supply connectors for 150-DC
- 4 x CAN
- GPS, Video
- Sync of both devices

