

## Hybrid Powertrain Test Cell Capabilities

FEV recently completed an expansion of its North American Headquarters. This expansion included the addition of four hybrid powertrain test sites, which are believed to be one of the only non-OEM, emission compliant, hybrid powertrain test cells in the United States. In total, FEV's North American Technical Center can now support its customers with six hybrid powertrain test sites (s. fig. 1). FEV offers hybrid development, testing and optimization services to OEMs, battery suppliers and hybrid electric motor suppliers that need to develop hybrid powertrains in a technologically advanced environment dedicated to sustained mobility through hybrid applications.

All hybrid powertrain test sites (s. fig. 2) are fully transient capable. Full hybrid powertrain test cells differ from conventional powertrain test cells based mainly on dynamometer capability and battery emulation/



Fig. 1: Hybrid Test Cell Controlling

simulation. The transient dynamometers used in FEV's new cells satisfy hybrid development needs for operating a powertrain at rated torque with 0 rpm while still being able to achieve high output speeds of up to 8,000 rpm. Each test site also utilizes a battery emulation system (ABC 150), which replaces the hybrid vehicle battery with a high-voltage source. The cells have the capability to run with battery simulator, with the high voltage battery, or use the unit to charge the high voltage battery.

In addition to the battery emulation system, FEV has developed a Restbus Simulation system, which simulates output signals that would exist from various vehicle systems. These signals are relayed to the Engine and Hybrid Control Units so that the systems function properly. The Restbus Simulator was developed

as a communication system to operate the battery emulator, which can command particular voltages, as required by specific testing conditions.

Hybrid test cells also require many safety features due to the high voltage environment. Features have been added, such as component isolation and electrical indicators (lights and buzzers) to alert the test cell technicians when high voltage is present.

Similar to conventional powertrain development test cells, each of the new hybrid cells are utilized for:

- powertrain and controller development
- calibration
- benchmarking
- validation and durability testing

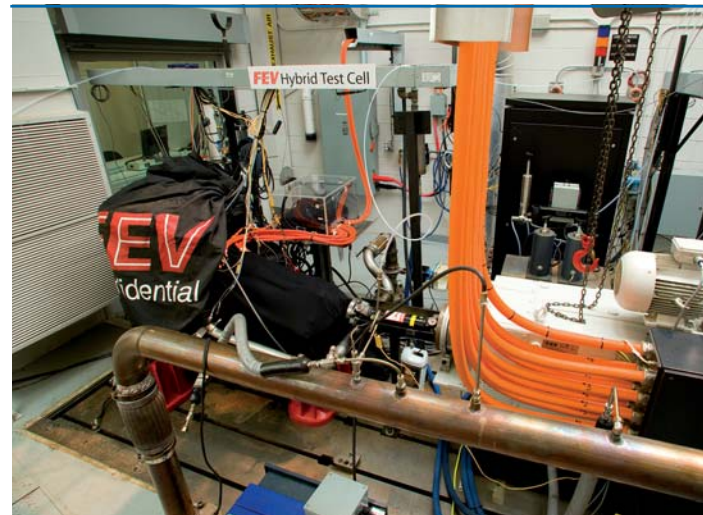


Fig. 2: Hybrid Test Cell

These cells, combined with FEV's experienced hybrid staff, provide our customers with the flexibility and technology to develop a wide range of current and future hybrid systems, which can reduce the overall development time by optimizing the integration process earlier in the vehicle development cycle and can aid in generating a faster time to market based on industry demand.

heidt@fev-et.com