

# Powertrain test equipment

Able to simulate a diverse range of environmental and in-vehicle conditions, specialized electric and hybrid powertrain testing equipment helps to reduce development time

►► The requirements for reduced emissions and increasing fuel efficiencies are driving the demand for specialized powertrains, and consequently the demand for specialized powertrain test equipment. As this demand evolves, these testers must offer both exceptional capabilities and the flexibility to accommodate different powertrain motor technologies. With the Electric Powertrain Tester (EPT) line of test platforms, D&V has taken its extensive knowledge of testing electric motors and created a line of equipment specifically designed for HEV and EV powertrain testing.

The EPT-130 is an excellent example of a D&V solution for these special requirements. This latest durability tester was recently built for an innovative European powertrain technology manufacturer. The customer's requirements led D&V to develop new, state-of-the-art technology to meet its high-tech demands. D&V was requested to supply a durability tester that was capable of running demanding lifetime testing for a switch reluctance electric motor and inverter under diverse simulated driving conditions.

In addition there were requirements to provide wide-ranging environmental conditions and to simulate many in-vehicle conditions and faults. The foundation of the EPT-130 is a proven D&V dual motor dynamometer configuration that uses two high-performance motors to feed power to a high-speed driveline. This configuration provides extremely high acceleration rates with

low inertia and considerable power capabilities.

The D&V-supplied battery simulator included a new 150kW power supply, with a true voltage range from 0-1,000V DC and bidirectional regenerative power capabilities. Also provided was a new high-speed, high-accuracy power measurement module with multiple channels for motor current and voltage, configurable analog inputs and multiple motor position input channels. The motor current and voltage channels include ultra-fast data-collection capabilities that enable very accurate active and apparent power calculations to be performed. These exacting measurements provide plentiful and relevant data that was not previously available to customers, and now enables the exploration of the upper limits of an HEV/EV motor and inverter system.

The client requirements demanded the most rigorous

environmental testing. D&V used an innovative solution that employed an extremely durable environmental system that exchanges air through a specially designed air mixing system, along with a purpose-built environmental chamber. The environmental chamber was designed to offer full and easy access to the device under test (DUT) without compromising chamber seal integrity. Innovative coolant piping, sensor wiring and patch panel arrangements were employed in order to minimize chamber losses.

A separate caster-mounted inverter panel, which enables easy mobility and access, supplies power to the DUT. In order to accommodate a variety of inverters, a reconfigurable mounting arrangement is employed to provide all integrated electrical and cooling connections. Quick disconnects are employed to simplify making or breaking the electrical connections.

Two fault-injection modules enable the development of fault-recovery strategies without having to destructively modify components. With these modules in place, it is possible to simulate a multitude of conditions and motor/inverter faults on the high-voltage DC bus and output phases, as well as on the low-voltage control, feedback and communication signals. Some of the conditions that can be simulated are: shorted or open motor windings; high or low resistance for each winding; resistance between windings; and lost or intermittent electrical signals, CANbus lines and resolver signals. These fault conditions are easily implemented and monitored through the system software's graphical user interface. 🌐



The EPT-130 platform was developed to run demanding lifetime testing for a switch reluctance electric motor and inverter

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