

ECCE Expo 2016: A Unique Forum For The Tools To Create Energy Conversion Systems

by David G. Morrison, Editor, [How2Power.com](#)

Each year the [Energy Conversion Congress and Expo \(ECCE\)](#) enhances the value of its very strong technical program by hosting an expo that presents the latest design tools, components, subassemblies, design services and other organizational resources relating to the development of energy conversion systems. This tradition continues at the upcoming ECCE 2016, which will take place Sep. 18-22, 2016 in Milwaukee, Wisconsin.

As in the past, the ECCE expo features strong representation from vendors of design software and hardware for simulation and emulation of power electronics and electric machines. Among these, hardware-in-the loop systems for prototyping high-power power converters and drives are notable as they address some of the key applications in transportation, industrial automation, renewable energy, and utility-scale power transmission (HVDC for example) that are addressed extensively in the ECCE technical program. Similarly, there are exhibits featuring the latest benchtop test instruments including scopes, power analyzers, and probes to support development of motors and power converters for these same application areas.

In addition, the components that are most critical in determining the performance of power converters and machines—particularly transformers and advanced power semiconductors, particularly silicon carbide and gallium nitride power transistors, and electrical laminations are prominently featured in the ECCE expo. This article offers a preview of these various products as described by the exhibiting vendors.

Test And Measurement

[Teledyne LeCroy](#) (booth #220) will be showing a number of instruments with capabilities geared to power electronics applications. One is the HDO8108, an 8-channel, 1-GHz, 12-bit oscilloscope. Another is the MDA810 Motor Drive Analyzer (which is built on the HDO8000 oscilloscope platform.) The MDA810 performs three-phase electrical and mechanical, static and dynamic power analysis with complete test capability. This instrument is feature in Ken Johnson's ongoing article series, "[A Practical Primer On Motor Drives.](#)"

The company will also be showcasing accessories such as its HVD series of high-voltage differential probes and its DA1855A differential amplifier. The HVD series probes are available in common-mode ratings of 1 kV to 6 kV, all with 1% accuracy. And according to the vendor, these probes have the widest differential ranges and unparalleled CMRR in a probe of this type. This series is also said to offer the only 2-kV HV differential probe available for measuring 1500-Vdc bus systems per IEC60038 and this probe is IEC/EN/UL 61010-031 rated.

The DA1855A differential amplifier is notable for its 100,000:1 CMRR, fast overdrive recovery, and voltage clamping for accurate semiconductor power device loss characterization.

Another test company, [Keysight Technologies](#) (booth #527), plans to show a broad range of instruments that aid designers in the selection of the right power components. Some key products include Keysight EEs of Electronic Design Automation (EDA) Software for accurate design simulation & modeling, power device analyzers, oscilloscopes, power electronic simulators, source measurement units (SMUs), power supplies, and power rail probes. According to Keysight, no other company offers this many solutions to include software, modular systems, and traditional bench top instruments.



Visitors to Teledyne LeCroy's booth at last year's ECCE learn about the MDA810 Motor Drive Analyzer.

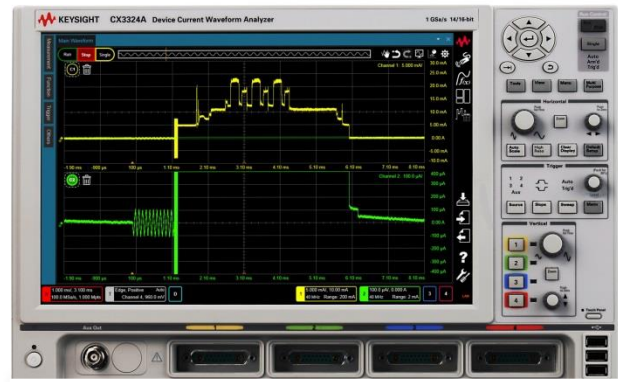
Technical focus areas for Keysight at ECCE 2016 will include: circuit design tools, power device characterization including power loss, design and validation of efficient power converters, reliability and efficiency of switching power supplies, power and power integrity measurements, and battery drain characterization.

Keysight has experts that will be available to discuss the latest challenges and available solutions relative to power and energy conversion. Stop by the Keysight demo booth to see how to



Keysight's N6780 series SMUs.

measure power transients and current harmonics with the company's power analyzer and how to make high-frequency switching power supply measurements with an oscilloscope among others.



Keysight's IntegraVision power analyzers.

Design Tools

[OPAL-RT Technologies](#) (booth 413) will be showcasing three products at the show. One is the OP4200, the company's newest real-time simulator. The OP4200 offers hardware-in-the-loop (HIL) rapid control prototyping (RCP) data acquisition, and I/O expansion capabilities in a desktop-friendly package to support power electronics and electric drive applications across industry and academia. The sleek and intuitive design of the OP4200 gives users the option of simple I/O reconfiguration, including signal format and conditioning to fit their needs.

Another product being featured is OPAL-RT's Lab-Scale Multilevel Modular Converter test bench. Described as the world's first turnkey, multilevel modular converter test bench for laboratory research, the OP1200 provides researchers with an optimized platform for performing rapid control prototyping of novel power electronics converters on actual hardware. Researching innovative HVDC converter topologies with a test bench has never been easier, giving researchers



OPAL-RT's Lab-Scale Multilevel Modular Converter test bench.

more time to focus on applications including HVDC transmission and distributed energy resource interconnection.



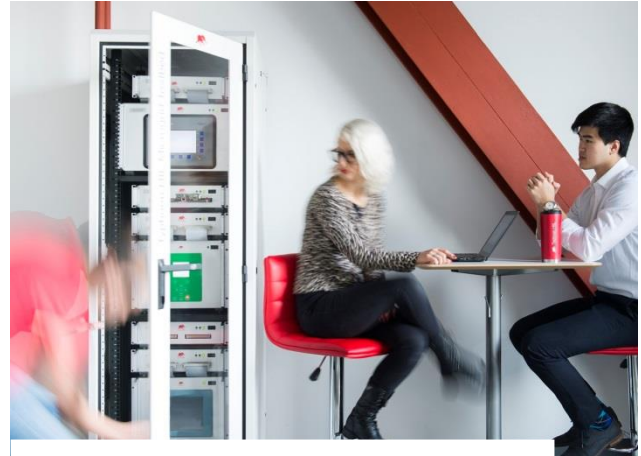
OPAL-RT's RCP/HIL System.

Finally, the company will be demonstrating its eHS simulation toolbox, eHS. This product is a real-time power electronics simulation toolbox that provides the same ease of use as standard PC-based HIL simulators. Thanks to a convenient circuit schematic graphical user interface, the FPGA code is automatically generated, making FPGA-based simulation accessible to a large number of users.

Meanwhile, [Typhoon HIL](#) (booth #410) a company providing technology for real-time ultra-high fidelity control hardware in the loop (C-HIL) testing for power electronics, power systems, and microgrids, will give its first public demonstration of the Typhoon HIL Microgrid Testbed. With this testbed, hardware models, comprising smart inverter hardware, PV panels, batteries, transformers, generators, switches, cables, active and passive loads, run inside HIL devices with a 1- μ s time step. Smart inverter controllers control the operation of smart inverter models. Relays control the protective switches and microgrid controllers provide the overall supervisory control. In addition, Typhoon HIL will be demonstrating their HIL402 and HIL602 systems.

Visitors to the Typhoon HIL booth can learn how the company's vertically integrated solution is used for a wide range of applications from solar and wind power generation, battery storage, power quality and motor drives to microgrid.

Attendees can stop by [Powersim's](#) exhibit (booth #504) to learn more about PSIM, and its add-on modules. PSIM is Powersim's core power electronics simulation tool, which empowers engineers to accelerate the pace of innovation with what the company describes as the fastest, most reliable and easy-to-use solution. PSIM provides expert technical support and delivers systems-level solutions that integrate smoothly with other popular engineering platforms.



Typhoon HIL Microgrid Testbed.

PSIM delivers systems and control level simulation capabilities, while SPICE provides a vast library of industry standard device level models. This combination of PSIM + SPICE creates the ultimate power electronics simulation environment according to the vendor. The combination of PSIM and SPICE will allow designers the ease & speed of system level and control design simulation with PSIM combined with the resolution and models that only SPICE can provide.

In addition to its activities in the exhibition, Powersim's Albert Dunford, will participate in a panel discussion "Challenges of Simulating Power Electronic Systems."

Components

[Payton](#) (booth #414) offers complete design and production capabilities for planar magnetics in the Americas, Asia, the Middle East and the U.K. At ECCE, Payton will be displaying a complete line of planar magnetics from a few watts to over 100 kW.

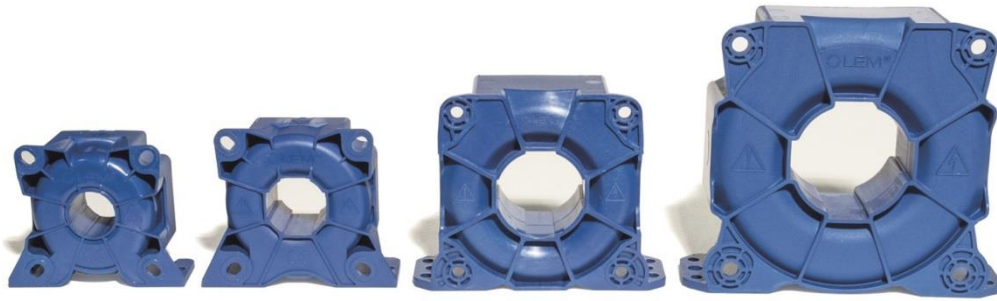


[LEM](#) (booth 321) will be showing its HO Digital family of Intelligent & interactive current transducers. According to the vendor, these transducers set the standard for current measurement. In addition to its tight accuracy over temperature and small form-factor, the HO family is now available with a digital output to help minimize additional system components and provide better signal fidelity over distances.

The company will also be introducing new members of its LF xx10 transducers for non-intrusive and isolated nominal measurements of dc, ac and pulsed currents from 100 A to 2000 A. the new series are the LF 210-S, LF 310-S, LF 510-S, LF 1010-S and LF 2010-S. According to the company this product family pushes the performance limits of Hall effect technology.



HO Digital family of intelligent & interactive current transducers.



LF xx10 transducers for non-intrusive and isolated nominal measurements of dc, ac and pulsed currents.

[Proto Laminations](#) (booth 420) specializes in the manufacture of electrical laminations in short runs supporting the research and development, prototype evaluation and limited production needs of motor and generator producers worldwide. In its exhibit, Proto Laminations will be highlighting its short-run manufacturing expertise pertaining to electrical laminations and will be making special note of the company's design-for-manufacturability and materials engineering services. As in past years, Steve Sprague will be on hand to discuss in detail the company's capabilities.

[Infineon Technologies](#) (booth #328) will show its CoolSiC 1200-V MOSFET, Infineon's leading edge solution to bring actual designs towards new efficiency- and power density levels. The CoolSiC MOSFET is said to represent the best solution for solar, UPS and industrial Drives applications by combining best performance, reliability, safety and ease of use.

The company will also be exhibiting its automotive-qualified power modules for hybrid vehicles including the HybridPACK 1 and 2 families, HybridPACK Light, HybridPACK Drive, Double Side Cooled, EconoDUAL 3, and Easy 1B+. It will also show its multi-level solutions for grid-tie applications including Easy 2B, EconoPACK 4, 62-mm, PrimePACK 2, XHP, Modules with Press Fit and Pre Applied TIM, and Modules with Internal Shunts.

The company will also display its high power modules; a 3-phase power stage for 400-W motor featuring Infineon's 700-V gate driver IC and 650-V IGBT; an evaluation board for the 1EDI60I12AF – two 1200-V single-channel coreless transformer isolated gate driver IC in a half bridge configuration for MOSFETs or IGBTs; and an evaluation board for the 2EDL23N06PJ – an optimized 600-V half-bridge gate-driver IC with LS-SOI technology to control MOSFETs.

[GaN Systems](#) (booth #305) will feature a new family of GS665XX demo kits with exceptional efficiency, high dv/dt drivers and a low cost layout. The demo kits consist of:

- A common motherboard that can be configured as a buck, boost or double-pulse tester.
- Daughter cards for the company's most popular 650-V GaN E-HEMT transistors from 15 A to 60 A that can plug into the motherboard, or even be used as a reference design in many system applications.

GaN Systems will also display examples of customers' products in production that use GaN transistors.

[How2Power.com](#), which is a longtime media sponsor and exhibitor at ECCE, will also be exhibiting at this year's expo. Please stop by the How2Power booth #506, say hello, and feel free to share your thoughts on the conference with me.

In addition to the companies profiled in this article, numerous other suppliers and organizations are scheduled to participate in the expo. The following is a list of the exhibitors for ECCE 2016 as of 07-14-2016. For further updates, see the ECCE [website](#).



