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## INL's Battery Test Center

*Improving energy storage and advanced vehicles*

The Battery Test Center at Idaho National Laboratory (INL) is the Department of Energy, Office of Energy Efficiency and Renewable Energy's (EERE) primary center for battery technology testing. The test facility provides 17,500 square feet of laboratory space equipped with tools that allow testing of several hundred

batteries at the same time, ranging from small cells to full-sized battery packs used in today's light-duty vehicles.

### **Testing Capabilities**

Testing equipment includes more than 700 test channels for advanced energy storage testing at the cell level, module level and pack level. Test stations are capable of outputs

up to 1,000 V DC with output currents as high as 500 amps and 350 kW.

Stations can also be operated in parallel to produce outputs up to 1,000 V DC at 1,000 amps with 700 kW in both charge and discharge directions. The testers can be programmed to perform any test profile while simultaneously monitoring constraints such as voltage and temperature limits. Batteries are typically tested inside thermal chambers, including two walk-in chambers for full-sized pack-level testing, to ensure consistent and repeatable temperature conditions. The thermal chambers are capable of a wide range of temperatures, from -65 C to 190 C for enhanced testing and modeling capability. Data acquisition capabilities include thermocouple channels and reconfigurable analog inputs as



*The Battery Test Center can test batteries ranging from small cells to full-sized battery packs used in current light-duty vehicles.*

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well as CAN bus capabilities to allow for communications with integrated battery management systems and diagnostics.

#### **Vibration Test Station**

Because of their high-energy content, high-power capability and significant cost, the electrical safety and mechanical robustness of batteries in hybrid, plug-in hybrid and electric vehicle applications is critical.

INL has a vibration test station to test mechanical durability based on accepted standardized test protocols. The Ling Dynamic Systems Vibration System, with a 25-inch diameter armature, can accommodate all of the short-duration random vibration tests for all vertical, longitudinal and lateral spectrum testing as outlined in nationally established battery test procedures. This system is capable of testing larger format items using the 36-square-foot head expander and 48-square-foot slip table. In addition to batteries, ultracapacitors and other electronics can be tested to standards for their applications.

#### **Research Excellence**

INL researchers have, through both laboratory and field experience, developed the protocols for testing energy storage devices. The impacts and improvements of reliable, repeatable testing have applications not just for transportation, but also for Department of Defense, consumer electronics and



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grid storage. Data from the laboratory is recognized as some of the most reliable and accurate available. INL battery research is the most comprehensive in the

nation, combining real-world applications and laboratory test data into reliable information for researchers, designers, industry, elected officials and taxpayers.

#### **For more information**

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