

PRE-DISCHARGE ONE BATTERY TESTER

A TEST STAND FOR CONDITIONING AND OBTAINING PERFORMANCE CHARACTERISTICS ON LITHIUM BATTERIES

Client

Major battery manufacturer.

Problem Scope

Our client needed a test stand for their 9-Volt lithium batteries that would replace their vintage HP workstation. This test stand needed to apply a load to the battery, measure various voltages and voltage traces, and check the orientation of the battery cap. The data from each battery needed to be logged to a database.

Solution

Viewpoint and SCJ Associates, Inc. used National Instruments' LabVIEW software and data acquisition (DAQ) cards to design a test stand which efficiently and rapidly acquired, analyzed, and archived the measurement data.

Technical Highlights

- Simultaneous acquisition over multiple DAQ cards
- LabVIEW software
- Touch-screen-driven application
- Air-driven rams for moving the battery rack within the test stand
- Optical Proximity Sensors for tracking the position of the battery rack
- Field Effect Transistors (FETs) for applying and removing ohmic loads

Description

Each battery is tested and conditioned to properly distribute its electrolytic components. The batteries are placed on a rack and loaded into the stand, which contains optical proximity sensors to indicate when the battery rack is in place. Tests are then run for initial voltage level, proper cap placement, and for voltage polarity. Next, varying cycles of ohmic loads are applied to and removed from each battery through a FET to allow measurements of voltage variation during discharge and resting periods and to provide for the necessary

conditioning. Simultaneous data acquisition over multiple boards is successfully performed using three separate, yet interconnected, DAQ cards. This allows 150 batteries to be tested simultaneously, along with monitoring of circuitry and temperatures.

As the tests are performed, a touch-screen displays a matrix of the batteries in the rack. A status indicator is displayed for each battery being tested, and the operator can push the indicator on the touch screen to view detailed information on a particular battery once testing is completed. Unlike the previous system, the new test stand does not freeze up if a problem arises, such as a battery's polarity being reversed. If there is a problem with a particular battery, the operator is given an informative message describing the problem and has the option to stop testing to correct the problem or to continue with the test. The same is true if a problem develops with the test stand itself, such as a loss of electrical power to the stand's uninterruptible power supply (UPS) or a loss of air pressure. Viewpoint customized the touch screen to appear as similar as possible to the previous screen, so that operators could easily adjust to the new system.

Results

Downtime has dramatically decreased, leading to an increase in throughput.

The test results for each rack are logged to a database, and include details as to when the testing was performed, the various voltages measured, and verbal explanations of which tests failed.

Future expansions will include the capability to perform statistical analyses on the recorded voltage measurements, tailored to evaluating the manufacturing and conditioning processes for the batteries.

