

CASE STUDY

White-Goods Manufacturer uses VTI Instruments' EX1401 to Reduce Costs for Energy-Efficiency and Reliability Testing of Refrigerators

Background

To be competitive in the consumer and commercial appliance market, white goods manufacturers must perform exhaustive testing to improve their products' reliability, performance, and energy efficiency. Manufacturers have found that improved energy efficiency is a highly marketable feature, promising less electricity consumption and reduced carbon emissions. However, meeting energy-efficiency ratings, such as EnergyGuide and Energy Star, requires rigorous testing regimens that consume a lot of time and money. To gain a competitive advantage, one of the largest refrigerator manufacturers in the world needed to reinvest in a new test platform to improve the performance of their data acquisition (DAQ) system to meet the most stringent testing standards and reduce the total cost of test.

The Challenge

This refrigerator manufacturer has dozens of testing facilities worldwide, each with many large walk-in thermal chambers. Each chamber houses six refrigerators that are used as test articles for energy efficiency, reliability, and performance testing. The DAQ system must reliably and accurately acquire data from hundreds of thermocouple and humidity transducers connected to the test articles.

The original DAQ system used a scanning DMM, which combined a multiplexer and one-channel analog input to acquire data from multiple transducers. The scanning DMM system required an ISOtech external cold-junction-compensation (CJC) instrument that added programming and maintenance complexity to achieve appropriate temperature accuracy. This also required that all instrumentation be installed in a central location. This centralized architecture required long copper transducer wires between the DAQ system and test articles. These long transducer wire runs cost an excessive amount of capital, introduced electrical noise, degraded accuracy, and were very difficult to maintain, especially when transducers needed to be added, removed, or replaced. These factors combined to create an overly complex DAQ system that drove operating expenses and the total cost of the test beyond tolerable limits.

This manufacturer recognized the need to upgrade to a modern DAQ system that significantly reduced operating costs while improving performance.

The Solution

The manufacturer chose VTI Instruments' EX1401 thermocouple instrument as the backbone of their DAQ system. The EX1401's high accuracy and built-in CJCs simplify their system and reduce capital expenses by eliminating the need for an external CJC junction instrument while providing an even higher temperature accuracy (+/-0.2 °C). The EX1401's Ethernet/LXI communication interface means the manufacturer can place the EX1401 DAQ instrument inside the thermal chamber within 1-2 meters of the test article, vastly decreasing the transducer wire lengths and setup time. The EX1401's combination of analog and digital inputs/outputs allows it to accurately measure thermocouples, humidity sensors, and door-open sensors from a single instrument. Open-transducer detection immediately indicates when a sensor has malfunctioned, simplifying maintenance and troubleshooting. The mini-TC connectors used by the EX1401 make sensor changes fast and easy. The EX1401's flexible software drivers allow it to integrate with the existing test software application easily. The cumulative result of this EX1401-based DAQ system is that the manufacturer has significantly reduced operating costs and setup time. This allows them to be faster to market with new products while still providing the high-quality, energy-efficient products their customers expect.

