

# Compact LXI Data Acquisition System Saves Gas Turbine Manufacturer Time and Ensures Reliability



Today's leading suppliers of power generation and energy delivery products require cutting edge technology and superior performance to meet the world's most demanding energy requirements. Gas turbine systems are primarily used in auxiliary electric power generation to manage peak loading conditions. Customers can reduce their dependency on costly primary sources since these generators can be located anywhere and started and stopped as power needs fluctuate.

As a global manufacturer, this company produces a wide range of alternative fuel turbine generators for power utility agencies, industrial companies needing self power generation, and companies requiring emergency power generation. Sizes range from very small units to larger combined cycle generators capable of generating up to 300 MW.

Testing is a key aspect of gas turbine manufacturing to ensure reliability and efficiency. This company relies on high-performance test instrumentation in its R&D facilities to improve the efficiency of new designs as well as reduce undesirable gas emissions. Production or startup testing is also done onsite at the time of installation to verify proper setup and ensure reliability. The most common measurements taken are temperature (inlet/outlet gas), gas pressures, loads, and torque.

## The Challenge: Precision Performance and Faster Setup

The company uses a data acquisition system to record, measure and analyze the physical characteristics of gas turbines. This testing allows the engineers to improve their products and remain competitive in the global energy market.

The gas turbine manufacturer needed to upgrade its data acquisition system to a more portable, scalable system that maintains high accuracy (better than 1° C). A common hardware platform that can scale from 100 channels for onsite testing to thousands of channels for R&D testing was essential. Portability was also needed for onsite testing. The company wanted to reduce the setup time and cost of the system by simplifying calibration, maintenance and transducer connectivity. The current test methodology required that the same equipment used for new system development be used in the field at installation.

## The Solution: Compact LXI System

The gas turbine manufacturer worked with VTI Instruments to identify an LXI system as a possible replacement. To test performance, the manufacturer purchased six EX1048A thermocouple instruments to run in parallel with the existing test system as well as other competitive data acquisition systems.

During the trial period, the EX1048A provided the highest accuracy (0.5° C) of any of the data acquisition systems and delivered the improved environmental and portability requirements that were needed. Setup time was reduced from 2.5 days to only 6 hours. The mini-TC connector used for the EX1048A allowed thermocouples to be directly connected to the instrument without using external reference junctions, patch panels, or terminal blocks. This simplified connectivity while reducing wiring errors. For these reasons, VTI's LXI hardware was selected.

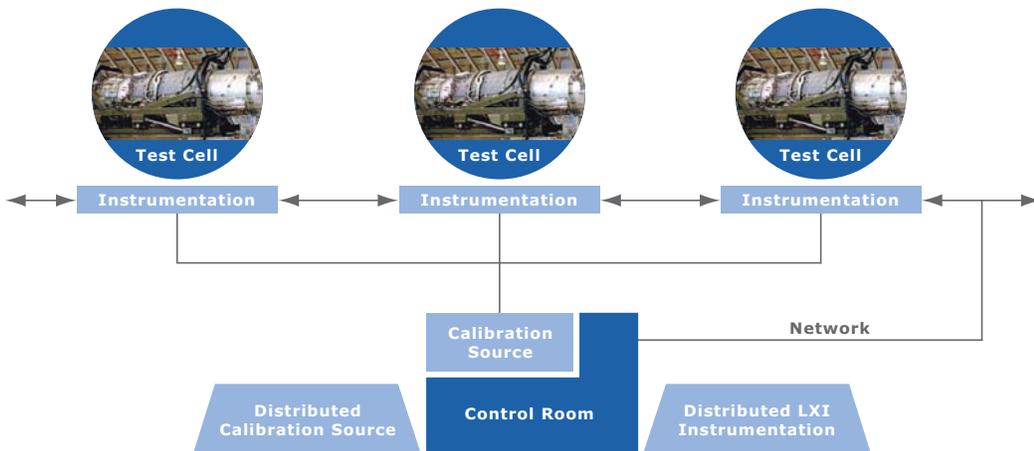
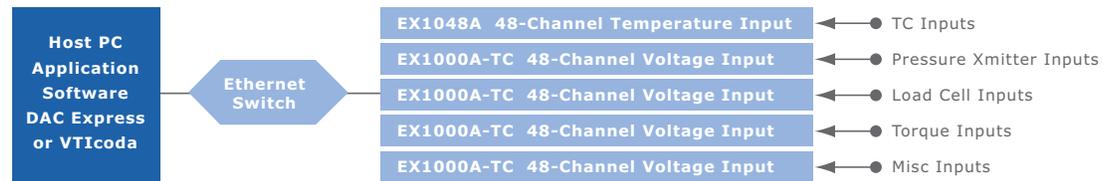


In addition to the EX1048A, VTI provided the EX1000A for voltage measurements (outputs from pressure and load transducers). Since the manufacturer also wanted simplified connectivity for voltage measurements, VTI leveraged the capabilities of both the EX1048A and the EX1000A to create a single box called the EX1000A-TC. This instrument can take both thermocouple and voltage measurements while utilizing the easy-to-use mini-TC plug.

### Compact Design, Ethernet-Based Technology

Aside from its proven performance, the gas turbine manufacturer selected this LXI system because of its compact design and ease of use. Startup testing involves shipping a large amount of test equipment to the customer site for new turbine installation testing and verification. The high-density LXI components weigh just 500 lbs – significantly less than the 4,000 lb weight of the previous system. This enables the company to save over \$11,000 in shipping costs when instrumentation is transported for startup testing.

The manufacturer also wanted cutting edge Ethernet-based technology. The EX1048A and EX1000A-TC devices are LXI Class A, which enables the synchronization of multiple, distributed devices over a single Ethernet cable through the IEEE 1588 Precision Time Protocol. The LXI platform allows centralized monitoring of the system by factory personnel at remote locations worldwide. The manufacturer uses IEEE 1588 for large system synchronization to provide more information in the event of an out-of-tolerance condition or failure. This saves both time and money since problems can be resolved quickly.



- Cu-Cu Mini TC Jack** ● Allows user to connect either a thermocouple or voltage input to any channel
- Open TC Detection LED** ● Indicates a faulty transducer before it's too late





## VTI: Excellent Products, Excellent Service

VTI's excellent customer service helped establish a good working relationship with the manufacturer. VTI demonstrated its flexibility and dedication to customer satisfaction by not only engineering the EX1000A-TC product, but also by adding a cooling fan with a run indicator to provide higher reliability in extreme environments. This allows the manufacturer to rack large groups of the instruments together to form a high-density system capable of performing in the most demanding environments.

Because of the successful implementation of VTI's system, the gas turbine manufacturer is planning to leverage these instruments for future test and measurement applications in its wind turbine business. The LXI platform will allow them to host the instruments remotely in each wind turbine for real-time health monitoring in multiple locations from a single control room, providing improved reliability and reduced operating costs.