



Upgrading a Manufacturing Test Station Using LabVIEW and PXI

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Industry

Aerospace

Products Used

PXI • LabVIEW™ • Database Connectivity
ToolkitAutomation Symbol Toolkit • Measurement and
Automation Explorer

The Challenge:

Upgrading three manufacturing test stations for a leading avionics firm, ensuring that the collaborative engagement confirms the project's direction and progress against client success metrics while maintaining the high-accuracy requirements of various manufacturer-specified functionality tests.

The Solution:

Using off-the-shelf software and hardware from National Instruments including PXI chassis, controller, analog and digital I/O boards with LabVIEW, and Proligent, a multifunction engineering software platform developed by Averna Technologies to achieve the required balance of quality, time, and budget.

Introduction:

Qualification and acceptance level testing of manufactured avionics components (commercial or military) involves electrical, thermal, vibration, and pressure tests. For example, separate test stations are typically dedicated to the testing of electronic limiting units, cabin pressure controllers, and pneumatic valves. This localized test model imposes a significant burden on the manufacturer in terms of cost, time, and the inability of this conventional setup to exploit the latest advances in automation technologies. The key features of the collaborative solution to this problem outlined below are the centralized test management, operational reliability, large I/O count, and a portable, networked, scaleable architecture realized with off-the-shelf NI components.

Building a Solution from the Ground Up

The collaborative answers we developed for redesigning an avionics manufacturing test station (MTS) will have the potential to revolutionize the way we will design and operate MTSs in the future.

By designing a solution from the ground up, we were able to approach the problem

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in ways that challenged conventional assumptions. For instance, in the client's original test station layout, all three test stations operated separately. Essentially,

they were "defined" by the different types of equipment housed within them, rather than the operational support requirements they shared.

Open Architecture Design Concept

From the outset, our engineering approach was to apply the 80/20 rule – address test station exceptions last. As a result, we used an "interchangeability of test stations" philosophy. The dedicated signal conditioning boxes that outfit the MTSs "define" the solutions we proposed for the independent testing of electronic limiting units, cabin pressure con-

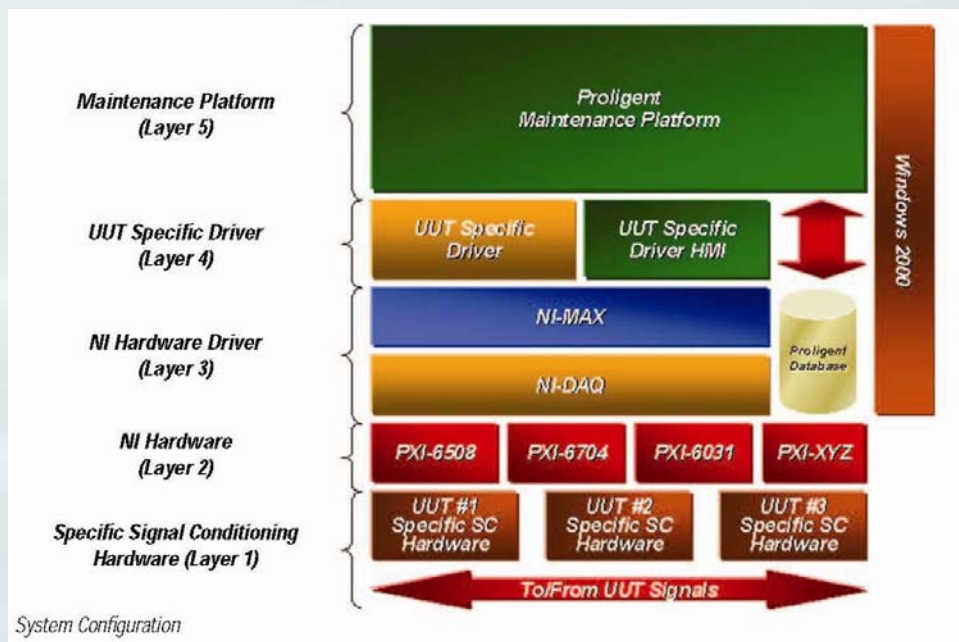


Figure 1 | System Configuration

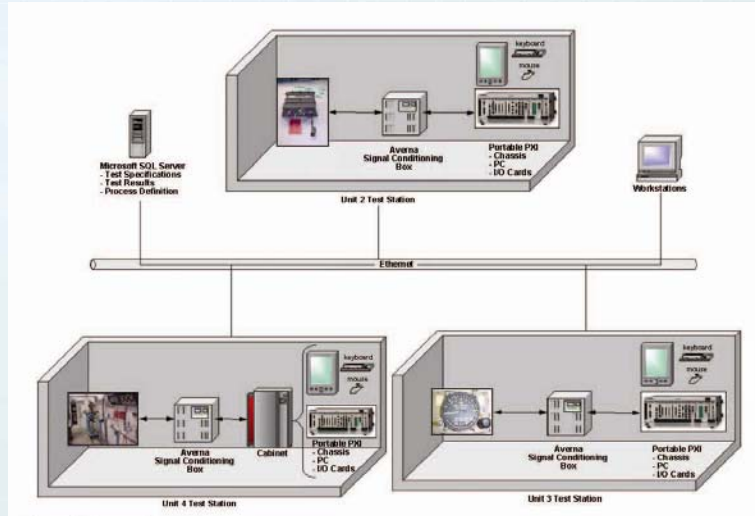


Figure 2 | Open Architecture Diagram

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trollers, and pneumatic valves – not the test hardware associated with the testing of a specific unit under test (UUT). The resulting economies of scale afforded us significant cost savings. Meeting Project Objectives. The open architecture test station design enabled us to satisfy the client’s primary project objective of modernizing existing stations using off-the-shelf software and hardware. Other important project objectives include the following:

- Increase test quality and reliability
- Decrease test execution time
- Minimize training effort
- Create a test platform adaptable for different types of UUT
- Centralize test specifications and results
- Create centralized process for operation, instruments, and users

- Install Windows 2002 as the operating system
- Provide return on investment (ROI) in less than one year (distributing costs with tools that are reusable)

System Configuration

We accomplished the above objectives with our integrated multilayered design solution. Each layer of the solution works signally and in combination to meet the client’s project requirements.

System Performance

The solution tool we developed meets all client requirements and has proven superior to the original test system in speed, cost, compactness, and portability while satisfying the accuracy and stability requirements of the mission-critical functionality tests.



Conclusions:

The solution tool outlined above was an unqualified success as measured against the project's client success metrics. In fact, the client has selected this solution model as a standard application for future manufacturing test station upgrades. The diverse challenges this solution addresses are not restricted to the avionics industry. Currently, we are updating the system to implement the same time- and cost-saving benefits in the automotive, biomedical, and communication fields. Averna digitization initiatives are allowing Honeywell Aerospace to make 21st Century process improvements to our test stations and contribute significantly to improve customer service and cost productivity. We have made great progress this year.

Engineers, managers and scientists involved in research, product design, quality control, operations and manufacturing, benefit from Averna's products, solutions and services to optimize asset use, reduce costs, minimize test and production times, and achieve reliability, success and competitive edge in their business.

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