HEWLETT® PACKARD

Avionics Test System Means Small Space, Big Savings

Electronic Functional Test Case Study

Customer:
A large aircraft avionics manufacturer.

Introduction:
Millions of people rely on aviation safety every day. An integral part of the functioning equipment of a modern aircraft is its large complement of cockpit instruments used to measure air speed, altitude, cabin pressure, and dozens of other parameters – avionics. Because of their potential effect on passenger safety, avionics instruments must be exhaustively tested prior to installation on an aircraft.

Situation:
A large avionics card manufacturer needed to test avionics cards in rigorous conditions in an environmental chamber. The cards were tested to screen out defective units and reduce 'infant mortality'. For FAA certification, the tests had to be accurate and well-documented. The test system chosen had to be capable of providing a wide variety of measurements and stimulus signals in order to exercise the avionics cards completely.

Problem:
FAA certification requires extensive testing and thorough documentation for each card. As business expanded, the company added new environmental chambers, which were designed to hold a large number of avionics cards. The test systems had to be able to handle a wide variety of measurements, yet be compact in size and lightweight to affix onto the outside door of the environmental chambers.

As the sophistication of the avionics increased, the demands on test also increased. It was important to keep wirelengths as short as possible between the test system and the cards to ensure high-quality measurements.

High-quality test equipment was a must and off-the-shelf equipment was needed to keep costs low.

Implications:
The cost of a failed avionics card can be enormous due to its critical use in aircraft. Human lives and safety are at stake, not to mention the cost of expensive aircraft. Poor quality avionics cards were not an option.

Solution:
HP VXI hardware was chosen for this application because it met stringent size and weight requirements. Integration costs were low because VXI is designed for easy wiring to a device under test (DUT). The industry-standard VXI system was an off-the-shelf solution with a long history of quality and reliability.

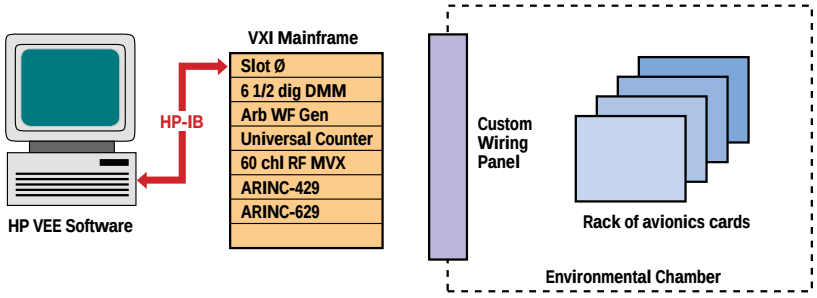
HP VEE software was chosen because it brought a huge gain in productivity. Operators could use HP VEE to troubleshoot problems with its simple graphical user interface. HP VEE routines written in R&D to test prototypes were easily moved to the production test system, where they could be run by an operator.

Description of Test:
The cards were run through a thermal profile of -54° to +71° C over a 90-minute timeframe, touching five points on the thermal scale. The test chambers were run 24 hours a day, 7 days a week.

Results:
Using HP VXI equipment allowed the manufacturer to design a unique $1.2 million environmental chamber where the changeover of avionics cards and test systems took literally minutes. This kept the environmental chamber in use constantly and increased production volumes.

The quality of the HP VXI test system has been outstanding – there has not been a single failure since it was installed. The test system performs highly accurate and repeatable tests that are easily documented for FAA certification.

The HP VXI system also cost less because the entire system was housed in a single cardcage with reduced wirelengths. The industry-standard solution cost much less than a custom solution with comparable size and weight restrictions. A rack of IEEE-488 equipment would not have been possible.



System Configuration

Configuration:	
Computer	HP E1406A slot 0 controller
VXI	HP E1401A 13-slot VXI mainframe
	HP E1412A 6.5 -digit multimeter
	HP E1445A arbitrary function generator
	HP E1420B universal counter
	HP E1470A 60-chl RF multiplexer
	VXI-429 Arinc 429 controller
Software	HP E2120C HP VEE