PXI and VXI: The basics

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—Dan Romanchik, Editor

PXI and VXI both serve as instrument buses, but they have significant differences. VXI is a more mature technology. Conceived in 1987, the VXIbus is supported by the VXIbus Consortium (www.vxi.org), an alliance of more than 14 members, including all the leading companies in the test and measurement industry. VXI is widely used in applications requiring high channel density or high-performance data acquisition, including automotive and avionics test. Sales of VXI products and services totaled approximately $650 million in 2001 (Ref 1).

VXI is based on the VMEbus, a bus that has been used in industrial applications and computer workstations since the early 1980s. (VXI is an acronym for VME Extensions for Instrumentation.) In designing the VXIbus, the developers did a very canny thing. Instead of starting from scratch, they built on the work already done on the VMEbus, adding features and specifications needed for test-and-measurement applications.

Adopting the VMEbus gave designers of test-and-measurement systems a huge boost in bandwidth. At the time, many designers were making do with the IEEE 488 bus, which has a maximum data rate of about 1 MHz. The VMEbus, on the other hand, can transfer data from module to module at rates up to 40 MHz.

In addition to giving designers more bandwidth, the VXIbus also ensures that modules from one manufacturer will work in chassis from another. It does this by requiring manufacturers to rigorously test and specify how much power and cooling a VXI chassis can supply to a module. Power and cooling specifications are more important for instrumentation modules than they are to computer modules as the accuracy of the instrumentation are often dependent on temperature and power quality. Specifying these parameters makes the system integration task easier.

PXI arrives
PXI (PCI Extensions for Instrumentation) was developed in the mid-1990s by National Instruments. It was intended to fill the gap between high-end VXI systems and PC-based instrumentation systems. The first PXI specification was released in August 1997, and from the start it was an open specification.

The PXI specification is supported by the 56-member PXI Systems Alliance (www.pxisa.org). Total sales of PXI products and services was approximately $60 M in 2001. According to Fred Bode, Director of Services for the PXI Systems Alliance, that number should increase by about 30% for 2002 (Ref 2).
Like the designers of the VXIbus, the developers of PXI were smart. They based their design on the CompactPCI bus, which can transfer data at rates up to 132 MHz. Also like their VXI forerunners, the developers extended the bus to include test and measurement features and added more rigorous specifications for the operating environment. By adopting the VXIplug&play software standards, they leveraged the work already done on those standards and made PXI systems interoperable with VXI systems.

One reason PXI is becoming more popular is that it can accommodate standard CompactPCI modules. A wide variety of affordable CompactPCI modules are already available for standard computer functions, such as disk storage and networking. PXI also supports Windows operating systems, which many companies use for test-and-measurement applications.

Of course, the PXI vs. VXI decision needn’t be an all or nothing one. At an otherwise contentious panel discussion at this year’s Autotescon (see “VXI or PXI? Neither is the clear winner”), panelists agreed that test-system architectures will continue to change. A trend toward an increasing use of standard interfaces ranging from Ethernet to USB can make it easy to connect multiple parts of a test system.

Not only will this architecture make it easier for test system designers to build cost-effective test systems, it will also enable them to more easily integrate their test systems with enterprise computing systems. Making the test system a node on the enterprise LAN will make it easier to archive and retrieve test data, and to share that data with suppliers and customers. This function is going to become increasingly important in the years ahead.

For more information


References