

PXI offers State-of-the-Art in Modular Platforms

PXI is one of the most successful modular test and measurement platforms. Modular platforms offer many advantages including flexibility, reduced size and weight, reduced cabling and interconnections and often enhanced timing and synchronization. For complex systems including multi-channel applications, modular platforms offer significantly lower price and lower total cost of ownership than the equivalent in stand-alone instrumentation. As seen in recent PXI newsletter articles, the range of products and performance in PXI is truly amazing, from microwave frequencies to Terabytes of storage to almost limitless channels of signal switching and data acquisition, all supported by powerful software and computing. One of the key benefits is the capability to combine signal switching and switch matrix functionality along with test and measurement instrumentation in a single chassis.

High-performance instrumentation has been historically available in a wide variety of platforms. These include the VME and VXI platforms, both still in use in many legacy Aerospace & Defense applications as well as newer test systems, such as the Teradyne's Spectrum 9000 series. A walk around any of the Defense focused tradeshow exhibit halls like at AUTOTESTCON, AFCEA, MILCOM or AOC will find a large array of VME and VXI products on display. The Hewlett-Packard Modular Measurement System (MMS) system, now discontinued, offered high-performance microwave spectrum analyzers, power meters and microwave synthesizers and custom signal switching and signal conditioning modules were common. Although the MMS system did not find wide industry acceptance, there were a number of companies providing products in the platform and it was used in several major satellite manufacturing and Aerospace & Defense programs.

PCI and PXI in various flavors have gained wide acceptance in the industry, with PXI being the dominant modular platform in use today. With over 50 participating companies and more than one thousand products, PXI is a perfect example a modular platform where the benefits have lived up to its promises, delivering a solid value proposition for a vast range of test and measurement applications. One of the driving forces behind continued enhancements to PXI such as PXI Express and more recently, PXI_{mc} (multi-computing), is the continual increase in data rates and system bandwidth requirements. While 100 MB/s bandwidth was considered state-of-the-art only a few years ago, now 3 GB/s bandwidth is available and in use today. Telecom systems are moving from 10 GB/s to 100 GB/s, with 100 GB/s systems becoming available this year. PXI is seeing the same type of advances. Transfer rates between the instruments and the host are approaching gigabytes. Measurement rates are targeting beyond Gsamples/s as noted in the recent announcement from NI and Tektronix who are working together to develop a PXI digitizer module that can achieve sample rates beyond 10 Gsamples/s with a signal bandwidth in excess of 3 GHz.

One of the application areas driving growth in modular test systems is defense electronics maintenance and repair. Whenever a military communications or electronic warfare or weapons system has to be deployed in a theater of operation, test equipment and test systems are part of the support logistics required. As the extent and the sophistication of defense electronics increases, so do the support needs. The rapidly growing deployment of un-manned surface and aerial vehicles loaded with complex electronic intelligence, surveillance and reconnaissance equipment along with increased electronic

countermeasures all mean that new and updated test systems and test capability are needed. PXI-based test systems represent the best solution. Small size and weight are key for portability with modularity providing an upgrade path and re-configurability to meet the requirements of long support life, for systems that may be in use for a decade or more. And state-of-the-art performance in instrumentation, signal switching and data connectivity to meet the most challenging test scenarios. PXI-based test systems provide the defense support application with an open architecture allowing best practices in TPS development and long term software support. The result is a robust test and measurement platform with high performance, high throughput and obsolescence resistance at a low overall life-cycle cost.

From humble beginnings, where critics thought acceptance of modular platforms such as PXI would be hindered by potential issues of noise on the backplane or by power and size constraints, PXI has not only survived but thrived. In some cases, modular systems are rivaling if not surpassing stand-alone instrumentation. For example, Aeroflex's 3026C 6-GHz RF signal generator has very competitive specifications, including an RF output power of 17 dBm. In another example, the Geotest GX3500 and NI FlexRIO incorporate FPGA technology that enables data manipulation beyond the capacity of some system CPUs. Looking forward, there is no slow down in sight. Frost & Sullivan predicts a compound annual growth rate of 17.6% through 2014 for PXI systems¹.

Reference

1. "New PXI Multi-Computing Specification Enables Multi-Controller Systems with High Performance Communication," PXISA, November 16, 2009. www.pxisa.org.