The Staying Power of VXI

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VXI is still a very important platform for the large Mil/Aero testers it was designed to address. There is an enormous installed base and investment in system integration of VXI products in Mil/Aero, where a great deal of the switching, stimulus, and measurement is handled by VXI. Here is a list of the major core ATE test systems used by the DOD, where VXI products have significant presence:

> **USAF** – VDATS, B-1B ARTS
> **Army** – IFTE/NGATS
> **Navy** – RT-CASS, eCASS
> **USMC** - TETS
> **Lockheed/USAF** – LMSTAR (JSF/F35)

Mil/Aero programs move at a much different pace due to the complexity of the devices they are testing, as compared to consumer products. These Mil/Aero devices and test systems require long-term support, which is a value often ignored when making market predictions and growth. With continuing USA budget constraints and multi-year extensions of existing programs, it is unlikely major changes to system architectures will occur any time soon. That is, if a test system is doing its job, it is much more difficult to acquire funding for new projects or technology refresh or replacement programs, especially since re-hosting and requalification represent significant investment.   These programs will continue to invest in VXI to keep test systems alive and meeting test requirements.

Another contributing factor to longevity is the commitment for long-term support from vendors such as Agilent Technologies, Bustec, EADS NA Test and Services, Gigatronics, National Instruments, Teradyne, and VTI Instruments. These companies understand test systems and software are a major investment and customer expectations the test system will outlive the products they test. Vendors will continue to step forward to meet the needs of sustaining engineering to design out component obsolescence and keep the test equipment working properly for as long as they can. These leaders are accompanied by over 250 vendors of VXI who often design suitable replacement modules when vendors obsolete products.

Newer technology Mil/Aero equipment will likely require newer measurement/stimulus and communication technology. This new test equipment may be designed specifically for VXI or may be a different modular family solution that can be integrated into the VXI form factor using VXI module carriers interfacing to PXI, VME, etc.

VXI has a history of integrating forward-looking technology into the specification while maintaining compatibility with its extensive installed base. For example, system developers have communicated to VXI mainframes over GPIB, MXI/MXI2, and a variety of consumer-oriented buses such as FireWire, USB, Ethernet, and more recently PCIe, with the adoption of VXI 4.0. And, the well-defined *plug&play* software architecture allows end users to upgrade their systems

to the latest bus technologies with little or no impact to application code by simply swapping Slot 0 interfaces.

Vendors have been incorporating this and other benefits offered by the new VXI 4.0 specification into their products and further establishing VXI as a viable platform for demanding test and measurement applications. Recent new product areas designed to VXI 4.0 include high-power/speed digital, enhanced mainframes with faster parallel and serial communications, faster PC to Slot 0 controllers, and faster data acquisition modules.

For 25 years, the Mil/Aero industry has realized the importance of modular instrumentation, which provides fast communication speed and smaller size to meet the space requirements of crowded repair depots, aircraft hangars, and ships. VXI established the standard of moving box product capabilities to the modular platform, increasing performance, retaining the necessary power, cooling, physical separation, and electrical shielding for precision measurements. VXI C-size modules have been the mainstay, providing significant board real estate for higher density switching and full instrumentation capability on a single module.

The Trends

Frost and Sullivan 2008 market reports on modular instrumentation predicted VXI would decline in 2010 to about $160M, but the 2011 report indicated a 5% increase in VXI sales to $200M, a $40M delta. Clearly this market is difficult to predict and is probably due to the large installed base of VXI and the need for long-term support in the presence of budgetary constraints.

Mil/Aero continues its trend towards modular solutions, and the growing offering and need for RF and microwave products only accelerates that trend. High-volume manufacturing is also trending in this direction, where faster measurements directly correlate to lower unit test costs. Data Acquisition has been operating with modular requirements for some time, where modularity and high density switching lowers the costs of signal wiring and increases measurement integrity by placing the data acquisition equipment nearer the device to be tested.

Modular systems scale quite well, where adding modules adds more channels and functionality without changing space requirements. Different capacity mainframes meet the smaller footprint for some applications, and users have the flexibility to purchase larger mainframes or extend to multiple frames, if needed.

The speed advantages of new modular solutions are also driving the shift. These faster modules require faster communication both within the mainframe and from the host to the mainframe. Faster measurements drive the need for greater memory capacity in the Host PC.

The Response of VXI

VXI's relatively small size, high performance, shielding/separation and cooling make high speed data acquisition solutions attractive. VXI mainframe vendors have addressed the need for scalability and provide multiple options for varying slot count and power capacity for high-volume and large-scale ATE systems.

VXIbus 4.0 has kept pace with newer serial fabric standards by adding a P0 connector and providing routing of PCIe up to 12 slots. In addition, the traditional parallel data bus now provides dual-edge synchronous transfers up to 320Mbytes/second.

These speed enhancements are complimented by the recent Bustec Slot 0 PCIe-VXI Bridge, bringing high speed transfer of data to the host PC without the complications of the PCI bus power-down sequences affecting the PC. The VTI Instruments LXI/VXI Bridge, with built-in resource management and driver control firmware, gives high speed data collection through its Gigabit interface. This permits distributed data acquisition and by using multiple LXI/VXI Bridges to multiple VXI mainframes positioned near and around the device under test.

Vendors have also kept up with evolving operating systems and have kept their software drivers current to ensure users can benefit from those new operating system capabilities. National Instruments released Windows 7 64-bit support for its MXI Express Slot 0 interface, and VTI Instruments did the same for its LXI/VXI Bridge. By adding 64-bit support to VXI, memory-intensive application programs can use the additional RAM to improve overall system performance.

The Commitment to VXI Continues

The End Users for VXI are confident in VXI-based designs, and are not generally driven to re-engineer proven solutions, especially during extreme budget cutting. New VXI-based designs continue to win approval for deploying into Mil/Aero, High-volume manufacturing, and Data Acquisition, all areas that benefit from high density switching, proven power and cooling, precision measurements, and high performance.

Vendors continue to invest in sustaining engineering, and new designs are backward compatible with previous implementations. Vendors also pay attention to supporting new operating systems and newer high speed communications technology.

Vendors recognize that VXI has staying power and is still a very important platform with a significant market presence, especially in larger scale Mil/Aero testers.