



## Case Study

Portwell, Inc.

BioTek Instruments, Inc.

### **BioTek Adds a Touch of Color to Its Microplate Dispensers and Washers Using Qseven-based Embedded Computing Technology**

#### **Introduction**



Think Possible



Based in Winooski, Vermont, BioTek Instruments, Inc., is a family-run organization with origins dating back to 1968. Since the company introduced its first microplate reader in 1981, it has emerged as the worldwide leader in the design, manufacture and sale of microplate instrumentation and software. BioTek provides microplate-based imaging, reader, washer, dispenser and pipetting systems that increase the productivity of its customers in healthcare, life science, pharmaceutical, agriculture and other applications. As software manager, one of Bob Chutter's responsibilities is to ensure that new and existing instrument architecture meets customer requirements. Chutter also oversees hardware integration, which includes choosing and defining the functions of the CPU platform and peripherals. He must find the perfect balance between risk, cost, safety, performance, power, form factor, time-to-market and a host of other requirements necessary to complete customer satisfaction.

Early in 2013, BioTek sought to update their existing automated washers and dispensers with modern, user-friendly interfaces. The washers and dispensers are used to add or remove liquids during tests called enzyme-linked immunosorbent assays (ELISA) in microplate format. A microplate is a disposable, plastic rectangle with a grid of wells that can number from 6 to over 3000, with 96 and 384 wells being the most popularly used. ELISA tests are common in diagnostic testing, laboratory research and quality control testing in a wide variety of markets.

Chutter was tasked with finding a customized computing platform that could be integrated with their existing software and a touch screen interface, and in a very short time period. Additional criteria included fitting into the instrument's existing small footprint with compatibility for existing software built on the Microsoft® .Net Framework and tight instrument interference specifications.





BioTek 405™ Touch Microplate Washer



BioTek MultiFlo™ FX Microplate Dispenser

## Searching for the Solution

Chutter interviewed a number of potential vendors in his search for the perfect solution, but while some could contribute pieces of the puzzle, only one was able to provide a seamless solution that covered all his bases given the short deadline: American Portwell Technology.

“After several in-depth, focused discussions with Bob Chutter,” says Jack Lam, American Portwell’s senior program manager, “we both decided that an Intel®-based embedded computing platform would be the best jumping off point. Given the robotic nature of BioTek’s microplate instrument platforms and the need to keep consistently ahead of the latest developments in both our technologies, we agreed to adopt a Qseven (Q7)-based modular approach and opted for Portwell’s PQ7-M105IT as the CPU/memory module and its companion PQ7-C100XL carrier board for the various I/Os.”

## Easy Upgrades to Latest Technology

BioTek and American Portwell chose the System-on-Module approach because the CPU module can be easily upgraded with the fastest and latest models whenever they are available without changing the configuration of the I/O carrier board. According to Lam, the modular design approach met Chutter’s criteria because it helps minimize design risks, reduces time-to-market, adds flexibility and scalability and increases the longevity of the system.

## The Power of the Intel® Atom™ Processor

“The Qseven open standard modules are based on Intel Atom processor E6xx series,” Lam confirms. “And at a mere 70mm x 70mm, the ultra compact, ultra low power PQ7-M105IT meets BioTek’s need for a small footprint and low power thermal-friendly design (under 10W/+5V), which also allows the device to work longer hours while reducing operating costs.” The PQ7-C100XL companion carrier board supports an industrial temperature range of -40°C to 85°C, and together with the CPU module, makes the ideal combination for fanless applications and battery-powered operation.

“What’s more,” Lam adds, “the modular PQ7-M105IT reduces time-to-market, safeguards development investments and lowers total cost of ownership.”



Portwell PQ7-M105IT Qseven Module



Portwell PQ7-C100XL Qseven Carry Board

## A Host of User-friendly Software Capabilities

The onboard computer is embedded in a Microsoft Windows® CE environment and delivers a variety of user-friendly software capabilities including:

- Managing and scheduling operations tasks such as sample loading, assay control, fluid handling, robotics, optical detection and results analysis.
- Allowing users to use pre-defined protocols with just a couple of touches on the icon-driven interface. The walk-away system is then auto-piloted to completion without any further intervention.
- Allowing users to define routines or protocols based on their standardized processes.
- Automatically flagging the system status when completing a run or when requiring operator intervention.

## A Touch of Color

While the efforts to integrate the hardware and software aspects of the PQ7-M105IT/PQ7-C100XL platform were being completed, BioTek was, in parallel, developing the touch screen user interface application. For BioTek, the touch screen user interface was critical to the success of the project. They were able to use the PQ7-M105IT/PQ7-C100XL platform with its high resolution color display to provide a visually appealing user interface, a context sensitive help system with high resolution pictures, plus video streaming used for training and instrument maintenance instructions. BioTek was able to fully leverage the PQ7-M105IT/PQ7-C100XL platform performance to provide its customers with an industry leading user experience.

The resultant display can be visualized in a matrix and other easy-to-understand graphical representations. "So the touch screen display not only helps enhance the compact look of the instrument and the smaller footprint, but also saves valuable bench-top space," Lam confirms.

According to Gary Barush, BioTek's director of sales and marketing, "Once the customer sees, touches and experiences this new user interface in a demonstration and also sees how powerful the instruments are for so many different applications, they will not want to let us take them out of the lab."

Jason Greene, BioTek's senior product marketing manager is also impressed with American Portwell's implementation of the modular embedded computer and touch interface. "With Portwell's solution we were able to provide our customers with an enhanced user experience and increased convenience in microplate washing applications," Greene confirms. "The color touch screen interface is so easy to use that protocols may be run with as little as two touches of the full-color screen. At the same time," he adds, "users can create complex protocols, save the protocols to a USB flash drive, maintain the instrument and access help systems."

## A Variety of Hardware Interfaces

The PQ7-M105IT hardware offers a variety of interfaces, including serial ports to control the analog-to-digital (A/D) converter circuits for motors, valves and other fluidics' components, USB 2.0 for external data or program transfer and connections to optical keyboard and mouse.

"We also provided the BIOS customization to add the customer logo on the system screen at initial boot up," says Lam. "That's just a small touch that indicates how much we care about customer satisfaction. Customers not only benefit from our ability to consistently provide the most up-to-date technology and features, but they also gain peace of mind from the long life cycle support inherent with every Portwell product."

## BioTek 405™ Touch Microplate Washer and MultiFlo™ FX Microplate Dispenser

This complete embedded solution from American Portwell helped BioTek build microplate-based instruments that operate with accuracy, ease of use, efficiency and scalability. American Portwell even aggregated the touch screen display, cables and their PQ7-M105IT/PQ7-C100XL computer platform so BioTek could conveniently order a complete system.

BioTek's 405 Touch Microplate Washer incorporates a high resolution touch screen user interface for intuitive and flexible programming of 96- and 384-well microplate wash protocols. The extensive onboard software seamlessly guides users through protocol development, instrument maintenance and operation.

BioTek's MultiFlo FX Microplate Dispenser is a modular automated reagent dispenser for 6- to 1536-well plates. All functions are programmed and accessed via the color touchscreen user interface and the small footprint allows MultiFlo FX to be used in a biosafety cabinet or integrated into an automated robotic system.

## The Final Words

"We are pleased American Portwell was able to meet all of Bob Chutter's criteria within his tight time constraints," confirms Jack Lam. "And by aggregating all the parts into a complete system, the ordering and assembling processes at BioTek are streamlined."

BioTek software manager Bob Chutter sums everything up when he says, "Portwell provided us with good support and a dependable complete solution for our 405 Touch and MultiFlo FX. They even provided an update to the operating system software to allow us to create a Chinese language version for our expanding Chinese market. We appreciate their response to our tight deadlines and their support in ensuring that our products are high-quality and safe to use in any laboratory environment."

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## About BioTek Instruments

BioTek Instruments, Inc., headquartered in Winooski, Vermont, is a worldwide leader in the design, manufacture and sale of microplate instrumentation and software. These technologies are used to aid life science research, facilitate drug discovery, provide rapid and cost-effective analysis and enable sensitive, accurate qualification of molecules across diverse applications. For additional information, visit us at <http://www.biotek.com>, call 1-888-451-5171 or email [sales@biotek.com](mailto:sales@biotek.com).

## About American Portwell Technology

American Portwell Technology, Inc. is a world-leading innovator in the embedded computing market and a Premier member of the Intel® IoT Solutions Alliance. American Portwell designs, manufactures and markets a complete range of PICMG computer boards, embedded computer boards and systems, rack mount systems and communications/network appliances for both OEMs and ODMs. American Portwell is an ISO 9001:2008, ISO 13485:2003 and ISO 14001:2004 certified company located in Fremont, California. For more information about American Portwell's extensive turnkey solutions and private-label branding service, call 1-877-APT-8899, email [info@portwell.com](mailto:info@portwell.com) or visit us at <http://www.portwell.com>.