Smiths Detection Relies on Tektronix Oscilloscopes & Signal Generators to Take the Trouble out of Troubleshooting

Customer Solution Summary

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Challenge

To enable a team of engineers to quickly, efficiently and accurately identify and resolve problems during the development of a range of complex handheld devices used to detect hazardous materials. Versatility and ease of use are critical in this busy lab.

Solution

A complete Tektronix test bench for debugging embedded systems designs, including analysis of serial and parallel buses. The Tektronix solution includes a MSO2000 mixed signal oscilloscope, a DPO4000 oscilloscope, and an AFG3000 signal generator.

Benefits

DPO4000 “paid for itself” in the first week on site, helping Smiths Detection engineers to identify a serial bus timing issue with a new product and stay on track for a tight delivery schedule. Consistent user interfaces and advanced feature such as Wave Inspector® make debugging efforts faster and easier.

HazMatID Ranger™ – Suspicious substance identification

smiths detection
bringing technology to life

Handheld Laboratories

Equipment from Smiths Detection is trusted by emergency responders, HAZMAT teams, law enforcement, and federal and local government agencies around the world to quickly and accurately identify potentially hazardous substances such as liquids, powders, gases and biological agents, among others.

The devices the company designs and manufacturers for these specialized applications essentially put a laboratory’s worth of detection equipment in a compact handheld device that can be used by an emergency responder, typically wearing a HAZMAT suit. This means the devices must be compact, rugged, have simple controls, offer good battery life and deliver fast, accurate analysis.

The Danbury, CT office is one of many global Smiths Detection sites whose primary focus is on driving the development of ongoing support and evolution of their expansive range of devices. Danbury’s research and development group consists of about a dozen electrical, mechanical and systems engineers who are responsible for developing several new products each year, supporting customers feature requests and supporting and enhancing existing products. As Senior Electrical Engineer David Valovich points out: “There are no idle hands in this lab.”

Given the volume and demands on the engineering team, the Danbury-based crew can ill-afford lengthy trial and error for debugging and troubleshooting problem devices. And,

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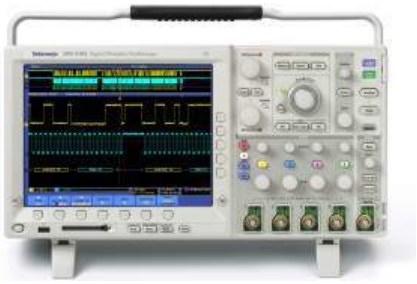
Tektronix MSO2000 Series Mixed Signal Oscilloscope showing analog and digital signals on a single instrument



Tektronix DPO4000 Series Digital Phosphor Oscilloscope showing a decoded serial bus

like most companies in this economy, each lab purchase has to have maximum value. The lab needs test instrumentation that provides the versatility to handle both digital and analog data acquisition and analysis across many different serial buses, parallel buses and power supply configurations, while also offering the necessary speed and performance for advanced designs.

Multiple Serial Buses

"We use lots of serial buses such as I^2C, SPI, and others and our test equipment has to be able to trigger on them all," says Valovich. "We only buy scopes that cover a wide range of capabilities and can be used for a variety of applications. We analyze any purchase "to death" before making a decision."

After much analysis of test instrumentation options, the electrical engineering team settled on the Tektronix MSO2000 Mixed Signal Oscilloscope Series, to handle day-to-day debugging and troubleshooting of their designs. The units provide 16 digital channels, in addition to up to four analog channels, for efficient system-level debugging. The 16 channels are especially useful for checking multiple lanes of bus traffic across several buses and power supplies. Wave Inspector controls further enable efficient analysis of waveform data. The MSO2000 units supplemented the lab's DPO4000 scope that was continuously booked and provided the additional capability of parallel bus analysis.

To test their devices, Smiths Detection engineers often need to replicate a sensor signal. To make short work of that task, Smiths Detection selected a Tektronix AFG3000 arbitrary/function generator with ArbExpress® software that, like the oscilloscopes, supports a wide range of application needs with one instrument.

The team is in the process of building a library of signals that will make it easier to exercise and stress the electronics for new products. Using the ArbExpress software the engineers can easily import a real sensor signal directly from their oscilloscope then modify the waveform or they can create a new waveform altogether.

Wave Inspector Boosts Productivity

One of the most loved features on both of the new oscilloscopes is the Wave Inspector. "Our main system engineer wasn't sure about this at first, but now it's his favorite feature," Valovich relates. The reason is that the system engineer builds prototype models and then is responsible for sorting through all the issues around timing or interference. The Wave Inspector controls make working with long records and extracting answers to problem he's facing from waveforms a simple and efficient process.

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>
> David Valovich
> Senior Electrical Engineer, Smiths Detection

Also earning high marks from Smiths Detection's electrical engineers is the well-thought out user interface that has steadily evolved from one generation of Tektronix equipment to the next. At the same time, the units are packed with engineer-friendly controls such as one vertical control per channel that make debugging simpler and faster, according to Valovich.

"All the interfaces are the same across our Tektronix equipment," says Valovich. "If you know how to run one instrument, you can run them all. In fact, I think I could walk up to just about any Tek scope made over the last 20 years and get it to trigger on anything I need."

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Along the same lines, the Smiths Detection team also appreciates the large display on the oscilloscopes, helping to reduce eyestrain, as well as various options for saving and sharing data such as USB ports or over that lab's recently upgraded high-speed network.

Beyond usability factors, Smiths Detection is well aware of the critical nature of its products – they are counted on to help save lives on a daily basis. And Tektronix brings a strong reputation for having the most accurate electronic test instrumentation available, a point not lost on Smiths Detection.

"The new oscilloscopes give us a lot of confidence that what we're seeing is actually there," notes Valovich. "The quality of tools you have is reflected in the quality of the engineering. Good tools help you do a good job."

For some of the more challenging test requirements, the DPO4000 oscilloscope has proven to be especially valuable, allowing Valovich and team to identify timing and other issues in buses they weren't able to see previously. The extra performance of the DPO4000 is also needed to handle the latest switching power supplies. These supplies have extremely fast rise times to boost efficiency and extend battery life.

"You need much wider bandwidth than you might think with these fast rise times," says Valovich. "We are able to see things with the DPO4000 that were previously undetected, which helps tremendously in troubleshooting. The hardest part is figuring out what the problem is. Once you know the problem, fixing it goes quickly."

Rapid Return on Investment

While it's often hard to quantify the value of test instrumentation, Valovich is quick to emphasize the benefit Smith Detection has already seen from its Tektronix equipment, which he says "paid for itself in the first week."

As luck would have it, introduction of a new smart battery into production was being held up due to data corruption problems on a serial bus. Using their new DPO4000 oscilloscope with the serial triggering module, the engineers were able to trace the problem to a Big Endian/Little Endian issue between the main board and the smart battery. The oscilloscope helped surface the unexpected swap that was inadvertently stepping upon manufacturer reserved bits for the new battery. Once discovered, the problem was quickly solved and the new smart battery was introduced to production and out to customers on time.

Adds Valovich: "We're pleased with our decision to upgrade our bench with Tektronix equipment. It fit in our budget and is making all of our lives a lot easier. We couldn't ask for more than that."

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