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JTAG Embedded Test Enhances Process Calibration Equipment Testability

FLUKE

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Steve Comerford is a Staff Engineer with Fluke, focused on new product introductions and product readiness. His work involves ensuring that products are defect free and ready for public use—rugged and reliable in extreme environments. Steve works closely with design, test, and production teams to deliver fully tested, dependable products to the marketplace. From prototype to production, Steve uses Corelis JTAG boundary-scan circuit test tools to test Fluke products, enjoying the peace of mind afforded by the knowledge that each unit has been thoroughly tested for manufacturing defects.

As a global leader in calibration standards, Fluke supplies a wide range of process control solutions. These instruments are used to build, maintain, and calibrate process control systems and ensure that all equipment is working to specifications. Because all measurement instruments drift over time, these systems must be regularly recalibrated to account for the shift in measured value—often on six or twelve month cycles—producing a large amount of calibration and accountability data over time.

To simplify the calibration process and alleviate paperwork headaches, Fluke's process calibration product line features Documenting Process Calibrators (DPCs)—hand-held multifunction devices that can be used to source, measure, and report data to digital record keeping systems and keep all measurements as precise and accurate as possible.

Fluke DPCs are utilized in many industries that employ process control systems—industries including pharmaceutical, petroleum, and gaseous environments—industries where high equipment reliability and

accountability are necessities. By replacing a number of tools, DPCs facilitate calibration information flow directly from the calibrator to a system running Calibration Management Software (CMS).

Providing this functionality requires an embedded system with a CPU that is versatile and low power; small scale but with big processing capacity. To meet these demands, Fluke integrated a Freescale i.MX multimedia applications processor in recent 75x series tools, increasing the digital interface and mobility capabilities without sacrificing its small form factor.

While the i.MX provided the processing power needed for the product design, there was a problem when it came to testing. The i.MX processor, while able to support basic boundary-scan testing, did not include control of a particular memory clock signal—an essential component for boundary-scan testing of synchronous DRAM devices. "We quickly discovered during early prototype test development that we needed an alternative test solution to complement the traditional boundary-scan tests."

To avoid tying up precious in-house resources with functional test code development, Fluke turned to Corelis for a solution in the form of JTAG Embedded Test, or JET for short—a test solution that utilizes the JTAG control port on modern CPUs to automatically create and execute functional tests for the CPU and surrounding peripherals.

JET makes use of the debug capability of the processor to run functional tests at full CPU speed, augmenting traditional low speed boundary-scan methods and filling the test coverage gap. Steve could now run complete tests on each prototype board; tests that fully covered the memory interface. "Knowing that critical components of a given prototype board are working is reassuring," comments Steve. "Being able to tell early on if we have a hardware problem saves our firmware design team time and effort spent debugging prototype boards."

Not only did JET extend testing capability above and beyond traditional testing methods, it also proved to add significant time savings. According to Steve, "JET doubled our Flash programming speed—a considerable improvement," compared to Fluke's previous Flash programming solution. That is not just time saved for every firmware update during prototype development, but many minutes saved for every unit programmed over the entire product development and production life cycles.

About Corelis

Corelis, Inc., a subsidiary of Electronic Warfare Associates, Inc., offers bus analysis tools, embedded test tools, and the industry's broadest line of JTAG/boundary-scan software and hardware products combining exceptional ease-of-use with advanced technical innovation and unmatched customer service. Corelis' development and test tools are used by companies such as Agilent, Dell, IBM, Intel, Microsoft, Lockheed Martin, Rockwell Collins, Hewlett-Packard, Motorola, Qualcomm, Nokia, Panasonic, TI, Ford, Broadcom, Ericsson, and many others. Corelis products are found globally in every industry developing or manufacturing electronic products.

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