



# Early bird

Danlaw believes that 'simultaneous engineering' means testing early and often during development, in order to shrink testing schedules and increase quality

➤ In an era when CAE tools can speed up development and testing, Testing Expo Europe exhibitor Danlaw believes that not all tools are equally effective. This 30-year-old company has strengthened its niche as an embedded software test tool provider by coming up with what it claims is a unique, one-stop solution for testing software.

Danlaw was founded in 1984 by Raju Dandu and Lloyd Lawrence to provide engineering services to the automotive industry. In providing engineers and testing expertise, the company has worked with engineers from virtually every major OEM and Tier 1 supplier in the industry. Keeping a low profile, Danlaw employees refer to the company as automotive's best-kept secret for verification and validation.

"It's a company that puts the employee first," says CEO Dandu. "Our core values of integrity, quality

and capability, not to mention hard work, are what make us successful."

Based in the suburban hi-tech corridor of Novi, Michigan, the company has global operations and resellers in North America, Europe and Asia. Danlaw is an innovator with an aggressive growth strategy in embedded software testing technology, infotainment system testing, telematics products, electronic components and body-control ECUs.

Mx-Suite is Danlaw's flagship testing product and is the brainchild of Mike McCormack, the company's director of product development. "It has decades of development experience built into it," he says. "Mx-Suite is a response to the industry's need to simplify embedded software development and to reuse test cases across the complete development cycle." Mx-Suite is a PC-based tool that

ABOVE: OEMs can use Mx-Suite to develop full executable specifications for all ECUs in a vehicle. ECU suppliers can use Mx-Suite to fully test their products

addresses the needs of electronics suppliers and integrators by increasing the number of tests that are performed on a product's features while reducing overall test time.

"Typically what we see in embedded testing is a very mixed bag of test methods, test procedures and operating procedures that make it very difficult to automate and simplify," adds McCormack. "By separating the error processing and reporting tasks from the test execution and interface to the system under test, testing is immensely improved. Often a group of several tools that would be used throughout the development process can be reduced to a single tool."

Other companies seem to agree. American, European and Asian car makers all use Mx-Suite to validate simulation models and verify their ECU electronics during design and integration. Their suppliers use the

tool to communicate and verify their software design and ECU integration before release. Offshore consulting companies use it to their operational costs during development.

The tool embodies three basic and critical principles: clear presentation, test-case abstraction and universal connectivity.

It is important to clearly communicate the requirements and acceptance criteria during the entire process. Mx-Suite uses an easy-to-understand graphical representation to show testing requirements and illustrates how to decide if they have been met. The same representation is used whether documenting requirements, designing simulation models, validating software or testing electronics.

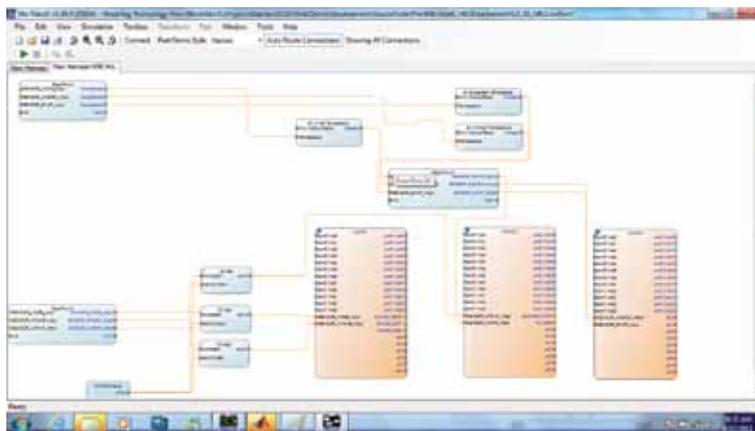
Similarly, it is important to use test-case abstraction and automate the tests for optimum test-case reusability. Mx-Suite transforms connections of the system under test to a common interface so that test cases don't have to change as the system progresses through development. By presenting test cases in the same format, regardless of how the system was developed, product planners, engineers and suppliers talk the same language and interpret the product specifications the same way.

It was a design goal to use the tool to drive every kind of real-time test apparatus. Mx-Suite provides universal connectivity. The Mx-Suite development team decided early on that it must support every test environment during every phase of development. In other words, it has to work properly when validating simulation models, verifying software algorithms, using bench equipment, or engaging full-size hardware-in-loop systems. To enable this functionality, Mx-Suite comes with a library of commonly used tool interfaces, as well as an easy-to-use facility to configure new kinds of connectivity. Legacy equipment can be used just as easily as new COTS hardware.

One of the most useful features of Mx-Suite delivers executive summaries, detailed summaries, the test cases and results themselves, as well as indicators of root symptoms of failure. This powerful reporting mechanism enables cross-functional

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Mike McCormack, creator of Mx-Suite, Danlaw

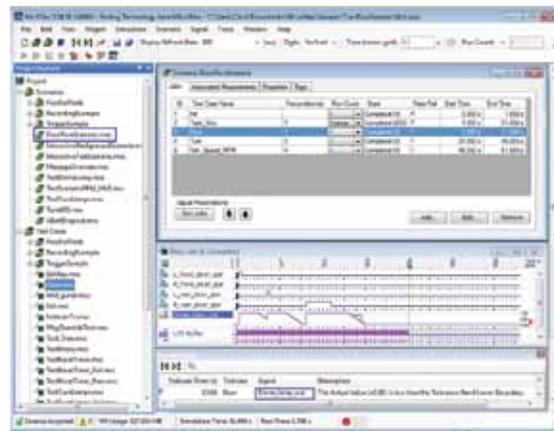


LEFT: Test engineers can define their own signal conditioning for HiL equipment and electronics

teams to quickly develop a plan of action when errors are found.

Most engineers have different tools to contend with, depending on what part of the development process they support. Algorithm designers often rely on model-based tools for analysis before releasing their designs. Rapid prototypes might be created using automatic code-generation tools, and software engineers might start developing on representative target ECUs. Debuggers, emulators and CAN/LIN/MOST data acquisition devices are used during the debugging and integration phase, and finally, hardware-in-loop test equipment proves out the component or integrated system. Mx-Suite replaces many third-party tools and integrates with the other ones.

"Mx-Suite is the only test tool in the market that fully spans the complete development process and supports all phases of testing," claims business development manager Chris Domin. "Whether in R&D or getting ready for preproduction, using one tool for early testing cuts waste from the value chain. Our goal is to continue stretching the limits of simultaneous engineering practices."



ABOVE: The consolidated graphical user interface provides an easy way to define test cases and sequences

Danlaw is aggressively investing into continued development and global support of Mx-Suite. Recent focus has been on tighter integration with model-based tools; ISO-26262 support; AUTOSAR support; MOST and Bluetooth protocol support; and expanded connectivity to the latest hardware-in-loop systems.

The company is delighted to be attending Automotive Testing Expo Europe 2013 as part of its efforts to serve the European automotive industry. It says it hopes to help developers explore how early testing can offer products that are delivered in less time, with better results. ◀