Mx-Suite™ Embedded Software Test Environment

Mx-Suite™ is industry-proven software for verification and validation (V&V) that runs on Microsoft Windows®. With its powerful behavior diagrams, test cases are specified in terms of inputs, expected outputs, and tolerances. Mx-Suite™ can record data from experiments or import field data as acceptance criteria. Test your development concepts using virtual prototypes, well before electronics are available.

Mx-Suite™ is used to test simulation models, software code (developer-written or auto-generated), and vehicle electronics. Danlaw provides the tools, training, and custom services to take the hassle out of developing powertrain, body electronics, active/passive safety, and other embedded systems.

**Mx-Suite™ Advantages**

- Test case portability across simulation models (MIL), software (SIL), and hardware (HIL)
- Replaces multiple test tools with a single universal tool
- Quickly implements test cases with an easy and intuitive GUI
- Supports industry standard test tools, CAN/LIN/MOST networks and custom hardware interfaces
- Performs white box and black box testing on functions, modules, or complete virtual subsystems
- Records ECU behavior and supports edit and play back of behavior as test cases
- Imports ECU test and log data from other tools as test cases
- Automatically creates easy-to-understand test reports
- Identifies root causes of system and function errors
Mx-Suite™ Components

- **Mx-VDev™** Universal Test Software (includes Test Editor, Test Reviewer, Test Executive and Report Generator)
- **Mx-Sim™** Simulation Engine to provide the vehicle environment to the system under test
- **Mx-TransIt™** interfaces for popular modeling tools, vehicle networks, HIL test Equipment, and ECU implementations
- **Mx-Net™** Stream Connector for real-time HIL testing, with unlimited connectivity and distributed testing capabilities

![Test Cases (XML)](image1)
![Test Report Summaries, Details, and Logs (HTML)](image2)

**Figure 2 - Full Test Case Portability**

**Figure 3 - Complete Life Cycle Support**

**Description of Mx-Suite™ Components**

- **Mx-VDev™** (includes Test Editor, Test Reviewer and Report Generator)

Mx-VDev™ can import system data and behaviors as test cases, create new test cases, schedule/execute test cases, and generate test reports. It provides the right level of information to users, whether high-level executive summaries for the program management team, or detailed root symptom/causes for product engineers. Its powerful regression-testing feature allows unmanned testing to occur during off-hours so that test reports are available during business hours.

![Mx-Suite™ Embedded Software Test Environment](image3)

**Figure 4 - Mx-Dev™ Test Case**
Mx-TransIt™ Virtual Wiring Harness Editor

Mx-TransIt™ uses common library blocks called “transforms” that connect your test cases and scenarios to your system-under-test, whether they are simulation models, software code, or electronics. It allows you to express your test case inputs and outputs using well-understood naming conventions and engineering units (e.g., RPM, torque ft-lbs, alternator voltage, cranking amps,...) for maximum readability. You can design your own transforms or use Mx-Suite’s built-in transforms to connect with popular modeling tools, virtual ECU implementations, and HIL test equipment. Mx-Suite™ supports MathWorks, dSPACE, National Instruments, Vector, Intrepid, Opal-RT, and other commonly used test equipment. Mx-Transit™ keeps your test cases readable as they were meant to be.
Mx-Sim™ Cosimulation Engine

The Mx-Sim™ Cosimulation feature allows you to test plant and control models in a PC workstation using popular modeling tools, such as MathWorks Simulink®/Stateflow®, National Instruments LabVIEW®, or C-coded algorithms. It can simulate vehicle networks over CAN/LIN/MOST. It allows you to connect different tool simulations with each other. Whether you want to cosimulate virtual simulation models, virtual ECUs, or with HIL equipment, you have full test case portability.

Figure 7- Cosimulate any combination of MIL, SIL, or HIL implementations

Mx-Net™ Stream Connector

The Mx-Net™ Stream Connector provides high-speed networking and test data delivery for real-time HIL systems, and supports HIL equipment from dSPACE, National Instruments, add2, and Vector. It ensures the timely delivery of test data from Mx-Suite™ to the HIL test system so that real-time deadlines are met. Mx-Net™ also keeps time clocks synchronized between Mx-Suite™ and the HIL system keeping the test data consistent. Danlaw's engineers can easily customize Mx-Net™ to support any real-time test equipment, providing unlimited connectivity and testing capabilities.

Mx-Suite™ Value Proposition

Mx-Suite™ enables automotive embedded controls teams to:

- Speed up the development process
- Consolidate embedded controls validation tools
- Reuse validation work throughout the development life cycle
- Communicate requirements effectively to suppliers and offshore teams
- Prove that design meets requirements

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