

## MxSuite

### Embedded Software Test Automation

# MxSuite Works for You

MxSuite™ is the most comprehensive automated platform for embedded software verification and validation. Its intuitive graphical interface and reports can be understood by anyone in the organization. MxSuite streamlines the complete software development cycle by reusing requirement-based tests during Model-based analysis and design (MiL), Software component development (SiL), Rapid prototyping target development (PiL), and on-target ECU testing (HiL).

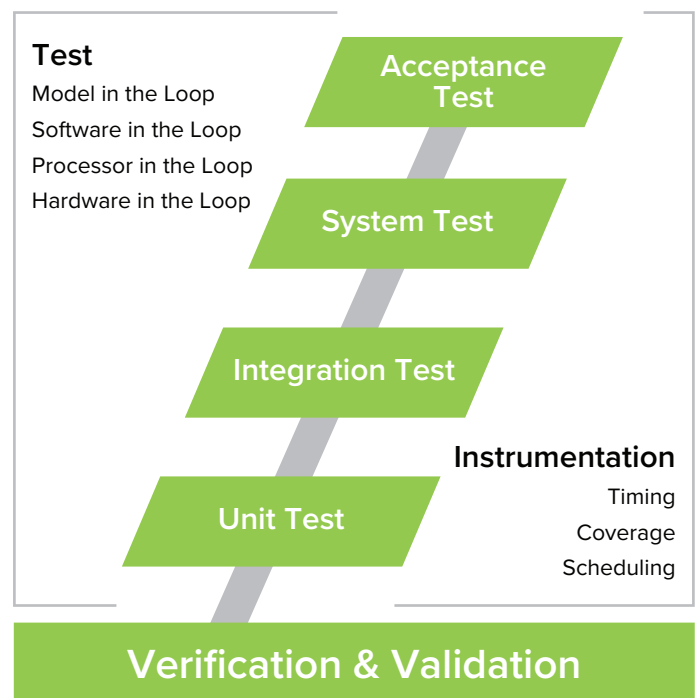
## Highlights

- ▶ Out of the box support for popular application life-cycle management systems and continuous integration tools
- ▶ Connects easily to simulation models, C code, AUTOSAR applications, and test & measurement equipment
- ▶ Executes a complete set of test cases ranging from a single ECU to an entire vehicle
- ▶ Automatically runs regression tests every time a change is made for a feature, product enhancement, or bug fix
- ▶ Monitors tests as they run and triggers other tests based on conditions or events
- ▶ Imports log files or records ECU signals and messages so engineers can edit and play them back as test cases
- ▶ Integrates with industry standard test tools and network interfaces, such as CAN, LIN, Ethernet, MOST, and custom hardware interfaces
- ▶ Provides coverage metrics for ISO 26262 compliance

MxSuite natively supports MC/DC analysis using Rapita Systems' RapiCover extension. It supports the necessary artifacts required for ISO 26262 regulatory compliance with the optional MxSuite Tool Qualification Kit.

## Benefits

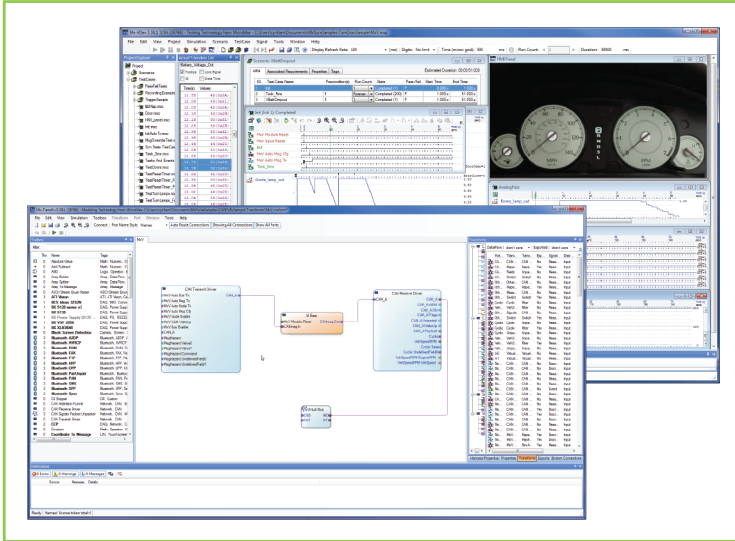
- ▶ Provides back-to-back testing and equivalence between models, software, and ECU behaviors
- ▶ Tests infotainment, powertrain, body, interior, cockpit, battery management, and safety/ADAS functions
- ▶ Promotes better team communication with graphical summaries and root symptom details
- ▶ Reduces costs by automatic and reusing test cases across all life-cycle stages, such as design, simulation, rapid prototyping, development, implementation, and integration
- ▶ Replaces multiple software tools with a single solution
- ▶ Finds bugs and highlights the root error symptoms



# Streamlining Your Process Development

MxSuite connects to most types of test and measurement equipment right out of the box, and Danlaw can quickly customize MxSuite to support new interfaces. MxSuite also seamlessly integrates with popular ALM systems such as IBM Rational Doors, Polarion QA, Atlassian Bamboo, and Jenkins.

## Process Management Systems



MIL

SIL

PIL

HIL

## Core Components

- ▶ **Test Executive and Scheduler** ensures test stimuli reach the item under test or HIL in sequence and on time
- ▶ **Pass/Fail Analyzer** determines the outcomes of each test and annotates the results with root failure symptoms
- ▶ **Simulation Engine** provides a virtual vehicle environment to the system under test and simulates in-vehicle bus such as CAN, LIN, Ethernet, MOST, etc.
- ▶ **Extensive Library** contains commonly used Connector Transforms, including machine vision and robotic interfaces
- ▶ **Connector Transform Editor** connects MxSuite to popular modeling tools, vehicle networks, HIL test equipment and ECU implementations

## Use Cases

- ▶ **Infotainment**  
Perform functional testing and system stability testing of components, such as radios, touch screens, system HMIs, amplifiers, rear-seat entertainment systems, NAV systems, and mobile applications.
- ▶ **Body & Interior Electronics**  
Test body control modules, gateways, lighting modules, door modules, seat controls, and virtually any interior or body ECU.
- ▶ **Cockpit Electronics**  
Simulate subsystems in the vehicle that communicate with a cluster or HUD for complete functional testing of HMI, cluster instrumentation, NAV, turn-by-turn, vehicle status, and infotainment status.
- ▶ **Battery Management Systems**  
Fully test battery management system software for electric or hybrid electric vehicles with MxSuite's support for MC/DC coverage for ISO 26262 requirements.
- ▶ **Powertrain Controls**  
OEMs select MxSuite for HIL automation software because it increases productivity and helps manage large volumes of tests cases using built-in tagging and metadata features. MxSuite supports National Instruments, dSPACE, ETAS, and others systems out of the box.
- ▶ **V2X / DSRC Testing**  
MxSuite includes USDOT certification tests for DSRC components. Users can extend the tests and add hardware interfaces for comprehensive testing of a device. MxSuite is being extended to provide a simulated mobility environment of DSRC nodes to test application virtually on a PC or on-target.

# Universal Connectivity

MxSuite can connect to any embedded control implementation. A standard library of Connector Transforms convert interface messages and signal values to better understood units (for example, counts to volts, bits to enumerated values, CAN payloads to signal definitions, etc.). MxSuite allows developers to write their own custom transforms to transform signals, communicate with applications, or connect to device driver APIs.

## Process Management Software

### *ALM Interfaces*

IBM Rational Quality Manager  
Polarion QA

### *Continuous Integration Servers*

Atlassian Bamboo  
Jenkins

## Communications

### *Networks*

CAN/CAN-FD (ISO 11898)  
LIN (ISO 17987)  
DSRC (IEEE 802.11, IEEE 1609, SAE J2945/1)  
Ethernet, GM FSA  
MOST  
RS-232  
Bluetooth

### *Protocols*

ASAM XCP / CCP  
ISO 15765 Diagnostics (ISO-TP)

### *APIs*

Android Debug Bridge  
iOS API  
Ford SYNC

## Hardware / Software Interfaces

National Instruments VeriStand  
National Instruments I/O devices  
Fiat Chrysler CAN Diagnostics  
Ford FNOS Part II Diagnostics  
Intrepid Controls CAN/LIN devices  
PEAK Systems CAN/LIN device  
Microchip (K2L) MOCCA device (MOST)  
National Instruments LabView  
BCS Idea devices  
iSystem OnChip Analyzer  
Lauterbach TRACE32  
PicoScope  
BK Precision Power Supplies  
Acroname Programmable USB Switch  
Vector Informatik CAN/LIN devices  
dSPACE HIL/XIL API  
dSPACE Fault Insertion Unit  
ETAS Labcar  
ETAS INCA  
Custom connector for Third Party HIL devices  
Text-to-Speech/Speech-to-Text  
Vision Image Recognition

## Embedded Environments

Mathworks Simulink Stateflow  
AUTOSAR

## Additional Product Extensions

- ▶ **Mx-PLT CAN/LIN Physical Layer Tester** checks ECU conformance to OEM standards
- ▶ **Mx-DSRC Test System** provides ISO, IEEE, and SAE V2X certification tests
- ▶ **Robotic Touch Interface** interacts with touchscreens for HMI testing
- ▶ **ISO 26262 Tool Qualification Kit** produces the required documents for approval by authorities

## About Danlaw

Danlaw is a leading global supplier of technology and services to the automotive and aerospace industries for safer, smarter and more secure systems. Danlaw is known for ground-breaking tech, efficient development, and adaptive solutions for dynamic environments. Our world-class connected vehicle solutions make Danlaw one of the largest suppliers of connected devices in the world.