

Using Mx-Suite™ for ISO 26262 Compliance

WHITE PAPER

DANLAW[®]
AUTOMOTIVE MADE SMART



Abstract

This Application Note provides answers to the following questions that arise when preparing to comply with ISO 26262:

- Which sections of ISO 26262 apply to Mx-Suite?
- What do I have to do to comply?
- How can I use Mx-Suite to generate evidence of compliance?
- How can Mx-Suite help me implement an ISO compliant development process?

ISO 26262 Overview

ISO 26262 is a functional safety standard for safety-related electrical or electronic systems in passenger cars. It is organized into ten parts.

“Road vehicles—Functional safety—Part 6: Product development: software level” (known as ISO 26262-6) provides a standard for development of the software used in safety-critical electronic systems. It defines a process for specifying requirements and design, as well as for testing and verifying the software product. In addition to testing the system, Mx-Suite provides features to help develop a compliant design and to test and verify the design objectives.

The standard also requires specification of software tools used in development and testing.

Which Sections of ISO 26262 Apply to Tools Such as Mx-Suit?

The standard requires the following phases for software development:

(The numbers correspond to the relevant section in the ISO 26262-6 standard.)

6. Specification of software safety requirements
7. Software architectural design
8. Software unit design and implementation
9. Software unit testing
10. Software integration and testing
11. Verification of software safety requirements

Each of these phases requires specification of software tools used in development and testing.

ISO_DIS_26262-8(E) calls for the qualification of software development tools that are to be used in the development of safety related items under an ISO 26262 compliant process. This document establishes how Mx-Suite is qualified for use as a development tool under ISO 26262.

With documentation provided by Danlaw, you can use Mx-Suite as a pre-existing software component without the need for further qualification.



What Needs to be Done in Order to Comply?

If Mx-Suite, or any other development tool, is used in the development process, the ISO 26262 specification requires that the software tool be qualified. This software tool qualification must be documented by preparing the following work products:

- Software Tool Qualification Plan
- Software Tool Documentation
- Software Tool Classification Analysis
- Software Tool Qualification Report

Danlaw provides Mx-Suite related information for each of the four documents listed above.

The result of performing a software tool classification analysis on Mx-Suite provides the tester with a 'Tool Confidence Level'. Depending on the results of the tool confidence level, the ISO 26262 specification defines the necessary qualification steps for the tool.

Mx-Suite is a software development tool and can be sub-classified as a verification tool. Although this distinction is not directly relevant in reference to ISO 26262, it does affect the 'Tool Confidence Level' determined during the Classification Analysis.

How Can Mx-Suite be Used to Generate Evidence of Compliance?

The following Mx-Suite features produce documentation and reports that you can use to produce ISO 26262 work products:

Traceability

Mx-Suite supports bidirectional requirements traceability. This enables the user to track safety requirements from specification to test case and vice versa, and allows them to use traceability to create compliant safety requirement specifications and verification plans.

Requirements can be associated with individual test cases and scenarios. Direct linking to web-based documents is also supported.

Code Coverage

Code coverage tools are integrated with Mx-Suite and can be used as part of compliant software unit testing and software integration.

Automated Regression Testing

Mx-Suite regression test capability can be used to automate all the test phases. The tests produce customizable reports for use as software verification reports.

Mx-Suite provides tools to create a regression command file that defines a set of scenarios and test cases that run automatically. These tests can be repeated as needed.

Test Specification Report

The test specification report provides detailed information that can be used for all phases of the development process. It lists all test cases for inclusion in the software verification plan. Requirements are associated directly with test cases and scenarios that verify the objectives.



How Can Mx-Suite Help Implement an ISO 26262-Compliant Development Process?

The ISO 26262 specification defines process steps appropriate for the development of safety critical software. Mx-Suite can be used to implement and automate all, or part of the following process steps required by the ISO 26262 specification.

Software Architecture: Error Detection

Use Software-In-the-Loop (SiL) and Hardware-In-the-Loop (HiL) testing for the following:

- Range testing of I/O data
- Testing of detection of data errors
- Control flow monitoring (see ISO-26262-6 7.4.14)

Software Architecture: Error Handling

Use SiL and HiL testing for the following (see ISO-26262-6 7.4.15):

- Testing of static recovery mechanisms
- Testing of graceful degradation
- Testing of independent parallel redundancy
- Testing of correcting codes for data

Software Architecture: Design Verification

Use SiL and HiL test results from Mx-Suite (see ISO-26262-6 7.4.18).

Software Unit Testing

Use SiL and HiL testing for the following (see ISO-26262-6 9.4.3):

- Requirements-based testing Interface testing
- Fault injection testing

Code Coverage

Bullseye Code Coverage is integrated into Mx-Suite (see ISO-26262-8 9.4.5).

Requirements Traceability

Requirements Traceability is a built-in feature of Mx-Suite.

Conclusion

Mx-Suite is a powerful tool that can not only be used to automate the development and verification process, but also to assist in complying with the ISO 26262 standard.

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. Thirty years ago, we designed software for the first 8-bit Electronic Engine Control module, and today, we continue to develop forward-looking technologies. We focus our efforts on R&D to stay ahead of rapidly changing industry needs in an increasingly connected world. Danlaw is known for ground-breaking tech, efficient development, and adaptive solutions for dynamic environments.

Danlaw's engineering professionals provide embedded electronics solutions to OEMs and Tier-1 suppliers. Our team specializes in embedded systems development and testing for Embedded Control Units, vehicle network communications, infotainment, and telematics. With engineering centers in the USA, Europe, India, and China, Danlaw is one of the largest suppliers of connected products, tools, and services in the world.