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# Technical Report

Evaluation of the Tool Qualification Kit and Safety Manual of the  
Software Tool

## Mx-Suite

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## Revision Log

Revision	Date	Name	Changes/History
1.0	09/08/16	Nicole Pappler	Final Version



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## 1 Purpose and scope

In the development of systems of any kind software tools take over more and more tasks. Using tools in the development helps to sort and accelerate a lot of tasks, but they can also introduce errors or mask existing errors in many ways. Hence, in a safety related development process, special attention must always be paid to the usage of the tools used during the different steps of the safety development processes.

There are many approaches how to succeed in getting enough confidence in the tools, depending on the domain the tool is used in and the safety standard used in this domain.

TÜV SÜD Rail GmbH evaluated the software Tool Qualification Kit for the Danlaw Mx-Suite. This Tool Qualification Kit has been developed by CertTech, based on the main assets which are 'trustworthiness' and 'safety manual'.

Trustworthiness can be assured by performing a suitable combination of the following qualification measures defined by the ISO 26262:2011:

- Increased confidence from use in accordance with ISO 26262:2011-8, 11.4.7
- Evaluation of the development process in accordance with ISO 26262:2011-8, 11.4.8
- Validation of the software tool in accordance with ISO 26262:2011-8, 11.4.9
- Development (of the tool) in accordance with a safety standard

In this report the trustworthiness of the software tools is assessed by evaluating the validation of the software tool. The Mx-Suite Qualification Kit is used for the validation of targeted software tool Mx-Suite. The Mx-Suite Qualification Kit is a test suite which enables the tool user to test the installed software for its integrity. The Tool Qualification Kit consists of a Safety Manual and a validation suite with evidence on the features that are covered by the Test Suite.

The safety manual is a document which supports the user to apply the software tools correctly during the development of a safety relevant system. It has been developed by CertTech and has been assessed by TÜV SÜD Rail GmbH, approving its final version.

All related documentation of these assets regarding the Mx-Suite Tool Qualification Kit were reviewed by TÜV SÜD Rail GmbH.

Use cases which are not described in the safety manual are out of scope of this report.

## 2 Product overview

Mx-Suite is a test management and execution tool from Danlaw. The Mx-Suite tool deployment is composed of several congruent components including Mx-Speclt, Mx-CheckIt, Mx-TransIt, SILEasy and Mx-VMC.

The tool provides an integrated test development environment where the configuration of the I/O test resources (test harness, transforms), definition of test cases, execution of scenarios, pass/fail determination of test measurements, and formal report generation are partitioned from the actual I/O test resources that provide the literal interaction with Unit Under Test (UUT).

The Mx-Suite tool is used to automate the execution of test cases. These test cases can make calls out to external code modules or perform other operations within Mx-Suite. Upon completion of a test case, Pass/Fail criteria may be checked and reported. In addition, upon completion of a scenario, Pass/Fail status for that scenario of test cases is recorded in a test report. The Mx-Suite test report Pass/Fail status data is then used as the basis for verification and/or validation of the component being certified via the execution of requirements-based tests.

The CertTech Tool Qualification Kit for the Danlaw Mx-Suite is designed to support the user in applying the qualification method “Validation of the software tool” in accordance with ISO 26262:2011-8, 11.4.9. It therefore consists of a Safety Manual [D1], a validation suite and additional documentation to enhance the user’s confidence in the use of the Mx-Suite.

### 3 Identification

Subject to this evaluation on the software tool qualification kit (see Table 1).

**Table 1: Product identification**

Release date	Product name	Product Number and version	Related Safety manual
April 2016	CertTech Tool Qualification Kit for Danlaw Mx-Suite	Version 1.0	Mx-Suite Safety Manual.docx, Version 1.0, Release 04/05/2015

### 4 Evaluation

#### 4.1 Standards

**Table 2: Applied standards**

Standard	Description
ISO 26262:2011	Road vehicles – Functional safety

#### 4.2 Basis of evaluation

General tool qualification based on the assessment of the following qualification method listed in ISO 26262-8:

- Validation of the software tool (11.4.9).

The assessment scope of this qualification method is influenced by the general use cases listed in the safety manual (see Table 1).

The application of this qualification method allows the tool user to claim the tool to be validated according to ISO 26262:2011.

## 5 Documentation

### 5.1 Documentations provided by the tool vendor

Table 3: Provided documentations by CertTech

No.	Title/Filename	Rev.	Date	Description
[D1]	Mx-Suite_Safety_Manual.docx	1.0	04/05/2016	Safety Manual
[D2]	Mx-Suite_TVPR.doc	1.0	04/13/2016	Tool verification procedure and results
[D3]	WritingTestCases.docx	–	–	Instructions for writing test cases
[D4]	Coding_Standard_and_Best_Practices.docx	1.0	03/31/2016	Coding Standard
[D5]	C#_Coding_Standards.docx	1.0	03/31/2016	C# Coding Standard
[D6]	Mx-Suite_TOR_R1.doc	1.0	08/31/15	Tool Operational Requirements

### 5.2 Documentation generated by TÜV SÜD Rail GmbH

During the review activities by TÜV SÜD Rail GmbH, several versions of the TÜV review protocol were exchanged between both parties.

The assessment minutes and final agreed versions for review protocols are:

Table 4: Generated documentation by TÜV SÜD Rail GmbH

No.	Title/Filename	Rev.	Date	Description
[A1]	Review_MxSuite_SafetyManual_NP_v1_3.docx	1.3	04/28/2015	Review protocol for Safety manual – final version
[A2]	20150112_KickOff.docx	–	04/16/2014	Minutes of the kickoff meeting.

## 6 Examination procedure and results

For this report both the validation (the Tool Qualification Kit) and the safety manual have been evaluated.

First a Kick-Off meeting took place where the detailed steps of this project were defined. The assessment of the safety manual has been iterative. The feedback from TÜV SÜD Rail GmbH was used for the improvement of the subsequent version of the safety manual. The validation has been assessed in form of a demonstration of CertTech's Danlaw Mx-Suite Tool Qualification Kit [D1] to [D6], its application and the coverage of functionality and use cases listed in the Safety Manual [D1].

### 6.1 Validation of the software tool

TÜV SÜD Rail GmbH evaluated the measures of the validation of software tool Danlaw Mx-Suite. The scope of the evaluated validation is described in the Safety Manual [D1].

For enabling the tool user to perform validation checks on his own platform, CertTech provides the tool user with a validation suite, called CertTech Danlaw Mx-Suite Tool Qualification Kit. This tool has been developed by CertTech. It consists of a test sequence where user interaction is needed and a subsequent test sequence which runs automatically. The tool user can run the Tool Qualification Kit from the installation folder and is informed about the progress and the outcome of these validation tests.

The basis for these tests are the Tool Operational Requirements (TOR) [D6], which lists the detailed functional requirements of the validated functionality. As both the TOR and the Safety Manual list use cases that need to be validated, a Trace Matrix [D4] for evidence of the use case coverage of the TQK has been provided.

A successful run of the CertTech Tool Qualification Kit informs the tool user that all functional requirements listed in the Safety Manual and the TOR have been validated. Reports to the run test suites can be found in the installation folder of the TQR. These reports give detailed evidence of passed and failed test cases. If applicable a reference to a known deviation is given.

The Tool Qualification Kit has been evaluated during a web meeting and by evaluating the TOR [D3] and the sample test reports. Spot checks on the coverage have been performed offline.

#### Result:

The qualification method "Validation of the software tool" (ISO 26262-8, 11.4.9), was assessed successfully by an independent organization (TÜV SÜD Rail GmbH). The assessment of the validation has focused on the use cases stated in the Safety Manual [D1].

### 6.2 Safety manual

The safety manual is a handbook that guides the user to apply the tools safely. It contains the main use cases, inputs/outputs, work flows, main risks and main mitigation measures. During offline reviews and assessments TÜV SÜD Rail GmbH has reviewed the Safety Manual [D1] several times until a final version was agreed. The results of these activities are described in the review protocol of the safety manual [A1].



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The safety manual also describes how the tool user can retrieve information on known product deviations. The tool user is responsible to keep up to date with possible product deviations. The user of the TQK needs to register for a listing of all known bugs at the customer support. Details about this procedure are defined in the safety Manual [D1].

**Result:**

The Safety Manual [D1] was assessed successfully by an independent organization (TÜV SÜD Rail GmbH). The functionality of the use cases described in the Safety Manual can be validated by using the test suite of this qualification kit.

## 7 Summary and overall judgement

TÜV SÜD Rail performed for the SW tool qualification kit for Danlaw Mx-Suite the evaluation of the general tool validation focusing on the use cases stated in the related Safety Manual [D1], which are validated by the CertTech Tool Qualification Kit [D2].

If the user runs the CertTech Tool Qualification Kit and adheres to the Safety Manual [D1], it can be claimed that the qualification measure “Validation of the software tool (ISO26262:2011, Part 8-11.4.9)” is fulfilled.

Munich, September 8, 2016

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