



FUNCTIONAL SAFETY VOCATIONAL TRAINING

Functional Safety for Safety Instrumented System Professionals

Participant Instructions

Within the TÜV Functional Safety Program:



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1. General course information

TinoVC is an official course provider within the TÜV Rheinland Functional Safety Program, and GMI is an official course promoter.

The course focuses on functional safety aspects for the process, oil & gas, petro-chemical and chemical industries according to IEC 61508 / 61511.

TinoVC (course provider) information is listed on the TÜV Rheinland website under:

<http://www.tuvasi.com/en/trainings-and-workshops/trainings/safety-instrumented-systems/155-tinovc> . Tino Vande Capelle, a worldwide renowned FS Expert (TÜV

Rheinland), is the course trainer.

1.1 Course objective

The main objective is to provide all engineers involved in safety instrumented systems with elementary and necessary knowledge about functional safety, based on the leading international functional safety standards IEC 61508 and IEC 61511.

A second objective is to give anybody attending the course the opportunity to have his or her functional safety competency confirmed by the TÜV Rheinland upon successfully passing the exam.

1.2 Who Should Attend?

- Plant and quality managers
- System integrators and independent consultants
- Control and process engineers
- Maintenance and instrumentation engineers
- Managers of engineering departments
- Risk, reliability, safety and quality engineers
- Loss prevention engineers
- Sales engineers - Sales managers - Marketing specialists for safety-products, systems and services
- Technical staff involved in any part of SIS lifecycle that need or want to develop their competency in Functional Safety

1.3 Why Should You Attend?

IEC 61508 ed2.0, released in April 2010, clearly indicates as a 'Normative' requirement, that anybody involved in safety lifecycle activities shall be competent to carry out the activities for which they are accountable.

Take advantage of this course, examination and certification to prove your clients, peers and management, your competency in the field of Functional Safety. Success in the final examination certifies your functional safety knowledge on your personal name, adding a great value to your professional career and image.

1.4 Participant eligibility requirements

In accordance with the TÜV Rheinland Functional Safety Program:

- Minimum 3 years experience in the field of functional safety.
- University degree (Master's or Bachelor's degree in Engineering) OR Equivalent engineer level responsibilities status certified by employer.

1.5 Course material

There are 2 separate syllabuses provided

- The “Handouts” syllabus contains every slide from the presentation used during the 3 days of training
- The other syllabus is containing:
 - Student exercises used by the participants for evaluation purposes during the course
 - Homework questions, to help the participants to review the material and prepare for the exam
 - Sample questions, to exercise multiple choice questions
 - Abbreviations used during the course



1.6 Course Duration

3.5 days: 3 consecutive days vocational training with student exercises, + 4 hours closed book exam in the morning of the fourth consecutive day.

2. Course Contents

Introduction to functional safety

- What is safety?
- Legal status IEC61511
- Overview of legal requirements
- Layers of protection
- Safety Instrumented System
- Safety integrity level
- Problems with safety systems
- Safety system failures
- What is functional safety?
- Functional Safety Standards

The basics of functional safety

- Functional safety management
- Lifecycle concept
- Documentation
- Verification & Validation
- Assessments & Audits
- Modifications
- Competency of people

Hazard & Risk Analysis

- Hazard & Risk definition
- Tolerable risk
- Risk management
- Hazard Identification Techniques, FMEA, FTA, HAZOP
- Hazard Analysis Techniques ETA
- Risk Reduction Techniques, risk matrix, risk graph, LOPA
- Safety Functions
- Safety Requirement Specification

Planning the Safety System

- Planning for end users (integrators)
- Realisation safety system
- Three important documents
- Requirements for suppliers

Hardware design

- Hardware lifecycle
- Hardware concepts
- Hardware fault tolerance
- Diagnostics, Proof test
- Safe failure fraction
- Architectural constraints

Hardware design (con't)

- Reliability analysis
- Markov modeling
- FMEDA
- Failure Data

Software design

- Software lifecycle
- Safe software
- Three types of software
- Software testing
- V-model
- Measures to avoid failures
- Measures to control failures

Certification and Proven In Use

- Certification & compliance
- Safety Manual requirements
- Certificates & reports
- Proven in use, how to use?
- Reliability data, sources

Using the Safety System

- Installation and commissioning
- Safety Validation
- Operation, maintenance and repair
- Modification and retrofit

Student exercises

- With the student exercises, the participants will have the opportunity to put the learned theory into practice
- Failure classification
- Verification
- Hazard and risk analysis (FMEA, FTA & HAZOP)
- Selecting the appropriate SIL
- Safety versus Availability
- Design a Safety Integrity Function
- Define device level safety functions
- Selection and comparing devices
- Accident documentary (video)
- Questions & Answers

Wrap up

- Summary
- Exam preparation

3. About the Exam

3.1 Rules & regulations of the course and exam

- The applicant has to attend the 3 consecutive days training course given by TinoVC
- The Eligibility Requirements forms must be completed, signed and supported with the necessary documents (University degree or statement letter from employer)
- The maximum duration of the exam is 4 hours and comprises 85 questions:
 - 60 Multiple Choice questions to be answered by selecting A-B-C or D. Only 1 will be the most complete and the most correct answer. Every good answer will be 1 point. (There are no negative points for wrong answers).
 - 25 Open Questions to be answered in a written form. Every single question can score anything between 0 and 1 (There are no negative points for wrong answers).
- The passing criteria is 75%, so you need minimum 63.75 points in able to pass the exam
- All exams are monitored by TÜV Rheinland, which will issue the successful participants their personal certificate.
- No details are allowed to be discussed once the exam is closed.
- Participants will get their exact score and average versus class/group communicated by personal email maximum 4 working weeks after the exam has been written

3.2 What you will need:

- A pen or pencil / eraser - both are acceptable
- A bilingual dictionary is allowed, but not compulsory
- You will NOT need a calculator to complete this exam

3.3 What is absolutely forbidden:

- Mobile telephone
- Photo/video - camera or 'any' recording enabled devices
- Course manual, notes or summaries

3.4 Exam Re-sit

The re-sit needs to take place within one calendar year from the first exam date without undertaking the complete training course again.

You are free to choose a location in one of the upcoming GMI trainings and TinoVC trainings, currently released on the GMI (www.gmintsr.com/training), on the TinoVC (www.tinovc.com) and on TÜV Rheinland (www.tuvasi.com) website.

You will need to register at least 4 weeks before the event is due in able to comply with the administration regulations.

Any re-sits undertaken over one calendar year from the date of the first exam will require the complete course to be done once again with the full fee payable.

4. Details

Each participant can find at www.gmintsr.com/training some useful files prior to the course:

- File: GM International - TUV FSE Eligibility Requirements.pdf
Participants **MUST** sent back the form, by soft-copy, at least 1 week BEFORE the course start date. A dummy example is included for your reference with the highlights of what has to be signed, checked, filled in etc.
- File: GM International - TUV FSE Sample Questions.pdf
These are sample questions for the candidates to practice if required
To download the last revision of this file please send request to:
training@gmintsr.com or info@tinovc.com
- File: TinoVC - TUV FSE white papers.pdf
We **recommend to read ONLY paper 1 & 2** of the total 10 papers in preparation for this training course. The rest of the material can be read after the exam...
To download the last revision of this file please send request to:
training@gmintsr.com or info@tinovc.com