Safety for the process industry – Functional Safety Services

The modular service package for safe and efficient plants

Industrial Technologies

SIEMENS
Plant safety is one of the key factors in ensuring that your production is efficient. Reliable systems that are simple to operate and maintain reduce the probability of accidents as well as the susceptibility of your equipment to faults.

The challenge

Maximum safety for the process industry

You can only achieve plant safety if existing risks are recognized in advance and, where necessary, reduced as quickly as possible. That’s why effective, systematic risk assessment plays such an important role today, as it is the only way to reliably define suitable measures and quickly implement them. To determine possible risk factors and for successful start-up, modernization or dismantling, a continuous development and modification process must be implemented at your plant.

The challenge is to develop a package of measures that meet all safety requirements in the individual phases of a plant life cycle.

The following points are crucial for defining and implementing your customized safety life cycle:

- How do you achieve “robust” safe processes?
- What personnel does your safety life cycle require, and what qualifications must they have? (These could be, for example, experts for HAZOP, SIL verification and programming.)
- Are suitable resources, such as tools and specifications, available?
- Are verification and validation activities, as well as the HAZOP procedure, performed by independent experts?
- Does the process offer the possibility of quickly implementing changes to regulations and standards?

The goal: Efficient implementation of safety requirements over the entire plant life cycle.
As a leading supplier of automation solutions, we have solid expertise and a wealth of experience, built up over many years in the process industry. With Siemens Functional Safety Services, we support you throughout the entire life cycle of your plant, allowing you to achieve the highest safety standard possible.

The solution

Siemens Functional Safety Services for the process industry

With Siemens Functional Safety Services, we support you with a comprehensive package of services that cover everything from risk identification and verification to commissioning and modernization. The individual service modules allow you to selectively enhance your development, modification, and maintenance processes. We thus offer you an effective means of preventing, right from the start, faults inherent in processes and of keeping an efficient, verified record of conformity to standards and operational plant safety. All of our safety activities are based on international standards. We can also easily accommodate country and company specifics. Our service for the process industry is complemented by a corresponding service package for the manufacturing industry. We can thus integrate approaches to safety from the manufacturing industry environment into your safety life cycle.
Siemens Functional Safety Services is a modular service package that we tailor to meet your specific needs. For you, that means customized support in defining and implementing your safety life cycle.

The modules
One concept with many components

Our service portfolio is as broad and varied as your requirements. For example, for your existing concept, we can perform SIL verification (calculation of the probability of a dangerous failure), programming of the safety function, or verification of the software.

Safety consulting
With this module, we assist you in complying with the requirements for functional safety management. IEC 61511 stipulates robust processes in the development, integration, modification, operation, maintenance, and decommissioning of safety-related control systems. This means that an analysis must be performed, in collaboration with Quality Management, to determine whether the existing processes are adequate for avoiding systemic faults in the above-mentioned life cycle phases. Backed by our many years of experience in the process industry, we can help you define efficient development and modification processes and check them for compliance with relevant standards.

Safety analysis/risk analysis/HAZOP
Working in cooperation with your process experts, we determine the potential dangers of your plant in order to identify the necessary preventive measures. We begin by conducting a thorough fault analysis, applying systematic methods such as HAZOP, its German counterpart PAAG, or fault tree analysis. If necessary, we determine material data relevant for process safety in the laboratory, such as the explosion characteristics of gases, vapor and dust. In the next step, our experts determine what risk reduction is necessary. And finally, an interdisciplinary team with specialists from the fields of process safety and automation specifies the detailed requirements for your safety instrumented systems.

Our experts are your partners for all safety measures:

- Fault analysis/hazard analysis/HAZOP
- Definition of the safety equipment and activities needed
- Specification of the requirements for safety instrumented systems
- Programming
- Verification and validation
- Maintenance
- Modernization
**Design and planning**

We formulate an individualized safety concept for you based on the requirements specification that we have drawn up for your plant. In addition to safety integrity (SIL classification), we also take into account requirements for maintenance and user-friendly handling of the protection system. Our objective is to equip your plant with workable components whose inspection intervals are as far apart as possible. To achieve this, we draw on the comprehensive system and service portfolio of Siemens automation technology. If necessary, it is also possible to include components without safety certification in the definition and assessment of the safety concept.

**Programming and commissioning assistance**

Using programs such as SIMATIC F-Systems or SIMATIC Distributed Safety, we develop a complete package of safety-relevant software or individual software modules for your project as a company-specific library expansion. This is drawn up and thoroughly tested by our experts in a defined development process. As an option, we can also have the software certified by an independent test institute. We also provide you with comprehensive documentation.

We will also be glad to assist you with the integration of the safety system.

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**Simplified example of a fail-safe, high-availability function for monitoring pressure**

- **PROFIsafe via PROFIBUS PA**
  - Pressure transmitter
  - DP/PA coupler

- **PROFIsafe via PROFIBUS DP**
  - Pressure transmitter
  - DP/PA coupler
  - Connection module ET 200M
  - Controller S 7-400 F/H

- **Solenoid valve/shutoff device combination**
  - F-DO card
  - Connection module ET 200M
  - F-DO card
Validation
As part of a safety validation audit, an analysis is performed to determine whether your system fulfills the safety requirements. If the Factory Acceptance Test (FAT) has already been carried out, the focus is on the project documentation and random checking of functionality and integration quality. The basis for this is the validation plan of your project.

Modernization
Safety technology plays a key role in modernization. A company may be modifying plants, processes or products as part of its company-specific management of change process. We verify, for example by updating the safety analysis/HAZOP, whether an overhaul of the safety system is relevant and whether the modification would involve new risk potential.

For planning and implementing the project, we rely on the individual Siemens Functional Safety Services modules, such as programming and commissioning support, verification, and validation.

Verification
In the verification process, we verify by analysis or test that the results of the plant development and modernization project comply with the specification. The methods that we offer you depend on the safety plan and especially on the verification and validation plan.

Verification activities can be:
- SIL verification: We provide mathematical proof that the protection system achieves the necessary safety integrity level. This includes calculation of the PFD (Probability of Failure on Demand) or PFH (Probability of Failure per Hour) value and accommodating the required hardware fault tolerance.
- Verification of the safety-relevant software: Our specialists can check the software for safety-relevant systems that were developed with the Siemens products SIMATIC F-Systems or SIMATIC Distributed Safety

Verification is performed by independent experts for fail-safe SIMATIC systems and documented for you. We also offer the option of setting up a test automation and simulation environment.
Your advantages

Maintenance
The maintenance of plant components is an important factor in maintaining the safety integrity of the system. With our global service structure, which includes more than 200 locations in nearly 50 countries, we support you with regular checks on your safety systems.

Maintenance activities can be:
- Annual inspection of safety-relevant shutoff devices and sensors
- Checking the parameters set for safety-relevant components
- We offer you an independent and documented test for all measures

- The entire safety life cycle is covered, thus reducing the number of interfaces and lowering the project costs
- An interdisciplinary team of experts will help you with the fast, effective implementation of your safety requirements
- Practical safety concepts and fast system approvals, thanks to our extensive experience accumulated over years in the process industry
- A modular service package tailored to your requirements
- Deployment of experts appropriate for your needs in order to cut development times and costs
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