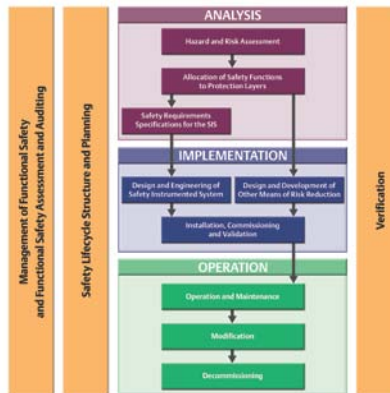


# Safety Instrumented Systems (SIS) Best Service Implementation Practices



IEC 61511 Standard, *Safety Instrumented Systems for the Process Industry Sector*  
Safety Life Cycle Phases and Functional Safety Assessment Stages

Successfully implementing a Safety Instrumented System requires a safety lifecycle, including a Safety Management System, as well as qualified personnel.

- Ensure safety standard conformance
- Enable regulatory compliance
- Reduce risk

## Introduction

Process safety is critical to plant operations. A Safety Instrumented System (SIS) performs specified functions to achieve or maintain a safe state of the process when unacceptable or dangerous conditions are detected. Structured project implementation is needed to ensure that safety requirements are met and risk is minimized. Emerson has developed this guideline to help ensure that SIS projects are successfully implemented by leveraging industry standards.

## Emerson Capabilities

Emerson Process Management understands the critical role of SIS. We have invested resources to become TÜV certified for:

- IEC61511 compliant project services
- IEC61508 compliant hardware & software

We believe that our structured project methodology and certified products not only reduce risk but also enable best engineering practices.

## Background

The international safety standard **IEC 61511** *Functional Safety: Safety Instrumented Systems for the Process Industry Sector* defines a structured methodology for the design, implementation, and operation of functional safety solutions.

Key elements of IEC 61511 are:

- **Framework** relationship with IEC 61508 (Part 1)
- **Safety management system** requirement (Clause 5)
- **Safety lifecycle** methodology to manage functional safety and reduce systematic failure (Clause 6)
- **Performance-based approach** aimed at producing an SIS solution that confidently places and/or maintains the process in a safe state (Clauses 10, 11 & 12)
- **Periodic functional safety audits** aimed at ensuring that SIS performance still meets process safety requirements and periodic proof tests that are designed to ensure that the SIS performs as intended (Clause 16).

## Best Service Implementation Practices

Leveraging the concepts of **IEC61511 standard** can lead to best engineering practices used throughout the entire lifecycle of a critical safety systems - from concept through decommissioning. A key concept within this standard is safety lifecycle management, including a functional *Safety Management System*, as well as the following phases:

- Hazard and Risk Assessment
- Allocation of Safety Functions to Protection Layers
- Safety Requirements Specification for SIS
- Design and Engineering of SIS
- Installation, Commissioning, and Validation
- Operations & Maintenance
- Modification & Updating
- Decommissioning

Specifically, during the design and implementation of SIS projects, approved procedures and qualified personnel are needed to support the safety lifecycle management approach. For added peace of mind, the **procedures** used during the implementation of a project and the **personnel** performing various project tasks can be certified by accredited third parties such as TÜV and/or the Certified Functional Safety Expert Governance Board to further ensure that best practices are being used.

**Certified procedures**— A Safety Management System (SMS) should be in place because it defines the implementation activities and verification steps necessary to complete an **IEC61511** compliant project. A major benefit of an SMS is that it helps ensure that the requirements described in a Safety Requirements Specifications are developed in a structured, traceable working environment. Additionally, SMS represents the use of good engineering practices that have been reviewed, certified, and periodically audited.

**Qualified personnel**—Competency and experience of the personnel responsible for designing, specifying, implementing, testing, and validating SIS project tasks is important. Organizations involved in these activities should operate under a formal competency policy in accordance with the IEC61511 standard. Additionally project personnel need to attend and successfully pass appropriate **educational courses specific to the SIS solution being implemented.**

Applying a structured project implementation methodology, based on industry standards, can help ensure best engineering practices are being used, as well as reduce risk—resulting in a successful safety solution.

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