



ABB - your partner in functional safety  
Minimizing risk to people, property and  
environment

# Managing safety in today's challenging global markets



The need to weigh improved productivity and lower expenditure against compulsory safety regulations is one of the most difficult balancing acts in industry today. Guided by their core values of health and safety, successful companies team with ABB for their functional safety needs, ensuring they remain centered every step of the way. With unparalleled experience and expertise in every phase of the safety lifecycle, ABB can assist you in meeting your social responsibility to protect your people, property, the environment, and the surrounding community from harm.

## Safety technologies are changing rapidly

With increasing acceptance and implementation of 'smart' safety automation technologies, the process industries are experiencing a revolution. To meet their functional safety management requirements, end-users now demand closer integration of their safety and control systems, safety functions at varying process states, flexibility, scalability, and reusability of their safety components. Finally, the use of fieldbus technologies makes it possible to lengthen test intervals and increase system uptime. With a wide variety of options available to you, the challenge is to determine the safest, most reliable and cost effective safety instrumented system (SIS) appropriately. Not every combination meets the safety integrity and regulatory requirements of your specific application. This is where ABB can help. With years of experience and a SIS product family that covers the full range of technology, we can provide the most cost-effective solutions to meet all your needs.



### Safety standards are also changing

The international safety standards IEC 61508 Ed2 and IEC 61511 for the process sector, IEC 62061 for machinery and IEC 61800-5-2 for power drives, are setting global benchmarks as “good practice” in functional safety. In addition, EEMUA 191 and ISA 18.2 related to Alarm Management are increasing in visibility and usage by asset owners. These standards and guidelines are impacting not only traditional safety sectors such as oil, gas, and petrochemicals but also the chemical, pharmaceutical, pulp and paper, metals, and utility industries.

Throughout the safety supply chain, demonstrable evidence of compliance to these standards is increasingly seen as a pre-requisite to demonstrate good practice safety management. This compliance is achieved through third party organization and product certification. The safety lifecycle, management of functional safety, and definition of safety function and safety performance (safety integrity level) are fundamental to these standards.

### Globalization

Moving into the 21st century, companies in all industries have developed truly global capabilities. This often leads to conflicts in inter-company safety management strategies and systems, lack of cohesion in the supply chain, and contractual and project disruption. While expanding globally, each local operation struggles to retain core competencies as each is asked to right-size their organizations. Removing core resources while retaining the operation liability is not generally considered a path to success. That is why it is vital to partner with a global company with local resources such as ABB. We can provide you with the products, services, and consistency needed to implement and sustain a global safety strategy at each of your local facilities.

### Competency

Competency is a necessary pre-requisite to meet your contractual and regulatory requirements. Our expertise, certified engineers, and project delivery safety execution centers, enable us to function as an extension of your information and safety resource pool, particularly where in-house resources are no-longer available.



# Delivering your functional safety lifecycle solutions

## Functional safety management

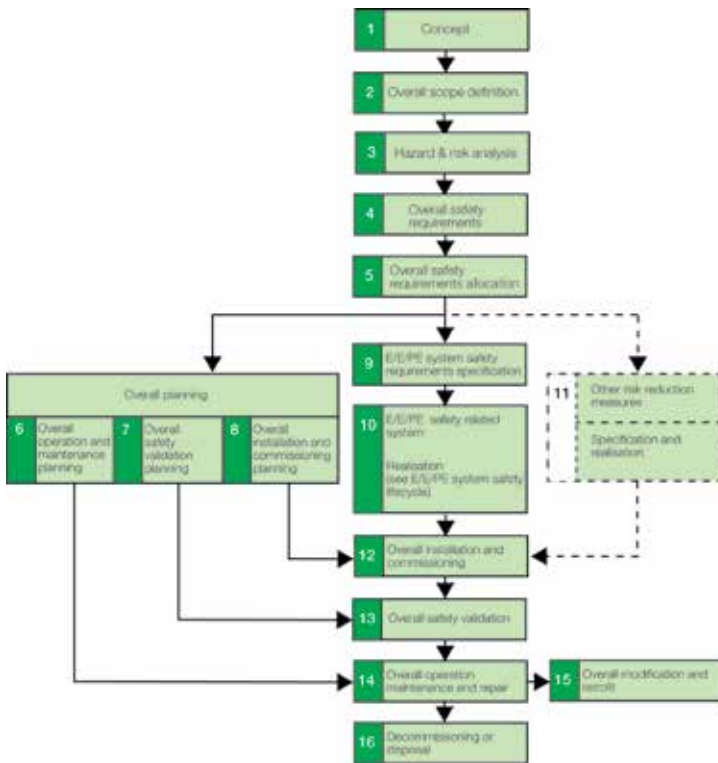
The international standard IEC 61508 Ed2 covers the functional safety of electrical, electronic, and programmable electronic systems and constitutes international good practice for instrumented protective systems. This standard is a precursor to a more robust approach for industry to demonstrate that appropriate reliability, functionality, and performance are built into equipment that is maintained effectively. IEC 61511, also an international standard, is the vehicle to interpret the framework of IEC 61508 specific to the process industries. Similar safety lifecycle requirements are also provided for machine and power drive safety via the implementation of IEC 62061 and IEC 61800-5-2 respectively. As with IEC 61511, both of these standards work in conjunction with IEC 61508 for the hardware and software design & engineering of an instrumented safety related system. Fundamental to these standards is a safety lifecycle, which spans the total asset and supply chain.

The safety lifecycle concept can be considered in respect of a number of key principles:

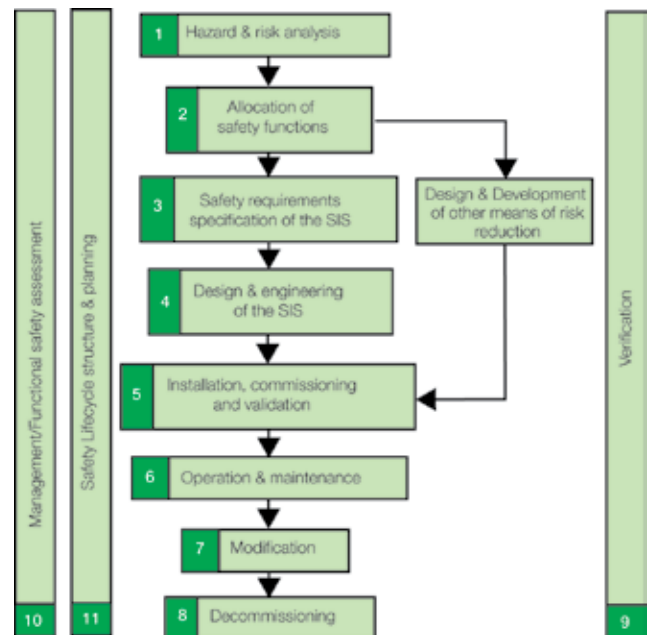
- Identify safety needs and specify safety requirements
- Design and build safety instrumented systems
- Install the safety instrumented systems
- Operate and maintain these systems over the life of the asset and maintain the safety performance

Your capital and operating expenditures span this entire lifecycle, which can last twenty years or more. To minimize the impact on your bottom line, you need a qualified safety partner that can take care of you from concept to decommissioning. As that partner, we have mapped our product and service portfolio to this lifecycle to meet your safety requirements.

IEC 61508 Ed 2 Safety Lifecycle



IEC 61511 Safety Lifecycle



In addition to guiding product requirements, these standards specify procedures and routines for all activities required to manage safety throughout the entire SIS lifecycle and include planning, design, implementation, documentation, training, operation and maintenance.

### Providing assistance every step of the way

We use IEC 61508, IEC 61511, IEC 62061 and IEC 61800-5-2 lifecycle standards as our benchmark. From these standards, we have developed a comprehensive set of systems and services for the full asset/safety lifecycle. This one stop offering includes instrumentation and final elements, safety instrumented systems up to and including SIL 3 certified, supporting safety tools and methods, development and operating environments, safety consultancy, and full service with support across the global process industry. Developed and continuously adapted in consultation with industry, regulatory bodies, government agencies, and standards committees, our safety portfolio is always in step with the latest safety requirements.

Leveraging our unrivalled experience, we work with end users, system integrators, and engineering procurement and construction (EPC) firms to:

- Perform front end hazard and risk analysis, and safety requirements/SIL determination
- Develop compliant safety requirements specifications on behalf of Asset Owners
- Design end-to-end safety instrumented systems that meet customers' needs, specific SIL requirements, and fulfill regulatory requirements
- Manage projects professionally to cost, time, quality, and functional safety management requirements
- Staff safety projects and services with competent safety professionals
- Deliver certified safety systems
- Deliver fully engineered safety systems, from stand alone subsystems through to fully integrated control, safety, instrumentation, analyzers and electrical systems
- Provide support for installation, commissioning and operations, including customized services agreements
- Apply the right tools, at the right time for project execution and safety lifecycle support
- Provide functional safety related technical training courses and support our clients competency development requirements.

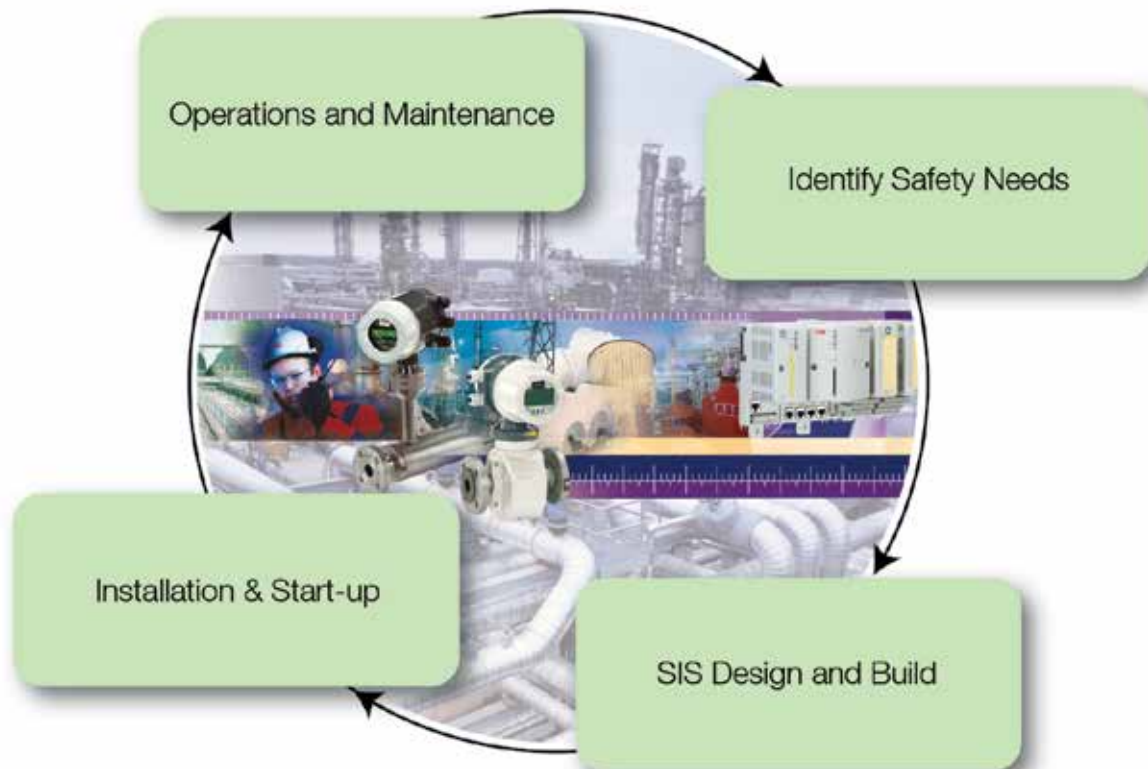


ABB offers you a complete portfolio of products for a wide range of process industries and services for the complete IEC 61508, IEC 61511, IEC 62061 and IEC 61800-5-2 asset/safety lifecycle.

# Hazard and risk assessment

Throughout the many aspects of the safety lifecycle, you are faced with a number of key questions paramount to safe process operation:

- Do I understand the risks?
- Can I quantify the implications of those risks?
- What is the required SIS specification?
  - to eliminate or minimize the key risks
  - to ensure residual risks are contained to acceptable levels
- Does my organization have the processes and skills to ensure that risks are managed effectively?

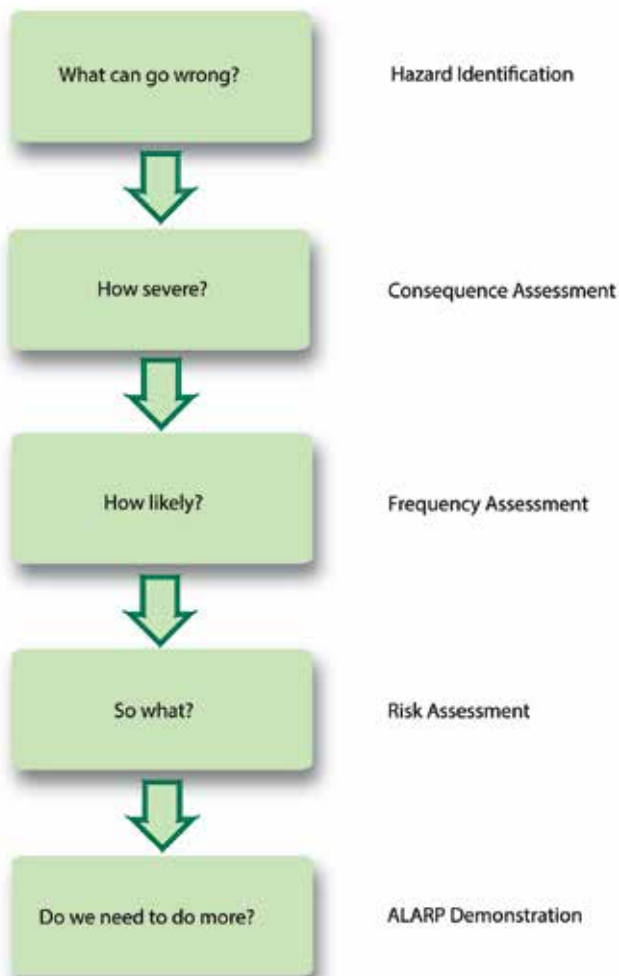
We can help you address these questions with confidence and provide you with a solid base for reducing your risk to acceptable levels.

Due to the complexity of the hazards in the process industry, it is required that a systematic process is used to identify all foreseeable major incidents. ABB offers a proven set of techniques and methods to enable identification of hazards, assessment of risks, and determination of appropriate risk reduction strategies.

## ABB's hazard study methodology

Our hazard study methodology comprises an 8-stage approach that covers the safety lifecycle of a plant from the initial process/chemical route selection, through conceptual and detailed design, commissioning and start-up, to periodic hazard reviews in ongoing operation. We apply the appropriate hazard study techniques according to the nature of the plant/process. These techniques include:

- HAZOP (Hazard and Operability) studies
- Past accident and incident reviews
- FMEA (Failure Mode and Effects Analysis)
- Industry checklists
- Process Hazard Renew (PHR)
- SIL Determination
- Human Factors Assessment



Where protection against major incidents is dependent on the action of an active shutdown system or human intervention, our risk assessments consider whether the reliability of these measures ensures that the risks remain As Low As Reasonably Practical (ALARP)



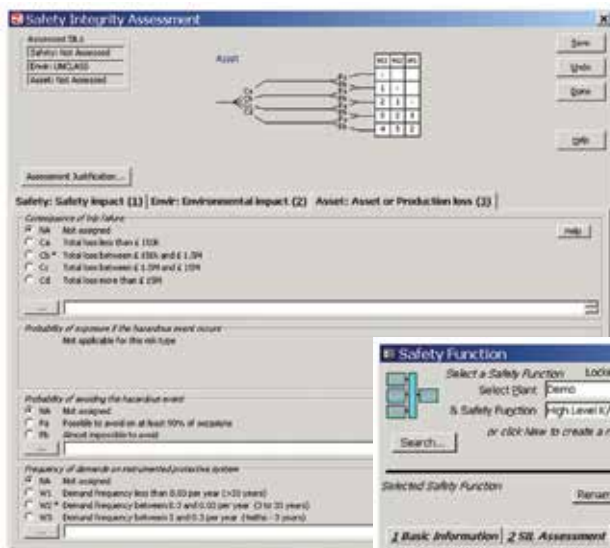
### HSE Assurance program

ABB has an HSE (Health, Safety and Environmental) Assurance program for existing plants via a structured periodic hazard review (PHR). This review encompasses an initial risk-based appraisal of identified hazards and provides a sound basis for determining where more detailed study may be needed. Also, Specialist Audits are performed on HSE critical systems and procedures identified by the PHR. Effectively identifying hazards leads to safer processes with reduced operating costs, compliance with the legal requirements for risk assessment, and benefits from increased efficiency and profitability.

### SIL determination

According to the IEC 61508/61511 standards, the Safety Integrity Level is fundamental to ensure a safety related system satisfactorily performs the required safety functions under all stated conditions within a defined time period. SIL assessment is the process of determining the required reliability for SIS, taking account of the severity of the hazardous event and other independent layers of protection that are contributing to the overall risk reduction.

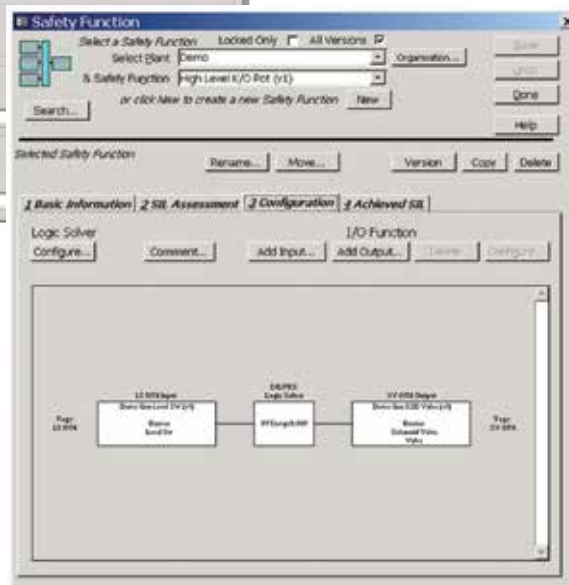
ABB's Trip Requirement and Availability Calculator (TRAC) package can be used to assist your safety, project, and maintenance engineers in determining the optimum design configuration and periodic test intervals for your Safety Systems. It provides you with a systematic and consistent approach to calculating required SIL, SIS Design and trip test intervals for safety loops relating to safety, environmental, or asset loss. Proper SIL determination is critical, as inappropriate SIL determination can affect the safety integrity of the asset protection envelope and may, in some cases, place the asset integrity under threat. Conversely, an overly conservative approach can result in unnecessary capital and operational spending. Properly defined SIL levels allow for significant cost improvements in both greenfield and brownfield operating environments. Asset operational safety integrity levels are maintained while the cost of ownership from ongoing testing and maintenance is optimized.



Our TRAC software offers both Risks Graph and Layer of Protection methodologies (from IEC 61511) to assess SIL requirements.



Test interval results are displayed graphically and issued via a comprehensive report with fully traceable and archived decision processes.



TRAC also provides individual SIF Architectural Design and Engineering to meet Target SIL requirements.

# Safety instrumented solutions

In designing the safety instrumented system, many focus their energies on logic solver functionality. However, the logic solver typically contributes less than 15% to the SIS loop's Probability of Failure on Demand (PFD). Through our TÜV certified product development centers, we provide complete SIS solutions, complying with IEC 61508, IEC 61511, IEC 62061 and IEC 61800-5-2 and covering not only the 'logic solver' but the entire safety loop, consisting of field instruments, controllers and I/O modules, and field actuators.

## Input systems

ABB supplies a range of intelligent field sensors suitable for use in Safety Related Systems including pressure, temperature, and flow instrumentation. Our solutions range from TÜV certified high integrity transmitters to standard transmitters with enhanced internal diagnostics to minimize the PFD. Additional documentation includes third party reliability data reports and cross referencing to IEC 61508.

## Logic Solvers

Our family of safety controllers complies with relevant safety standards (IEC 61508) and provides a range of architectures and SIL ratings to meet any requirement. Building upon the proven features of dual and triple redundant safety controllers, System 800xA provides a common engineering and operations environment that enables us to deliver SIL 3 capable, powerful, scalable safety solutions.

## Output systems

Our TZID family of smart electro-pneumatic positioners forms the vital link between the system and the valve. These positioners incorporate an auto-adjust function to reduce commissioning time while an adaptive control program

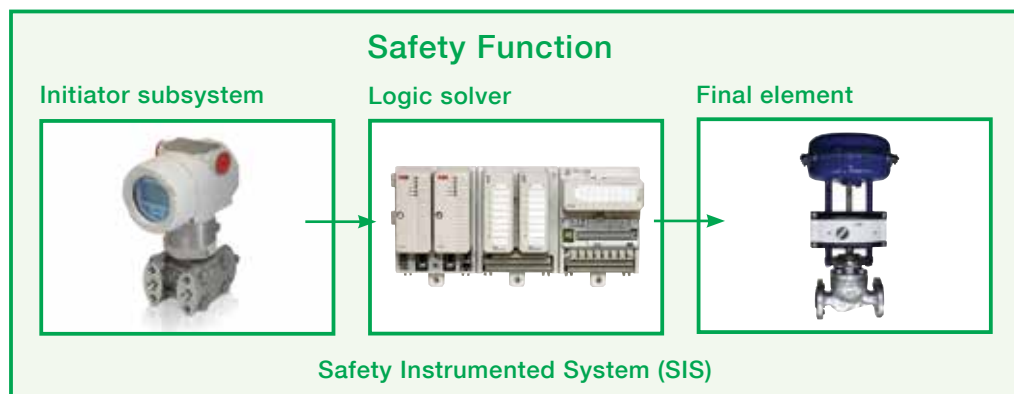


provides for optimal control of the position until set point is reached. When fitted with a safety shutdown module, our safety positioners meet the requirements of IEC 61508 for SIL 2 applications.

### 800xA supported safety controllers

AC 800M Hi Series

Safeguard 400 Series



Improving Logic Solver reliability has minimal impact on the reliability of the overall loop. To increase safety, the entire loop must be examined.



### High integrity system architecture

ABB's Extended Automation System 800xA improves process availability while reducing risk to overall plant operation by providing a common high integrity system environment for production control, safety supervision and production monitoring. System 800xA provides the unique design flexibility to maintain functional separation of your Basic Process Control System (BPCS) and SIS functions by utilizing individual controllers, or through dedicated applications within the same controller. With safe, instant interaction between applications, our common system environment offers improvements in process availability while reducing the risk to overall plant operations. This TÜV certified SIL 3 capable architecture eliminates the duality of system operations and their associated lifecycle costs and leads to optimized project engineering, training, operations, maintenance, and spare parts.

### Secure firewalls

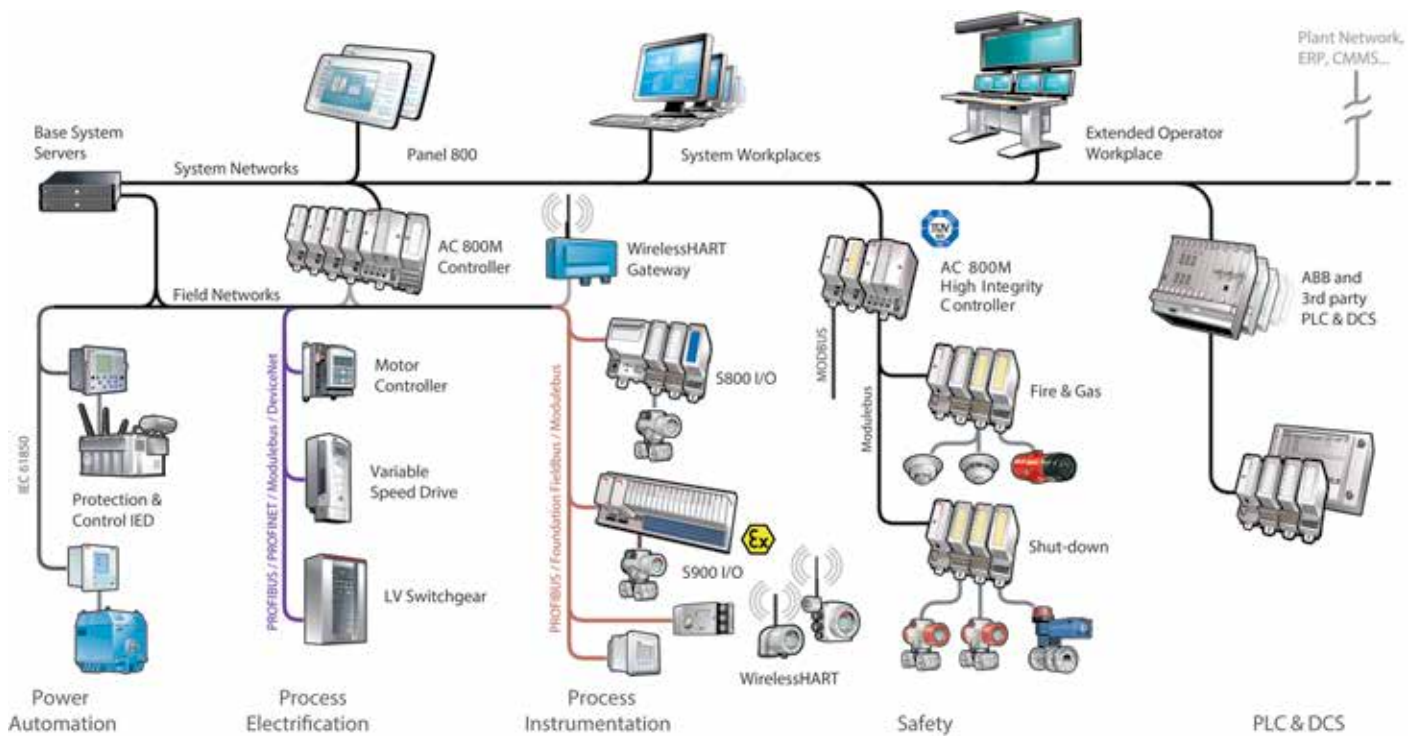
Although integrated within a common environment, System 800xA's extensive diagnostics and certified firewall mechanisms eliminate common-cause failures of control and safety circuits. Access management mechanisms embedded within the 800xA controller environment include:

- Access Control to applications
- Confirm Operation
- Force Control

With these secure firewalls in place, safety and process applications can freely exchange signals and data without the need for external, complex interface hardware, software, and mirroring of data.

At its highest level, 800xA safety system integrity is protected through inherent system security features, such as audit trail, user log-overs, data access controls and advanced security features.

800xA Safety features a flexible and scalable SIL compliant design. 800xA high integrity controllers and I/O are highly modular, offering many interconnection options. This makes them suitable for all small to large business-critical automation applications.



# Engineering the safety instrumented system

Working within a common engineering environment, our safety engineering application suite supports a consistent information flow from planning and design, through installation and commissioning, to operation and maintenance; resulting in engineering for maximum performance and real increases in overall productivity and safety.

## SIS function design

ABB's engineering environment provides graphical design of the entire SIS loop – from field inputs and logic solver to the safety loop's final elements. We provide a comprehensive library of standard reusable TÜV certified components. These pre-tested proven libraries significantly reduce the time required to engineer, test, and maintain safety applications, while minimizing project risks.

## SIS device management

The engineering environment includes support for your intelligent field instrumentation. These device management tools allow you to engineer device integration from topology to field elements, including device parameterization, application planning, commissioning, detailed diagnostics, and in-place calibration.

## SIL Achievement

Successful demonstration that the target SIL for a safety instrumented function has been achieved is reliant on many aspects of the overall safety lifecycle, such as Hazard and Risk Assessment, SIL Determination, Safety Requirements Allocation and Realization - phases 1 to 10 of the IEC 61508 safety lifecycle. The evidence required in order to demonstrate that a safety instrumented system function meets its target SIL (i.e. the SIL Achievement exercise) is far more than a quantitative exercise, based solely on target failure measure. Architectural constraints and Systematic capability must also be taken into account.

SIL Achievement is a demonstration that for each Safety Instrumented Function, the target SIL, as derived from SIL Determination, has been met in accordance with the requirements of IEC 61508. As part of our TÜV certification safety systems integration and engineering services we perform SIL Achievement using proven methodologies and provide comprehensive reports.

Only when a safety instrumented function meets the criteria set by IEC 61508 in terms of architectural constraint, target failure measure and systematic capability, can the target SIL be said to be achieved.



### Engineering tool integration

Engineering productivity is further enhanced through the integration of process engineering tools. Opportunities to drive operational performance improvement begin early in the safety project lifecycle when key safety asset information is created in core design systems. For example, through our engineering tool integration for SmartPlant Instrumentation®, not only can safety system structure, functionality, and documentation be created directly from the SmartPlant Instrumentation design, but operational changes such as ranges, units, and settings, can be directly reflected back to the Smart-Plant Instrumentation application.

### Reusable solutions

Safety practices need to be repeatable and re-deployable. While most focus their “best practice” safety solutions at the control strategy and implementation levels, with ABB’s engineering tools your safety solution standards can incorporate extended automation entities such as TÜV certified control modules, function blocks, faceplates, graphic elements, trends, document links, CMMS data views, field device diagnostics, and asset monitors.

Our wide range of best practice solutions include: Fire & Gas systems, Emergency and Process Shutdown (ESD and PSD), Interlock systems, Burner Management and Boiler Protection (BMS), Critical Control, High Integrity Pressure Protection Systems (HIPPS), and Pipeline Protection Systems (PPS). Through the common engineering framework, these solutions can be quickly reproduced and adapted to meet specific safety requirements with minimum engineering and revalidation.

Maintenance of your “best practice” solutions is easily achieved through the same engineering environment. As your requirements evolve and standards change, your “best practice” templates can be updated and instantly deployed allowing for immediate improvements in plant performance and safety.

### Change management

ABB’s change management features record and track all configuration changes to project libraries, instantiated solutions, and run-time and off-line data. The system’s audit trail and electronic signatures are key features that specifically fulfill regulated industries requirements such as FDA 21 CFR part 11.





# Providing assured safety solutions

## Compliant Safety Execution Centers

ABB's global Safety Execution Centers design, configure, engineer, deliver, install, commission and service TÜV certified safety instrumented systems using TÜV certified building blocks. These centers are audited for compliance by TÜV with IEC 61508 and IEC 61511 and employ TÜV certified safety-engineering staff that are well versed in both regulatory and process industry requirements. Safety projects are managed in accordance with proven project management methods and TÜV certified functional safety management systems, processes and workflows. Rigorous testing ensures that systems are verified in accordance with safety requirements.

These centers work closely with ABB's Corporate Research organization to specify and develop new methods and tools to automate and streamline the safety lifecycle. In addition, these centers are actively involved in the management of national and international collaborative R&D safety projects including regulatory, government, and process industry focus groups.

## Safety Consultancy Centers

ABB Safety Consultancy Centers provide a wide range of safety engineering services to a broad spectrum of customers around the world. Exploiting decades of experience in the process, oil & gas, and related engineering fields, we can offer you support services ranging from consultancy; to guidance in highly specialized fields. These services include:

- Effective safety management processes
- HAZOP and lifecycle hazard studies for new projects and existing plants
- Functional safety systems management (IEC 61508)
- Human factor reviews & HSE culture change
- Human factors assessment
- Process Safety Management (PSM)
- Alarm management
- SIL determination
- Independent functional safety assessments
- Development of safety requirement specification
- SIS performance auditing
- Achieved SIL assessments
- Technical training
- SIS migration studies



Our safety engineers work where you work. With knowledge of local/regional requirements, and backed by a global company, these teams work side-by-side with your engineers to deliver and maintain compliant safety systems to a wide variety of industries.



### Safety product support services

In addition, we support our safety products and systems with a full range of complete lifecycle services. From spare parts and equipment repair, remote services and training, maintenance and evolution support, to complete asset management, our application and process knowledge provides proficiency that translates into measurable production performance improvement.

ABB's service team is positioned globally, with thousands of service personnel ready to provide fast and efficient response to every service request. Our service team is trained and certified in advanced repair and diagnostic techniques to minimize down-time and have your safety equipment back on-line quickly. We use our global strength and experience to develop and leverage best practices in process and system optimization to improve the safety performance of your ABB products and minimize associated cost.

New generations of software and system components provide increased operating efficiency, lower cost and extended

system life. ABB offers IEC 61508/IEC 61511 compliant low-risk evolution and upgrade strategies for a broad range of products and systems to assure maximum return on investment while enhancing equipment availability and performance. Our customized evolution planning, implementation and follow-up ensure long-term benefits and continued asset effectiveness.

### Training and awareness

As a recognized leader in safety, ABB has built up a comprehensive portfolio of training courses, spanning the complete safety lifecycle. These include general safety lifecycle courses and those that are tailored specifically to ABB manufactured safety systems, services and products.

ABB sponsors international safety conferences and seminars, road shows, "hot topic" events and safety workshops. These events are designed to share our comprehensive knowledge of process and functional safety to the safety community with presentations by internationally recognized industry speakers.



# Operating and maintaining your SIS - enhancing operator effectiveness

As the common interface for both Process Control System and Safety System operations, ABB's Process Portal aggregates all plant information in one system interface. Views are personalized for specific user job functions to deliver the exact information to the right people, in context, at the right time and in the right form.

In day-to-day operations, the safety level of a plant depends mainly on accurate dissemination and analysis of plant data. This process is critical to the formulation of correct decisions. In fact, studies of major accidents have shown that the severity of an incident is directly related to unfortunate coincidental events leading up to the incident and inadequate actions taken during the first critical phase afterwards. Therefore, knowledge, information availability, and overall plant awareness is key to the daily achievement of plant safety.

## Contextual safety navigation

In other systems, data is represented without user context. This means that every user must evaluate and understand the same sea of data, and then root out the decision criteria before taking action. Built upon ABB's Aspect Object technology, System 800xA makes all information required to install, operate, and maintain the system available through a common portal. This makes it easy to access data (aspects) directly from the source in the context of the asset (object) without needing to know where the data came from, and without concern about data integrity and concordance. With System 800xA, each user's login defines the type and class of information required for timely and informed decision-making.





### Safety operator workplace

Delivering more than a safety operator console, System 800xA provides you with an intelligent and focused presentation of the entire production facility including SIS field devices, I/O and logic solvers, alarm and events, asset optimization functions, safety reports, etc.

System 800xA enables rapid response to changing plant conditions through the following safety supervision functions:

- Sequence of Events (SOE) and alarm displays identify root causes with 1ms time tagging accuracy
- Field device signal displays provide real-time information and dialog for every device connected to safety controller
- During process start-up, maintenance and testing, inhibiting of specific safety functions is performed through standard operator dialogs and based on access management permissions
- System status supervision function includes detailed diagnostics of every SIS device
- Notifications alert remote personnel of critical events via mobile phones, email accounts, and pagers

### Safety compliance reports

System 800xA information management features collect, store, and retrieve historical process and business data from control, safety and related systems and transforms that data into meaningful information.

For the responsible technical authority, our safety compliance reports provide a summary of the overall status of the safety system and include:

- Override report – summarizes all tags currently forced, blocked, suppressed, or in override
- Valve verification report – summarizes the valve functionality in the system
- Valve leakage test report – summarizes results from valve leakage testing
- Automatic Shutdown Report (ASR) – summarizes all shutdowns performed in the system, and gives operators detailed information of all causes and effects

Most safety system failures are caused by field devices not by Logic Solvers. With ABB's integrated asset optimization software there is a wealth of diagnostic information residing within the instrumentation. Logic Solvers, final elements and electrical elements can monitor and analyse data for use in functional verification and documentation of Safety Instrumented Function (SIF) integrity. This saves spurious trips, increases SIS reliability and gives greater maintenance efficiency.

### Safety integrity monitoring

In accordance with IEC 61508/IEC 61511 requirements, your SIS requires proof testing on a regular basis to reveal hidden dangerous failures that cannot be detected and announced through traditional monitoring methods. The main concern resides with the field equipment and its functional connection to the Logic Solver, equipment and process connections that typically require off-line proof testing on a yearly basis.

With extended diagnostic coverage however, the need for costly, off-line proof testing can be dramatically reduced. In particular, our integrated automatic partial stroke testing of shutdown valves can detect many covert failure conditions. By partial closure of the valve and the logging and analysis of the valve performance, valuable information is provided about the valve's condition and its ability to operate on demand. This data is essential to maximizing the full stroke test interval required by the standard and increasing the loop's SIL rating.

### Reliability centered maintenance

Effective predictive, preventive, and corrective maintenance practices maximize the performance of automation, production, and safety equipment. With our integrated condition monitoring, reporting, maintenance management and calibration management features, you can effectively implement a Reliability Centered Maintenance (RCM) strategy at your facility. To assist you with this strategy, ABB service personnel are trained in the latest diagnostic, repair, and maintenance practices to ensure the highest value for your maintenance investment.

### Maintaining functional safety performance

Regular reviews of installed safety systems against good practice standards are required to achieve continuous safety improvement for ongoing process operations such as:

- Modification of the process and the SIS
- Trip and alarm testing and management
- Benchmarking of proof testing regimes
- Collection of proven in use data
- Periodic functional safety assessments

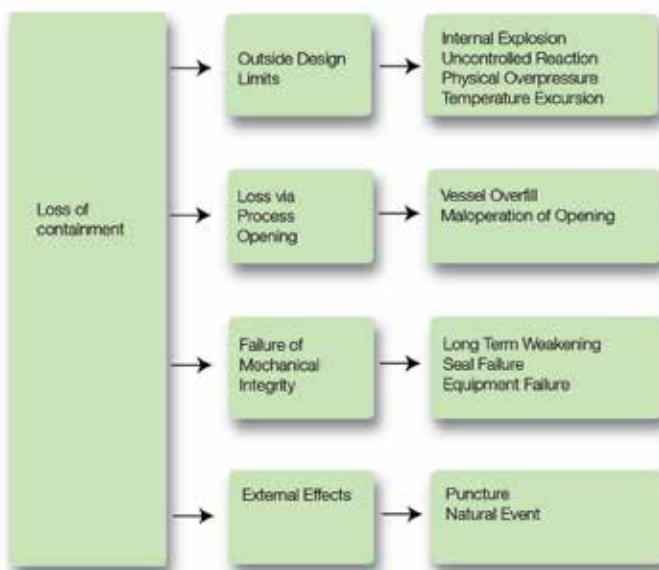
To maintain safety performance, we offer a range of methods and tools including Ventyx Process Safety Management Suite, Process Hazards Review, Installed Systems Review, and Proof Test Benchmarking.

### Functional safety management

Designed to demonstrate compliance with IEC 61508/IEC 61511 safety standards, our Functional Safety Management Review and Independent Functional Safety Assessment services provide you with the evidence to support regulatory requirements, demonstrate due diligence, lower insurance premiums, gain market advantage and reduce external audit and assessment costs.

In addition, ABB offers a range of alarm rationalization and management services. An effective alarm management strategy minimizes the unwanted consequences of unlimited and unconstrained alarm environments. Regulatory bodies are becoming increasingly aware of the effects that nuisance alarms, standing alarms and unnecessary alarms have on safe operation. This is especially true following a number of high-profile safety incidents in recent years where the alarm systems have been implicated. Therefore, without effective alarm management, you cannot be certain that your operators will respond correctly when a plant upset occurs.

We offer an alarm management “health check” that provides a benchmark and gap analysis against recognized good practice such as EEMUA 191 and ISA 18.2. In addition, we provide a range of services to help with the planning, management, and implementation of an alarm rationalization or improvement project.







# Minimizing your risk with an experienced partner

With the emergence of new technologies, globalization, and international safety standards, many suppliers have arrived on the scene claiming to be “safety experts.” However, because it is ultimately the end users social responsibility to protect people, property, and the environment, it is critical that you choose your safety partner wisely. Due diligence is required to separate the expert from the opportunist.

## A rich history

ABB builds upon the leading brands and technologies that have made us a leader in the safety industry. This includes products, technologies, and experience from ABB, ASEA, August Systems, Bailey, Hartmann & Braun, Fischer & Porter, Kent, Sensycon, TBI, and others.

Well before the first standard guidelines were drafted, we were actively involved in the design and implementation of Safety Systems. During the mid 1970s and early 1980s, ABB led the industry with the introduction of new safety technologies by delivering high integrity safety systems to the North Sea, including the first large integrated Emergency Shut Down (ESD) and F&G system (1980) and the first microprocessor based ESD system (1984). Transferring the concept of “Software Implemented Fault Tolerance” (SIFT) to industrial applications, we introduced the first Triple Modular Redundant (TMR) systems for safety related applications (1980). These early safety innovations were just the start. Over the next thirty years, we have developed a number of safety technologies that are installed and in operation today, including dual redundant and triple modular redundant architectures, and the development continues with our integrated SIL 3 capable AC 800M HI.

## Trust and confidence

At every step of the way, we have ensured that our products meet the most stringent requirements as defined by the international standards community (ANSI, DIN VDE, ISA, and IEC).

Our thirty years of detailed involvement with TÜV have improved both ABB’s certified product and safety management development processes and laid a firm foundation for quality products and solutions that meet today’s much more exacting industry requirements.

## Diverse industry experience

ABB has more than 30 years of experience in safety instrumented systems focused on delivering productivity, profits, and safety to end users. Supported by a global infrastructure that embraces manufacturing, design engineering, and research, our local customer-focused teams are committed to provide you with solutions in the Oil and Gas, Chemical and Petrochemical, Life Sciences, Pulp and Paper, Metals and Minerals, Manufacturing, Utilities, and other industries.

With over 5,000 safety instrument systems installed around the world, we minimize risk to people, property, and the environment on a daily basis.



# Contact us

## Assured and certified products, services, delivery and execution.

For further information please contact:

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Printed in UK (08.2014)

3BGB 000937/08/2014

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Process Safety