INP Reference

Functional Safety

LOCATION: worldwide

SERVICES: Production monitoring, Commissioning, Quality assurance, Documentation, As-built status and data recording, Basic-engineering and pre-engineering, Detail engineering, Installation supervision

INDUSTRY BRANCH/TYPE OF PLANT: Large Plants, , Power Generation, Power plants, Waste incineration systems, Chemical plants, Industrial systems

POINTS OF CONTACT



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Verification of technical safety functions on the basis of DIN EN 61508/61511 as well as VDI/VDE 2180

The safety standards of DIN EN 61508 and DIN EN 61511 stipulate requirements and procedures for planning, design and operation of technical safety systems in the area of the process industry throughout the entire safety lifecycle. In this case, safety functions resulting from hazard and risk analyses, amongst other things, are allocated to a level of risk minimization which is used as the basis for deriving a safety integrity level (SIL). Each safety function requires verification with regard to the allocated and necessary SIL. The verification includes not only evaluation of the hardware fault tolerance (redundancy/voting) but also a computer-aided verification of the safety circuit. The average failure probability when the safety function is requested is estimated by computer.

INP Services

- Verification of technical safety functions on the basis of a risk analysis
- Evaluation and calculation of the complete safety circuits: Sensors, logic (Controller, I/Os, bus, etc.), actuators
- Evaluation of the hardware safety integrity (hardware fault tolerance):
  Suitability of components
  Requirements on the hardware architecture (redundancy of components and subsystems)
- Evaluation via DIN EN 61508 (safe failure fraction, type A/B) or DIN EN 61511 (with consideration of the proven operating capabilities)
- Quantitative validation of safety integrity
- Calculation of the failure probability (low demand mode PFD/high demand mode PFH) acc. to DIN EN 61508 or VDI/VDE 2180
- Calculation using reliability block diagrams (DIN EN 61078)
- Calculation with software tools

Planning, design and commissioning of safety-related logic systems incl. application software

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- Planning of safety controllers in compliance with the permitted application areas and conditions
- Planning of redundant logic systems, in compliance with the technical safety availability
- Planning on the basis of a specification with the necessary safety requirements
- Compliance with the safety manuals of safety controllers
- Consideration of cycle times, response time, fault behavior, password protection
- Graphical programming (with restricted range of functions)
- Modular structure of the user program (use of recurrent functions and function blocks)
- Use of certified blocks from the manufacturer
- Commenting and symbolic addressing (e.g. KKS) of variables or logic
- Programming of diagnosis and monitoring as well as notification to the Master control or instrumentation & control system
- FAT - Test of the user software
- Complete function check with subsequent TÜV acceptance
- Extensive documentation (signature, version numbers, user program, hardware installation, configuration, etc.)
- Revision management
- Maintenance of safety controllers (repeat test)

Reference projects

- **Albbruck**, paper mill
  Planning, design and commissioning of the boiler protection-and burner control (Hardware and software)
- **Beeskow** CHP
  Migration of the safety-related boiler protection control, exchange of the hardware, renewal of the software commissioning
- **Dillingen** gas-fired power plant
  Planning, design and commissioning of the boiler protection-and burner control (Hardware and software)
- **Bern** waste incineration plant
  Validation of the required safety integrity, verification of safety functions, calculation of the PFD and evaluation of the HFT
- **Mainova**, Niederrad CHP plant
  Planning, design and commissioning of the boiler protection control (Hardware and software)