

Edward M. Marszal, PE, ISA84 Expert **President, Kenexis**

Fields of Competence

Safety Instrumented System Engineering
High Integrity Pressure Protection System Design
Alarm Rationalization and Management
Design/Reliability Engineering
Process Hazards Analysis / Hazard Identification
Quantitative Risk Analysis
Chemical Engineering
Process Safety Management
Project Management

Experience Summary

Mr. Marszal has over ten years of experience in the design and implementation of engineered safeguards, such as safety instrumented systems, relief systems, alarm systems, and fire and gas systems, in the process industries. Mr. Marszal is President of Kenexis and responsible for engineered safeguard design basis development and verification/validation projects. In his current position he has solid experience in SIS implementation and risk analysis projects for a variety of process plants in diverse world-wide locations. Marszal began his career with UOP, a licensor of process units to the petroleum and petrochemical industries, where he performed field verification of control and safety instrumented systems at customer sites, and designed and managed development of custom control and SIS projects. After leaving UOP, Mr. Marszal led a number of risk analysis / engineered safeguard consulting teams culminating in the establishment of Kenexis. Mr. Marszal is committed to providing education on chemical process loss prevention. He teaches many of the Kenexis courses and an ISA course on SIL selection and layer of protection analysis, and he also provides regular lectures and loss prevention to the Ohio State University undergraduate program. In addition to training, Mr. Marszal is a prolific author, including numerous technical papers and the award winning ISA book *Safety Integrity Level Selection*. Mr. Marszal is very involved in the Instrumentation, Systems, and Automation (ISA) society. Mr. Marszal holds a number of leadership positions at the national and local levels. He is currently Director of the Safety Division and Vice-President of his local section. Mr. Marszal participates on ISA standards committees, including SP 84 for safety instrumented systems and SP 18 for alarm systems. He also peer reviews papers for ISA Technical Conferences and ISA Transactions.

Credentials

B.S., Chemical Engineering, The Ohio State University, 1992
Registered Professional Engineer (Control Systems), State of Illinois, State of Ohio
Certified Functional Safety Expert, TÜV

Key Assignments

Performed and managed safety instrumented system (SIS) design basis development and verification / validation projects at various customer sites worldwide on various process units including. SIS design basis projects include identification and definition of safety instrumented functions, risk analysis to determine safety integrity level, quantitative reliability analysis to verifying achievement of SIL targets, Safety Requirements Specifications development, and in some cases, functional test plan development and PSAT assistance.

- Hydrocrackers
- Steam Reformers
- Hydrogen Purification Units (Liquid/Liquid, PSA, Membrane)
- Diesel Hydrotreating
- Gasoline Hydrotreating
- HF Alkylation
- Naphtha Reformers
- Cokers
- Fluidized Catalytic Cracking (FCC)
- Batch Custom Peroxide Production
- Utility Boilers
- Onshore/Offshore oil and gas production
- Gas Liquefaction
- Sulfur Removal and Recovery
- PTA/PIA Production
- Polypropylene Production
- Phenol / Acetone Production
- Butandiol Production
- Utility Boilers
- Compressor Systems (Centrifugal, Reciprocating, Screw, and Liquid Ring)
- Bio-catalyzed waste water treatment systems

Managed and participated in the analysis and design of a High Integrity Pressure Protection Systems (HIPPS) for various clients in various locations. HIPPS project scope includes assessing the appropriateness of a HIPPS system by reviewing the flare loading scenarios that are the design basis of the flare. Subsequently, requirements were placed on the HIPPS by a combination of ISA 84 risk analysis techniques and prescriptive requirements in the ASME Boiler and Pressure Vessel Code. The projects also included a conceptual design evaluation and quantitative SIL verification, ensuring that the design was appropriate for the situation and all requirements were met. In several cases, reports generated for this project were presented to the authority having jurisdiction for approval of this alternative pressure protection scheme.

- Gasoline Desulfurization Unit – Canada
- Gas Production Wellhead System – Trinidad and Tobago
- Gasoline Desulfurization Unit – US Gulf Coast
- Batch Reaction – US MidAtlantic Coast
- FCC Regenerator – Northeast US
- Entire Refinery Flare System – Midwest US

Key Projects - Continued

Assisted a major petroleum refiner in establishing design guidelines for fired heater safety instrumented system. The first phase of assistance included detailed fault tree analysis of the potential failures of a fired heater and cost benefit analysis to determine which interlocks and shutdowns could be cost justified. The project analyzed the full range of heater designs from natural draft single fuel to combined fuel forced draft systems. The second phase of the project included benchmarking of practices of peer refiners and providing a cold-eye review and recommendations for improvement of the standard, based on industry practices and peer company practices.

Performed detailed fault tree analyses of process systems for the purpose of determining the overall availability of highly critical systems. The results of these studies were utilized to determine the overall suitability of process designs in terms of safety and throughput and also to provide recommendations for improvement of the process designs in order to minimize the rate of losses from safety incidents and business interruption.

- Batch Reactor – High Energy Chemistry – Northeast US
- Emergency Flare Pilot Gas System – Shanghai, China
- Refinery Fuel Gas System – Northeast US
- Hydrocracker Runaway Reaction – Gulf Coast US

Managed and participated in the quantitative risk analysis of several facilities of a major global refiner. The objective of the study was to profile the risks of various facilities throughout the organization according to criteria that we assisted in developing. The results of this study were used by board level executive to prioritize risk reduction expenditures and assign responsibility for EHS performance of the sites.

Managed and participated in detailed EPA Risk Management Plan (RMP) compliance services for several chemical, pharmaceutical, and manufacturing company facilities. These projects included hazard assessments, including worst case scenario and alternate release scenario development and modeling, compliance minimization alternatives analysis, prevention program analysis and development, emergency response plan review and development, and Risk Management Plan documentation preparation.

- Pharmaceuticals – HF Acid, Ammonia, HBr – US Caribbean
- Power Generation Equipment Manufacturer – Flammables - Northeast US
- Appliance Manufacturer – Flammables, Toluene Di-isocyanate – Multiple US Locations
- Industrial Lighting Manufacturer – HF Acid – Multiple US Locations
- Water and Wastewater Treatment – Chlorine – US Caribbean

Presented numerous training classes discussing the principles and techniques employed in engineered safeguards.

- Safety Instrumented Systems Engineering
- Burner Management Systems

Participated in performing all aspects of implementing the requirements of the ISA 84.01 specification and IEC 1508/1511 specifications for a major U.S. process licensor with global licensee operations and manufacturing facilities. The project included determining scope of liability, SIL selection methodology and procedure development, creation of tolerable risk policy, equipment SIL verification procedure creation and detailed SIS design procedures.

Managed the detailed design, construction, installation, and start-up of several multi-million dollar control system projects, including advanced process control. Projects included control system detailed design, control software development, operator interface software development, advanced process control software development, controller assembly and fabrication, packing and shipping, installation, pre-startup checkout, and loop-by-loop “hot cut over” commissioning.

Affiliations

American Institute of Chemical Engineers (AIChE)
Senior Member

Instrumentation, Systems and Automation Society (ISA)
Senior Member, Director – Safety Division, Committees – SP84, SP18, and SP91

National Fire Protection Association

Selected Publications

Mr. Marszal is a prolific author on engineered safeguards and risk analysis, publishing a number of articles, technical papers, and books on the subject.

Books

Marszal, Ed, et al, “Safety Integrity Level Selection with Layer of Protection Analysis”, Instrumentation, Systems, and Automation Society, Research Triangle Park, NC, 2002.

Instrument Engineer’s Handbook, Section 3.2.1, “Hazardous Area Classifications”, Third Edition, CRC Press, New York, 2002.

Instrument Engineer’s Handbook, Section 4.1, “Alarms and Annunciators”, Fourth Edition – Volume II, CRC Press, New York, 2002.

Articles and Technical Papers (Selection of over 20)

Marszal, Edward M., et al, “Comparison of Safety Integrity Level Selection Methods and Utilization of Risk Based Approaches”, Process Safety Progress, (Vol. 19, No. 4) Winter 1999.

Marszal, Edward, “Tolerable Risk Guidelines”, ISA Transactions 40 (2001) 391-399.

Marszal, Edward, “Human Reliability Analysis for SIL Selection”, ISA National Show - Technical Conference, Chicago, 2002.

Marszal, Edward, “Protection Layer Commonality in LOPA”, ISA National Show - Technical Conference, Houston, 2003.

Marszal, Edward, et al. “Defining Safety Instrumented Functions”, ISA Safety Division Symposium, Houston, 2002.

Marszal, Edward, et al. “Oxidation Reaction Safeguarding”, Loss Prevention Symposium, New Orleans, 2004.

Marszal, Edward, et al. “Using BPCS for Protective Functions”, ISA National Show – Technical Conference, Chicago, 2005.

Marszal, Edward, et al. “Justifying use of High Integrity Pressure Protection Systems”, ASME PVP Division Conference, 2004.