

ANGELA ELAINE SUMMERS, PhD, PE - President

SUMMARY:

Dr. Angela Summers has over 30 years of experience in instrumentation and controls, process design, and environmental pollution controls. Dr. Summers holds a PhD in chemical engineering. She is a Distinguished Engineering Fellow of the University of Alabama and Mississippi State University, as well as a Centennial Fellow of Alabama’s chemical engineering department (top 100 graduates in 1st 100 years of the program).



In 2014, Dr. Summers was the first to receive Fellow distinction from International Society of Automation, the American Institute of Chemical Engineers, and the Center for Chemical Process Safety. In 2019, the International Electrotechnical Commission (IEC) presented her with the IEC 1906 award. In 2022, she received ISA’s standards excellence award. Dr. Summers received these honors for her contribution to the development of standards and practices for process safety management, especially in the use of automation to prevent loss events in the process industry.

Known as Dr. SIS and the Mother of SILs, she is a sought after consultant by users, manufacturers, engineering contractors, regulatory agencies, and industrial societies. She has published over 70 papers, technical reports and chapters for engineering handbooks, including Perry’s Handbook of Chemical Engineering, Loss Prevention in the Process Industries and Kirk-Othmer Encyclopedia of Technology.

Dr. Summers was named to the Process Automation Hall of Fame by Control magazine. This award honors excellence, diligence, and influence in the application of process automation. She was specifically recognized for her work on the ISA 84 and IEC 61511 safety standards. She served as lead editor of CCPS’s *Guidelines for Safe Automation of Chemical Processes*, while leading and participating in many other IEC, API, ISO, ISA, and AIChE efforts.

SPECIFIC EXPERIENCE:

September 1999 to Present. SIS-TECH – Owner and President.

Started business in 1999 to provide assessment, design, programming, construction, operation, maintenance, and long-term support of safety instrumented systems used to prevent loss events in the chemical process industry. Received 9 US and 28 international patents. Current products are the ICE Manager, Diamond-SIS and SIL Solver. Responsible for financial and business strategy, including personnel management, marketing, sales, product development, quality control, accounting, and project execution.

January 1992 to present. University of Houston – Clear Lake – Adjunct Professor.

Teach Spring semester college course for the Environmental Management Department in the School of Business and Public Administration. The course is Environmental Pollution Control Technologies and covers air, water, and hazardous waste remediation. It is a required course for a Masters degree in the program. Developed course content

and textbook, covering the following topics: the nature of pollution, air pollution control, wastewater treatment, and hazardous waste remediation.

July 1998 to September 1999. Premier Consulting Services (Triconex Corporation) – Director.

Managing director of consulting organization, involved in the assessment and design of safety instrumented systems. Responsible for financial performance of the group, as well as sales, marketing, project execution, and quality control. Interfaced directly with each Regional Vice President to maximize consulting impact on the sale of Triconex hardware. Developed business plan for expansion of Premier into other regions with expanded services line. Executed projects worldwide, including travel to Australia, Asia, Europe and South America.

March 1996 to July 1998. Premier Consulting Services (Triconex Corporation) – Global Risk Assessment Manager.

Manager in charge of Risk Assessment Services. Coordinated all projects executed by Premier Consulting Services, including conceptual design packages and quantitative risk assessments. Implemented growth plan to expand staff from 2 full-time and 2 contract personnel to 7 full-time and 4 contract personnel.

July 1995 to February 1996. Premier Consulting Services (Triconex Corporation) – Senior Risk Analyst.

Responsible for quantitative risk assessment projects. These projects required the use of fault tree analysis to assess the integrity and nuisance trip potential of safety instrumented systems. Projects also required the review of the design for compliance with standards and the development of recommendations for improving the design to meet customer performance targets.

September 1992 to July 1995. ENSR Development – Project Engineer.

Supervised laboratory research associated with the development of innovative technologies for the treatment of hazardous wastes. Wrote proposals and research plans for government and private industry projects. Directed the activities of laboratory technicians, ran advanced laboratory equipment, analyzed laboratory data, and developed research strategy for future work. Research included coal-fired power plant wastewater, oily sludge remediation, tetraethyl lead soil contamination, soil washing, and solvent extraction.

June 1991 to August 1992. Mississippi State University – Research Associate.

Established environmental research laboratory in the Department of Chemical Engineering. Wrote research proposals and supervised graduate student research. Performed waste minimization audits for small to medium sized businesses throughout Mississippi.

May 1989 to May 1991. Ethyl Corporation – Project Engineer.

Performed project engineering work from basic laboratory research to full-scale implementation. Utilized basic chemical engineering skills including chemical analysis, ASPEN modeling, equipment sizing, and project management.

PROFESSIONAL ORGANIZATIONS:

- American Institute of Chemical Engineers (AIChE), fellow grade
- Center for Chemical Process Safety (CCPS), fellow grade
- International Society of Automation (ISA), fellow grade
- American National Standards Institute (TAG Member)
- International Electrotechnical Committee (IEC)

COMMITTEE AFFILIATIONS:

- American Petroleum Institute
 - API 2350 (overfill prevention), member
- Center for Chemical Process Safety (CCPS)
 - Guidelines for Hazard Evaluation Procedures (2007), committee
 - Guidelines for Inherently Safer Processes (2007), peer reviewer
 - Guidelines for Safe and Reliable Instrumented Protective Systems (2007), committee, editor
 - Process Equipment Reliability Database, (2007), volunteer
 - Guidelines for Developing Quantitative Safety Risk Criteria (2008), committee
 - Guidelines for Engineering Design for Process Safety (2012), committee
 - Guidelines for Conditional Modifiers (2013), committee
 - Guidelines for Initiating Events and Independent Protection Layers (2015), committee
 - Guidelines for Safe Automation of Chemical Processes (2017), committee, editor
- International Society of Automation (ISA)
 - Standard & Practices Board, Managing Director (2003-2006)
 - TR84.00.02 (SIL Calculations), voting member, chair
 - TR84.00.03 (SIS asset integrity), voting member, editor
 - TR84.00.04 (SIS design and management), voting member, chair
 - TR84.00.05 (BMS analysis), TR84.00.07 (fire and gas systems), TR84.00.08 (wireless) and TR84.00.09 (security), voting member
 - ISA 84.91 series (control, alarms, and interlock management), voting member, chair (84.91.03)
 - ISA TR96.05.01 (automated testing), voting member
 - ISA 18.2 (alarm management), information member
- International Electrotechnical Commission - IEC 61508 (safety-related systems), IEC 61511 (SIS), IEC 62879 (human factors), and IEC 62682 (alarm management) committees
- International Standards Organization, ISO TC67 WG4: ISO 12489 (reliability calculations) and ISO 14224 (reliability data)

AWARDS AND RECOGNITION:

- 2022 ISA Celebrating Excellence in Standards
- 2022 ISA S&P Department Award
- 2022 Outstanding Adjunct, University of Houston – Clear Lake
- 2019 IEC 1906, honors experts whose work is fundamental to the mission of the International Electrotechnical Commission (IEC)
- 2019 Mississippi State University, Distinguished Engineering Fellow
- 2018 Recognized by Process Safety Progress as one of the Women in Process Safety
- 2015 ISA S&P Department Award, recognized for contribution to ANSI/ISA 84.00.04-2015 Part 1 and TR84.00.02
- 2014 Center for Chemical Process Safety (CCPS) Fellow
- 2014 AIChE Fellow
- 2012 ISA S&P Department Award, recognized for contribution to ISA 84.91.01-2012 and TR84.00.03
- 2011 TÜV Functional Safety Expert
- 2010 Best Paper, 2010 Process Plant Safety Symposium, AIChE
- 2010 Centennial Fellow, Department of Chemical Engineering, The University of Alabama
- 2009 ISA Fellow
- 2009 College of Engineering, Distinguished Engineering Fellow, The University of Alabama
- 2008 Department of Chemical Engineering Fellow, The University of Alabama

- 2007 Process Automation Hall of Fame
- 2006 ISA S&P Department Award, recognized for contribution to ISA TR84.00.04
- 2005 Albert F. Sperry Founder Award, ISA.
- 2004 Service Award, Mary Kay O'Connor Process Safety Center.
- 2003 ISA S&P Department Award, recognized for contribution to ISA TR84.00.02
- 2000 Bill Doyle Award, Best paper, 2000 Loss Prevention Symposium, AIChE.

PUBLICATIONS:

- Angela Summers and Eloise Roche, "You Got LI-PL," Process Safety Progress, 44(4): 713-721, 2025.
- Kedar Kottawar, Jyoti Sharma, Angela Summers, and Eloise Roche, "Managing the Risk of Continued Operation with Out-of-Service SIS Devices," Process Safety Progress, 44(1), 2024.
- Angela Summers and Julia Bukowski, "What to do with your Maintenance Records for Instrumented Protection Layers," Process Safety Progress, 44(1), 2024.
- Julia V Bukowski, Angela E Summers, William M Goble, Rajeev Limaye, and Juan Gutierrez, "Using credible failure rates for SIS ensures process safety: A summary of the panel discussion," Process Safety Progress, 42(4):603-611, December 2023.
- Julia V Bukowski and Angela Summers, "Statistical concepts and data requirements for valid failure rate estimation," Process Safety Progress, 42(3):516-522, September 2023.
- Eloise Roche and Angela Summers, "Overcome the challenges of implementing safety instrumented systems for reactive processes," Process Safety Progress, 43(1): 138-143, September 2023.
- Maïder Estecahandy, Total Energies; Jon T. Selvik, University of Stavanger and NORCE; Jean-Pierre Signoret, Ex-Total Energies; Angela Summers, SIS-TECH; Stefan L. Isaksen, SAFETEC; Florent Brissaud, GRTgaz; Nicolas Clave, Total Energies, "Industry Application and Benefits of ISO/TR 12489 for Reliability Modelling and Calculation of Safety Systems," OTC-32468-MS, Offshore Technology Conference, Houston, TX May 1-4, 2023.
- "Choosing HIPS over PRD: It is more than risk reduction," Process Safety Progress, 41(1):191-194, March 2022.
- "Working under pressure: Managing overpressure hazards with high integrity protective systems," Process Safety Progress, 41(1):139-145, March 2022.
- Eloise Roche, "A Practical Approach to Preventing Systematic Error in the Maintenance of Instrumented Safeguards," Process Safety Progress, June 2020.
- Eloise Roche and Watson Dupont, "Beyond HAZOP - Analyzing Common Cause and System Scenarios," Process Safety Progress, June 2019.
- "Does your existing SIS get the job done?" Chemical Processing, <https://www.chemicalprocessing.com/articles/2018/does-your-existing-sis-get-the-job-done/>, July 2018.
- "Inherently Safer Automation," Process Safety Progress, 37(1), February 2018.
- Eloise Roche and Monica Hochleitner, "Introduction to functional safety assessments of safety controls, alarms, and interlocks: How efficient are your functional safety projects?" 392-398, 36(4), Process Safety Progress March 2017.
- Raymond (Randy) Freeman, "Evaluation of Uncertainty in Safety Integrity Level Calculations," Process Safety Progress, Vol 35, Issue 4, January 2016.
- Hui Jin, "Dependent, Independent, and Pseudo-independent Protection Layers in Risk Analysis," Process Safety Progress, 35(3), November 2015.
- "Risk Assessment Challenges to 20:20 Vision," Process Safety Progress, 34 (2), pp 119-125, June 2015.
- "Bhopal Revisited: Sharing Stories," Process Safety Progress, 33 (4), p 312, December 2014.
- "See Risk More Clearly" Chemical Processing, 76 (11), pp 32-37, November 2014.
- "The Next Step Change in Process Safety" Chemical Engineering, 121, (10), pp. 53-58, October 2014.
- "Safety control, alarms, and interlocks as IPLs," Process Safety Progress, 33 (2), pp 186-194, June 2014.
- Author's Response to the letter to the editor, Process Safety Progress, 31(4), pp. 239, December 2012.

- William Vogtmann and Steve Smolen, "Consistent consequence severity estimation," *Process Safety Progress*, 31(1), pp. 9–16, March 2012.
- William Hearn, "Risk criteria, protection layers, and conditional modifiers," *Process Safety Progress*, 31(2), pp. 139–144, June 2012.
- "Centralized or distributed process safety," *Intech*, November 2011.
- "Don't Fall for Safety System Myths," *Chemical Processing*, November 2011.
- "Improving PHA/LOPA by consistent consequence severity estimation," *Journal of Loss Prevention in the Process Industries*, 24 (6), pp. 879-885, November 2011.
- William Hearn, "Overfill protective systems – Complex problem, simple solution," *Journal of Loss Prevention in the Process Industries*, 29 (4), September 2010.
- "Overfill protective systems – Complex problem, simple solution," *Journal of Loss Prevention in the Process Industries*, 23 (6), pp 781-783, November 2010.
- "Don't Underestimate Overfilling's Risk" *Chemical Processing*, pp 30-33, August 2010.
- "Safety Management is a Virtue" *Process Safety Progress*, 28 (3) pp. 210-13, September 2009.
- "What is a Safety Instrumented System" *Process Safety Beacon*, July 2009.
- "Safe Automation Through Process Engineering," *Chemical Engineering Progress*, 104, (12) pp. 41-47, December 2008.
- "Quality Assurance in Safe Automation" *Process Safety Progress*, 27(4), pp. 323-327, December 2008.
- Michela Gentile, "Cookbook versus Performance SIS Practices," *Process Safety Progress*, 27(3), pp. 260-264, September 2008.
- "Keep Operations Safe," *Chemical Processing*, pp. 32-36, August 2008.
- "IEC 61508 Product Approvals—Veering Off Course," *ControlGlobal.com*, <http://www.controlglobal.com/articles/2008/187.html>, July 2008.
- "Alternative Approach to Wellhead Flowline-Pressure Protection," *Journal of Petroleum Technology*, pp. 69-70, February 2008.
- "Conversation with a Guru of Safety Systems," *Automation World*, p. 54, November 2007.
- "Value at Risk Perspective on Layers of Protection Analysis," *Trans IChemE, Part B, Process Safety and Environmental Protection*, 85(B1): pp. 81–87, 2007.
- "Achieve Continuous Safety Improvement," *Chemical Processing*, pp. 33-37, April 2007.
- "The Evolution of Plant Automation," *Control Global*, pp. 53-55, February 2007.
- Michela Gentile, "Random, Systematic, and Common Cause Failure: How do you manage them?" *Process Safety Progress*, 25(4), pp. 331-338, December 2006.
- "SIS Expert Answers 5 Key User Questions," *Flow Control*, XII(11), pp. 14-16, November 2006.
- "Meet SIS 'User Approval' Mandates," *Chemical Processing*, pp. 44-46, May 2006.
- "IEC 61511 and the Capital Project Process – A protective management system approach," *Journal of Hazardous Materials*, 130, 2006.
- "Can You Safely 'Grandfather' Your SIS," *Chemical Processing*, pp. 42-44, August 2005.
- "The Grandfather Clause is Not a Fat Man in a Red Suit," *Global Control*, pp. 68-70, August 2005.
- "Bhopal: Could it Happen Again?" *Hydrocarbon Processing*, Guest Editorial, March 2005.
- "Perspective on ANSI/ISA 84.00.01-2004 (IEC 61511): An Emerging International Consensus Standard," *Hydrocarbon Processing*, June 2004.
- "Consider HIPS for Reactive Processes," *Chemical Processing*, pp. 33-37, March 2004.
- "Safety Standards Harmonize: Comparing European and U.S. Safety Standards," *Intech*, p. 21, January 2004.
- "Introduction to Layers of Protection Analysis," *Journal of Hazardous Materials*, 104 (2003).
- "Partial Stroke Testing A Cost-Effective Alternative," *InTech*, p. 54, February 2003.
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- "Software Implemented Safety Logic," *Process Safety Progress*, 21(2), pp. 161-163, June 2002.
- "Bridging the Safe Automation Gap Part 2," *Hydrocarbon Processing*, pp. 57-60, May 2002.

- "Bridging the Safe Automation Gap Part 1," Hydrocarbon Processing, pp. 85-87, April 2002.
- "A Real Danger to the HPI-Congress," Hydrocarbon Processing, March 2002.
- "The Real Danger," editorial, Houston Chronicle, January 13, 2002.
- "Fault Management Analysis," Process Safety Progress, 20(3), pp. 204-207, November 2001.
- "Setting the Standard for Safety Instrumented Systems," Chemical Engineering, 107(13), pp. 92-94, December 2000.
- "Partial Stroke Testing of Valves," Control Engineering, pp. 87-89, November 2000.
- "Using Instrumented Systems for Overpressure Protection," Chemical Engineering Progress, pp. 65-68, November 2000.
- "Path to S84 Compliance," Guest Editorial, Factory Mutual Newsletter, July 2000.
- "Safety Requirements Specifications in a Capital Project Environment," Control Engineering, May 2000.
- "Viewpoints on ISA TR84.0.02-simplified methods and fault tree analysis," ISA Transactions, 2000.
- "Why use safety integrity levels?" Intech, p. 74, March 2000.
- "Understanding Safety Integrity Levels," Control Engineering website, February 2000.
- "The next generation for overpressure scenarios," Intech, pp. 65-66, January 2000.
- "Managing Risk Improves Production," Control Engineering, p. 30, December 1999. December 1999 website contains full publication.
- "Safety Can Go Wrong Fast," Intech, pp. 40-42, November 1999.
- "Safeguard Safety Instrumented Systems," Chemical Engineering Progress, 95(11) pp. 85-90, November 1999.
- "Common Cause and Common Sense, Designing Failure Out of Your Safety Instrumented Systems (SIS)," ISA Transactions, 38, pp. 291-299, 1999.
- "Draft IEC 61508 Target Safety Integrity Level," Australian Journal of Instrumentation and Control, pp. 9-13, July 1999.
- "Is Your SIS 'Grandfathered?'," Chemical Engineering Progress, pp. 39-42, May 1999.
- "Are Your Instrumented Safety Systems Up to Standard?," Chemical Engineering Progress, pp. 55-58, November 1998.
- "Techniques for Assigning A Target Safety Integrity Level," ISA Transactions, 37, pp. 95-104, 1998.

BOOK PUBLICATIONS:

- Chapter, Safety Instrumented Systems, Perry's Handbook of Chemical Engineering, 9th edition, 2018. Also, 8th edition 2007.
- Chapter, Safety Instrumented Systems, Kirk-Othmer Encyclopedia, 2018. Also, 2009.
- Book, Guidelines for Safe Automation of Chemical Processes, 2nd edition, Center for Chemical Process Safety, American Institute of Chemical Engineers, 2017.
- Chapter 13, "Control Systems," Lee's Loss Prevention in the Process Industries, 4th edition, 2012, Also 3rd edition 2005.
- Book, Guidelines for Safe and Reliable Instrumented Protective Systems for Chemical Processes, Center for Chemical Process Safety, American Institute of Chemical Engineers, 2007.
- Chapter, "Partial Stroke Testing of Block Valves," Instrument Engineers Handbook, Volume 4, Chapter 6.9, 2006.
- Chapter, "High Integrity Pressure Protection Systems (HIPPS)," Instrument Engineers Handbook, Volume 3, Chapter 2.6, 2003.

PATENTS:

- Apparatus and Method for On-Line Detecting of Leaky Valve Seals and Defective Flow Diverters, Patent No. 7,107,822 B2, September 19, 2006, Angela Summers and Bryan Zachary.

- Method of Testing a Variable Function Voting Solenoid-Operated Valve Apparatus, Patent No. 6,862,914 B1, March 8, 2005, Angela Summers and Bryan Zachary.
- Dual Sensor Process Temperature Switch having a High Diagnostic One-Out-of-Two Voting Architecture, Patent No. 6,965,840 B2, November 15, 2005.
- Apparatus and Method for On-Line Detection of Leaky Valves and Defective Flow Diverters, Patent No. 6,820,465 B2, November 23, 2004, Angela Summers and Bryan Zachary.
- Variable Function Voting Solenoid-Operated Valve Apparatus and Testing Method Therefor, Patent No. 6,722,383 B2, April 20, 2004, Angela Summers and Bryan Zachary.
- Dual Sensor Process Pressure Switch Having a High-Diagnostic One-Out-of-Two Voting Architecture, Patent No. 6,704,682 B2, March 9, 2004, Angela Summers and Bryan Zachary.
- Apparatus and Method for On-Line Detection of Leaky Valves, Patent No. 6,550,314 B2, April 22, 2003, Angela Summers and Bryan Zachary.
- Two Out of Three Voting Solenoid Arrangement, Patent No. 6,435,202, August 20, 2002, Bryan Zachary and Angela Summers.
- Two Out of Three Voting Solenoid Arrangement, Patent No. 6,155,282, December 5, 2000, Bryan Zachary and Angela Summers.

ACADEMICS:

- Dissertation committee, Hui Jin, A contribution to reliability assessment of safety-instrumented systems, Norwegian University of Science and Technology, Trondheim, Norway, 2013.
- Dissertation committee, Mary Ann Lundteigen, Safety Instrumented Systems in the Oil and Gas Industry: Concepts and methods for safety and reliability assessments in design and operation, Norwegian University of Science and Technology, Trondheim, Norway, 2009.
- Dissertation committee, P.D. Fick, Control Systems Trip Management in the Chemical Industry, North-West University, Potchefstroom, South Africa, 2008.

EDUCATIONAL BACKGROUND:

- Ph.D., Chemical Engineering, University of Alabama, 1993
- M. Engr., Environmental Systems Engineering, Clemson University, 1987
- B.S., Chemical Engineering, Mississippi State University, 1985
- Licensed Professional Engineer, State of Texas