



## SUMMARY

Over 40 years' experience in materials technology, process safety management, and risk analysis. Managed and conducted hundreds of failure analysis/incident investigations, fitness for service projects and risk/safety assessments. Experienced in hazard identification and probability/consequence analysis, particularly as it relates to crisis and asset integrity management for the petroleum and chemical industries (both upstream and downstream) and the power industry. Equipment experience in power plants, chemical plants refineries, and pipelines. Recently specialized in implementing Risk Based Inspection (RBI), Mechanical Integrity (MI) and Flange Leak Reduction Programs. Provide software independent and software specific training on RBI and Leak Management and Bolting Technology.

## EDUCATION AND LICENSES

- MS, Materials Science
- BE, Mechanical Engineering, Materials Science Option
- Professional Engineer

## PROFESSIONAL EXPERIENCE – Some Example Projects

### Risk Based Inspection and Mechanical Integrity Projects

- Methanol – Implemented fixed equipment, piping and relief valve RBI program for Atlantic Methanol in Equatorial Guinea.
- MTBE – Conducted extensive investigations into performance and failures in bellows expansion joints at SuperOctanos in Venezuela; subsequently assisted Global Octane in Houston with spring hanger/support walk downs and audits.
- PTA – Directed implementation of RBI project (vessels and piping) for Tennessee Eastman Chemical Company.
- VCM – Implemented Mechanical Integrity Program for Taiwan Vinyl Chloride Monomers Plant, also assisted with root cause investigation and QC support on cracking in oxy-hydro chlorination reactors.
- Polystyrene – Implemented RBI program for Huntsman's Styrene plant in Melbourne Australia
- Ammonia – Utilized RBI technology to develop plant specific failure frequency data for use in siting calculations for Terra.
- Ethylene and Ethylene Glycol – Incident investigation of flare line failure, investigation of weld quality integrity, world wide survey of ethylene plant experience with the need to do internal inspections. Brittle fracture and auto-refrigeration investigations of risk associated with vessels that either had experienced auto-refrigeration events, or needed to confirm ability to perform intended function in a safe and reliable manner. RBI program for BP chemical plant. Sasol Lake Charles La, ethylene unit pilot RBI project.
- Polyethylene and polypropylene – Set up RBI programs for various chemical plants. Mechanical Integrity Program Review/Audit of Chemical plant in Venezuela work included a critical assessment of the application and use of RBI technology at that plant.
- Gas Plants – RBI programs for Occidental Petroleum gas plant and pipelines. RBI analysis of BOC gas plant fixed equipment. RBI analysis of four of BP's deepwater platforms: GOM; Nakika, Horn Mountain, Thunder Horse and Mad Dog.
- Refineries – Broken Hill Proprietary (Hawaii), Engen (South Africa), Yukong (Korea), Orion, National Cooperative Refinery Association (NCRA), Hunt Refining, Williams Refining, British Petroleum, et. al. Turnaround planning for fixed equipment using RBI. Set up RBI program for Sincor Coker solids handling equipment. Pressure boundary flange joint technical consulting, procedures and quality control during refinery turnarounds.
- Year 2006 Refinery-wide facilitation and development of "Process Stream and Corrosion Analysis", i.e. identification of damage mechanisms, development of corrosion loops and documentation of process conditions for RBI consequence analysis at NCRA.

Other Projects

- Sub-Sea Pipeline – Oman to India financial risk analysis for construction and operations
- Resolution of bolting integrity Issues and crane hook failure analysis for Global Santa Fe.
- Incident investigations and failure analysis, e.g. degradation and failure of Incoloy 800H metal bellows, failure of low alloy extruder flange bolts, metal bellows failure due to carbon wedging
- Fitness for service analysis of cracked flanges, stainless steel piping and towers due to external chloride stress corrosion cracking, local wall thinning in carbon steel pressure vessels.
- Created APTECH's RBI program and software and assisted with development of Plant Life Extension Program for Chemical Plants.

**CHRONOLOGICAL WORK HISTORY**

- 2004 to Present** **Augustus Professional Engineers & Associates, LLC**, Houston TX, Senior Consultant. President and Owner of Sell-Manage-Execute Consulting Practice.
- 2001 – 2004** **RBIT Consulting, LLC**, Houston. TX, Principal Consultant, Vice President and Owner responsible for Operations, including Business Development, Marketing, and Management of all Projects.
- 1988 – 2001** **APTECH Engineering Services, Inc.**, Houston TX, Principal Engineer. Director of Houston Office and Petroleum and Chemical Business Unit reporting to the President. Annual revenues \$2.5M.
- 1986 – 1988** **Tennessee Valley Authority**, Knoxville, TN, Assistant Branch Chief Materials Technology. Supervised 25 professionals and Singleton Materials Laboratory 15 professionals and technicians (metallurgy, welding, nde, coatings, concrete, environmental, etc.). Support to nuclear, fossil, and hydroelectric power.
- 1985 – 1986** **Tennessee Valley Authority**, Knoxville, TN, Specification Improvement Program Manager. Managed \$6.5M project to improve Nuclear Construction and Maintenance Specifications, reported to Director of Engineering. Letter of Commendation from TVA's Vice President of Nuclear Power.
- 1979 – 1985** **Tennessee Valley Authority**, Knoxville, TN, Manager Codes Standards and Materials Group. Responsible for resolution of pervasive materials related issues.
- 1973 – 1978** **Tennessee Valley Authority**, Knoxville, TN, Metallurgical Engineer Codes Standards and Materials Group. Responsible for review and approval of Nuclear Steam Supply System specifications and fabrication procedures, supervised numerous failure and fitness for service analyses, provided cost effective resolution of a 100's of nonconforming conditions. Development of ASME code solutions, e.g. code case for repairs and assessment of damage to bellows assemblies for nuclear applications

**SELECTED PUBLICATIONS – Some Examples (Published and Un-Published)**

- Chemical Manufacturers Association's Mechanical Integrity Guideline Manual
- Weld Repair of HSST Program Vessel V-7
- Electric Power Research Institute Manual on Good Bolting Practices
- Alternatives to Replacement of Damaged Bellows Expansion Joints
- Overview of Issues Related to Nuclear Bolting Applications
- Stress Corrosion Cracking of Fasteners Used In Support Applications
- Development of Site and Equipment Specific Probability of Failure Frequency Data for Quantitative Siting Calculations
- Cost Benefits of Risk Based Inspection Programs
- Integrating High Density AST Bottom Scanning and Risk Based Inspection
- Implementation and Creation of Huntsman Chemical Companies Risk Directed Inspection Program

**SELECTED COMMITTEE ACTIVITIES**

- ASTM A-1 and F-16 Committees, Member and Secretary to F-16 Sub-committee on Structural Fasteners
- Atomic Industrial Forum Subcommittee on Materials (AIF), Chairman. Responsible for development and implementation of strategy to resolve Generic Safety Issue on Bolting Degradation and Failure in U.S. Nuclear Plants to the satisfaction of the NRC
- Bolting Technology Council, Board of Directors and Founding Vice-Chairman
- Atomic Industrial Forum Committee on Nuclear Plant Life Extension - Vice Chairman (Codes and Standards), assisted development of technical rules for re-license of nuclear plants beyond 40 years.
- Electric Power Research Institute, Systems and Materials Task Force
- Present Member ASME and NACE