Structural Integrity Associates, Inc.®

Experts in the prevention and control of structural and mechanical failures

FOSSIL POWER ■ NUCLEAR POWER ■ RENEWABLE POWER ■ OIL & GAS

ABOUT STRUCTURAL INTEGRITY ASSOCIATES, INC.

Structural Integrity Associates, Inc. is a leading engineering consulting company that prides itself on our vision, continuous innovation and fully integrated services to the energy and utility power sectors. One marked by creative approaches to structural evaluation and repairs, as well as development of increasingly sophisticated computer-based tools reflecting a unique blend of technical expertise with the latest computer and expert system technologies. This is evidenced by our innovative leadership on:

CORPORATE SNAPSHOT

- Employee-owned company founded in 1983 in San Jose, CA

- Branch offices throughout the US and Canada as well as overseas affiliates

- 250+ employees providing consistent innovation, value solutions, & uncompromising service for over 25 years

CUSTOMIZED SOLUTIONS

- Aging management of PWR vessel internals under the EPRI® Materials Research Program
- **BIoGeorge**™ for Microbiologically Influenced Corrosion
- Buried Piping Integrity Initiative
- Co-developed economics-based risk assessment method for boiler tube failures
- Developed a plant chemistry assessment program and conducted a number of plant assessments
- Distribution Integrity Management Program (DIMP) development and implementation support
- Flaw evaluation procedures & acceptance standards for ASME Nuclear Inservice Inspection Code
- Hydrogen water chemistry (HWC) and co-patented zinc injection for stress corrosion cracking mitigation in BWRs
- IGSCC test program for the BWR industry
- Leader in HDPE for NDE Services

SOFTWARE DEVELOPMENT

- Life prediction software, including NRC's PRAISE probabilistic fracture mechanics-based software for nuclear reactor piping
- MAPPro™ software for expediting data management, risk modeling, decision-making, and process documentation
- pc-CRACK 4.0 for analyzing and predicting flaw behavior, including calculation of crack growth rates and critical crack sizes for pressure vessels, piping, steam turbines, and structures
- Pioneered the implementation of Integrity Management written procedures, data integration, HCA identification, code interpretation, and risk minimization practices and algorithms – including participation in the development of API 1160 and several NACE Direct Assessment standards
- Viper/Viper-Noz/Viper-WR to determine probability of failure for reactor pressure vessel welds and nozzles
- Developed for the U.S. NRC, WinPraise can analyze crack initiation and growth caused by fatigue, primary water stress corrosion, intergranular stress corrosion, & flow-accelerated corrosion
- SI-MiniDAS™; high-speed, automated SI-VersaDAS™; and real-time TTVMS™ (Transient Torsional Vibration Monitoring System) are proprietary customizable data acquisition systems that collect and analyze vibration data

EPRI COAUTHORED SOFTWARE/PROGRAMS

- EPRI BLESS code for headers and pipes
- EPRI Creep-FatiguePro™ and Boiler computer codes for real-time creep-fatigue monitoring
- EPRI LPRimLife™ computer code for assessment of low pressure turbine rotor blade attachment dovetails
- EPRI RRing-life for assessment AC generator rotor retaining rings
- EPRI TULIP continuum creep damage mechanics-based software

We're proven in applications ranging from R&D to engineering, metallurgy, and nondestructive testing; from nuclear and fossil-fueled power plant support to oil and gas transmission pipeline applications, and renewable energy sources such as hydro, geothermal and wind generation.

OUR INDUSTRY EXPERTISE

Leading the industry with over 200 industry-recognized experts and technical staff for over 25 years, Structural Integrity has offices throughout the US and Canada, as well as affiliates in China, Korea, Spain, and Taiwan to better serve you and your company's needs. Our experts average over 15 years experience in their field and are heavily involved in Energy Industry Associations and Committees.

ASSOCIATIONS

- American Nuclear Society
- American Society for Materials, the National Association of Fire Investigators, and the Coastal Conservation Association
- American Society of Mechanical Engineers
- ASME Boiler and Pressure Vessel Code Committees on Materials (II), Unfired Pressure Vessels (VIII) and Welding (IX)
- ASME Code B31.1 Operations and Maintenance and Materials Subgroups
- ASME Code, Section XI Task Group on Group Erosion-Corrosion
- ASME Research Performance Test Codes Committee
- ASME Section III Working Group on Piping; Subgroups Design, Fatigue Strength, Design Analysis, PVRC Subcommittee on Dynamic Stress Criteria
- ASME Section VIII, the High Pressure Systems Committee, and the Special Working Group on High Pressure Vessels (Section VIII Division 3)
- ASME Section XI Working Group on Flaw Evaluation
- ASME Section XI, Working Group on Welding
- American Society for Nondestructive Testing
- ASNT Level III Certification in Ultrasonic and Eddy Current Testing
- Certified Fire and Explosion Investigator
- Charlotte ASNT Board of Directors
- Design Basis Reconstitution
- EPRI, MRP and BWRVIP programs and reports
- HPRCT Committee
- NACE International Unit Committee on Corrosion in Geothermal Systems
- Project Management Institute
- Secretary and Honorary Fellow for the International Association for the Properties of Water and Steam (IAPWS)
- Senior Reactor Operator Management Certification
- Task Group on Fatigue in Operating Plants U.S. Environmental Protection Agency on implementation of the Safe Drinking Water Act in Pennsylvania
- Technical Papers Committee for AWS International
- Kepner-Tregoe® Problem Solving & Decision Making program leader
- Working Group on Risk-based Inspection and Sub-Group Water Cooled Systems

EDUCATION

- Adjunct Associate Professor of Metallurgical Engineering, University of Utah
- Adjunct Professor, Colorado School of Mines
- Board of Advisors for University of North Carolina Charlotte, William States Lee College of Engineering
- CA and IAEA certified LWR corrosion control training instructor

CORPORATE MILESTONES

- 1983 – Company Founded in San Jose, CA
- 1985 – Opened Infometrics; NDE Products Business in Washington, DC Area
- 1989 – Opened Fossil Plant Services in Uniontown, OH
- 1991 – Acquired IST, Inc. and Focused Array UT Inspection Technology in Ft. Lauderdale, FL
- 1995 – Opened Charlotte, NC Office
- 2000 – Opened Denver, CO Office
- 2002 – Opened Materials Science Center in Austin, TX Office
- 2002 – Opened Stonington, CT Office
- 2004 – Acquired GWT Technology; Opened Pipeline Services Group
- 2005 – Opened Structural Integrity Canada in Toronto, Ontario
- 2007 – Opened Structural Integrity Expert Solutions in Salt Lake City, UT
- 2008 – Opened Chattanooga, TN Office
- 2008 – Structural Integrity celebrates 25 years in business

FOSSIL PLANT SERVICES

Structural Integrity provides integrated solutions to the fossil power generation industry, assisting in the management of critical plant assets including boilers, high energy piping systems, turbines, generators, and balance of plant equipment. Structural Integrity solutions are provided by focused application and balanced integration of materials knowledge, engineering expertise and specialized nondestructive examination technologies. Metallurgical analysis supporting these activities are conducted at Structural Integrity's Materials Science Center located in Austin, Texas. Application-specific inspection techniques are developed internally by our NDE Applications Group, and are implemented by Structural Integrity's Technical Support Unit, both of which are located in Charlotte, North Carolina. Some areas of expertise provided in the fossil plant services industry include:

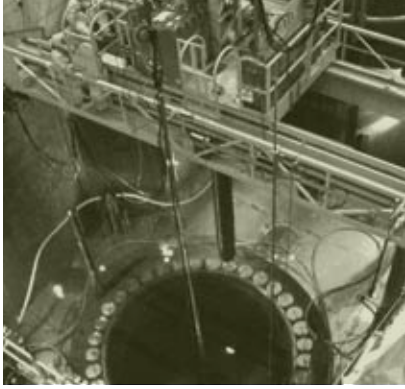
ENGINEERING PROGRAMS AND SOLUTIONS

- Boiler Tube Failure Reduction Programs
- Component Database Management
- Component Evaluations and Damage Mechanism Identification
- Combined Cycle Plants / HRSG Assessments and Reliability Studies
- Engineering Analyses
- Flow Assisted Corrosion Programs and Assessments
- High Energy Piping and Header Evaluations
- Materials Evaluation and Testing
- On-Line Monitoring
- Outage Planning and Support
- P91 and Other Advanced Materials Evaluations
- Repair Design, Oversight and Implementation
- Turbine and Generator Assessments

NONDESTRUCTIVE TESTING SERVICES

- High Energy Piping Inspections
  - Girth and Seam Welds
  - Weld UT in lieu of RT
- High Energy Header Inspections
  - Girth and Seam Welds
  - Header Ligament and Stub Tube Weld Cracking
- Boiler Tubing Inspections
  - Butt Weld; UT in lieu of RT
  - Dissimilar Metal Welds
  - Oxide Scale Measurement
  - Hydrogen Damage
  - Corrosion Fatigue Cracking
- Guided Wave Ultrasonic Testing of Tubing and Piping Systems
- Flow Assisted Corrosion Inspections
- Turbine/Generator Inspections
  - Turbine Rotor Bore and Solid Rotor Examination
  - Turbine Disc Bore/Keyway and Blade Attachment Examination
  - Turbine Blade Tenon Examination
  - Generator Retaining Ring Examination
  - Generator Rotor Tooth-Top Dovetails; TIL-1292 Ultrasonic Inspections without disassembly
  - Generator Rotor Coupling Keyway; TIL-1516 Ultrasonic Inspections without disassembly
  - Valve and Turbine Casing Damage Characterization

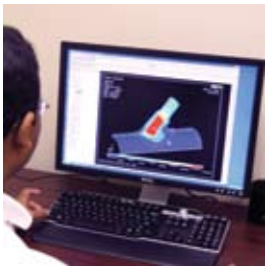
NUCLEAR PLANT SERVICES



Structural Integrity provides consulting solutions to the world-wide nuclear utility industry related to the overall management of critical plant components. We provide these services through application of our multi-disciplinary approach including stress analysis, fatigue, fracture mechanics, metallurgy and materials, advanced nondestructive testing, thermal hydraulics, and systems engineering. A partial listing of our Nuclear Plant offerings include:

ENGINEERING PROGRAMS AND SOLUTIONS

- ASME Code Evaluations
- BWR IGSCC
- Buried Piping Programs
- Candu Reactor Solutions
- Cathodic Protection Surveys/ Evaluations
- Component Repair/ Replacement Designs
- Fabrication Oversight/ 3rd Party Reviews
- Fatigue Monitoring and Analysis
- High-Density Polyethylene (HDPE)
- License Renewal Services
- New Plant Services
- PWR Alloy 600/PWSCC
- Reactor Vessel Integrity
- Risk Based Programs
- Root Cause Analysis
- Turbine and Generator Assessments
- Vibration Monitoring and Analysis



NONDESTRUCTIVE TESTING SERVICES

- Appendix VIII, Supplement 2 & 3; Austenitic/Ferritic Piping Inspection
- Appendix VIII, Supplement 4 & 6; Vessel Shell Inspection
- Appendix VIII, Supplement 10; Dissimilar Metal Weld Inspection
- Appendix VIII, Supplement 11; Weld Overlay Repair Inspection
- ASME Section XI Code Case N-659-1; UT in lieu of RT
- Guided Wave Ultrasonic Testing of Piping Systems
- Level III Consulting Services / Third Party Inspection Oversight
- Comprehensive Turbine and Generator Inspections (see Fossil Plant Services)

In addition to the above NDT service listing, Structural Integrity is highly adept at creating, demonstrating and qualifying, as needed, customized NDT solutions for its clients.

PIPELINE SERVICES

Structural Integrity integrates expertise in materials degradation, structural mechanics and regulatory requirements with advanced inspection technologies to design and conduct assessments of difficult to access piping systems in the energy industry including buried or above-ground nuclear and fossil service-water systems, hydro and pump storage penstocks, and oil and gas transmission pipelines. Our pipeline integrity program approaches each opportunity from the owner's perspective, with the goal of accurately characterizing the situation through an integrated solution consisting of program development, risk assessment and ranking, quantitative inspection, materials evaluation, Geographic Information System (GIS) mapping, engineering analysis, and recommendations for remediation and mitigation. We provide the condition assessment necessary to help the owner make sound engineering decisions for the continued safe and economical operation of an aging pipeline component or entire system.

- Assessments of Difficult to Inspect and Buried Piping
- Cathodic Protection System Testing and Design
- Distribution Integrity Management Program (DIMP)
- External and Internal Corrosion Direct Assessment (ECDA and ICDA)
- Stress Corrosion Crack Direct Assessment (SSCDA)
- GIS Mapping and Spatial Data Analysis
- Guided Wave Ultrasonic Testing (GWT)
- Integrity Assessments of Early Generation Piping
- Pipeline Integrity Management Program Development and Implementation
- Metallurgical Analysis and Degradation Assessments
- Electro Magnetic Acoustic Testing (EMAT)
- Corrosion Rate Predictions
- Basic and Advanced Ultrasonic Testing

EXPERT SOLUTIONS

Through Expert Solutions, Structural Integrity can draw upon its entire staff to provide expert opinions to utility, industrial, legal, and insurance firms. Our professional staff provides technically-based, thoroughly researched and unbiased opinions on a timely basis. In the event it becomes necessary, Expert Solutions' staff is prepared and qualified to present these expert opinions in a comprehensive and instructive manner in court. Our staff has demonstrated experience and expertise with:

- Construction Claims
- Database Construction and Analysis
- Environmental Issues
- Mechanical, Electrical and Rotating Equipment Failure Analysis
- Metallurgical Failure Analysis
- Product Liability
- Utility Rate Case Testimony
- Utility Risk Management
- Nuclear Plant Solutions for CANDU Plants

RENEWABLE ENERGY SERVICES

Clients in the expanding renewable energy industry are increasingly recognizing the value that Structural Integrity can provide to address their unique needs in assessing and resolving issues with critical generating components. As in the fossil and nuclear generating sectors, in hydro generating facilities we provide an integrated, multi-disciplinary approach utilizing our full complement of proven engineering and inspection technologies for critical assets; including penstocks and turbine-generators. In addition, our technical staff has participated in the development and application of technologies to capture power from wind, geothermal, and solar sources for more than two decades. Relying upon this experience and knowledge, Structural Integrity is qualified and able to assist our clients with problem resolution, improved reliability, and reduced maintenance associated with these expanding technologies.

SOME OF THE TYPES OF SERVICES WE PROVIDE ARE:

- Assessments of Penstocks and Geothermal Piping Systems
- Assessments of Wind Turbines
- Cathodic Protection Evaluation and Design
- Design Reviews
- Development and Implementation of Custom Inspection Solutions
- Failure Analysis
- Flaw and Remaining Life Evaluations
- GIS Mapping and Spatial Data Analysis
- Guided Wave Ultrasonics Testing (GWT)
- Integrity Management Program Development and Review
- Materials Selection
- Risk Informed Inspections

TECHNICAL SUPPORT UNIT

NONDESTRUCTIVE EXAMINATION

Structural Integrity's Technical Support Unit (TSU) provides advanced nondestructive examination services (NDE) to the nuclear and fossil power industry. Our services are superior in the industry because of our combined use of more advanced tools, instruments and inspection technologies with materials knowledge and engineering expertise. TSU-NDE offers integrated solutions for asset management. Our areas of expertise include:

- Fossil Plant Component Assessments
- Turbine and Generator Component Assessments
- Nuclear Plant Component Assessments
- Transmission and Distribution Pipelines and Facilities
- Oil and Gas Facilities

Overseas Affiliates
B&W Tech - China
HOMATECH - Korea
Iberdrola - Spain
Flexarc Engineering - Taiwan

CANADIAN OPERATIONS

The Canadian Office is staffed by individuals with recognized industry expertise in all the markets served by Structural Integrity. The primary focus of this operation involves providing expertise and projects for Canadian clients drawing upon all resources available throughout the company, including:

- Fossil and Hydro Plant Services
- Nuclear Plant Services
- Pipeline Services

Structural Integrity Associates, Inc.®

877-474-7693
(877-4SI-POWER)

Visit our website at: ***www.structint.com***

Annapolis, MD	Austin, TX	Charlotte, NC	Chattanooga, TN	Chicago, IL	Denver, CO
410-571-0861	512-533-9191	704-597-5554	423-553-1180	815-648-2519	303-792-0077

Salt Lake City, UT	San Jose, CA	Stonington, CT	Toronto, Canada	Uniontown, OH
801-676-0216	408-978-8200	860-536-3982	905-829-9817	330-899-9753