



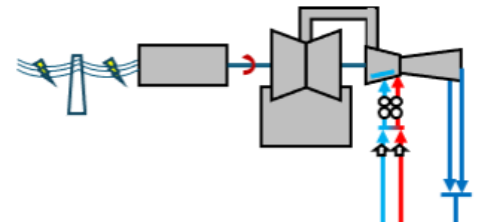
Structural Integrity
Associates, Inc.®

GAS AND STEAM PLANT OPERABILITY

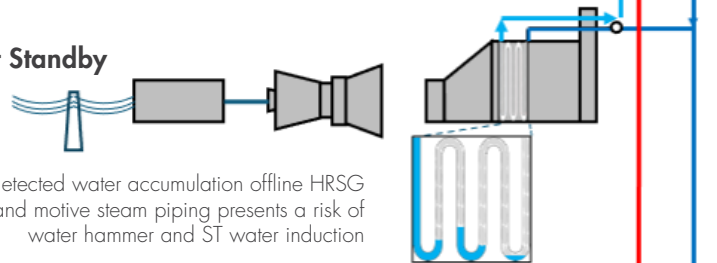
Structural Integrity's Gas and Steam Plant Operability Assessments provide a comprehensive view of plant systems including a comprehensive view of combined cycle and conventional plant systems including steam turbine generators (STGs), gas turbines generators (GTGs), heat recovery steam generators (HRSGs), high energy piping (HEP), and critical balance of plant components. Each assessment is custom tailored to identify risks, determine the cause of equipment damage, and / or provide recommended modifications to operating procedures, control logic, and equipment design. Our goal is to help operators optimize equipment life, reduce unplanned outages, and improve operational safety.



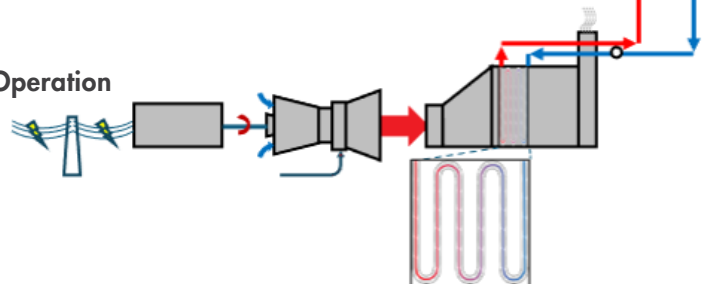
STG Block: In Operation



GTG Block: Hot Standby



GTG Block: In Operation



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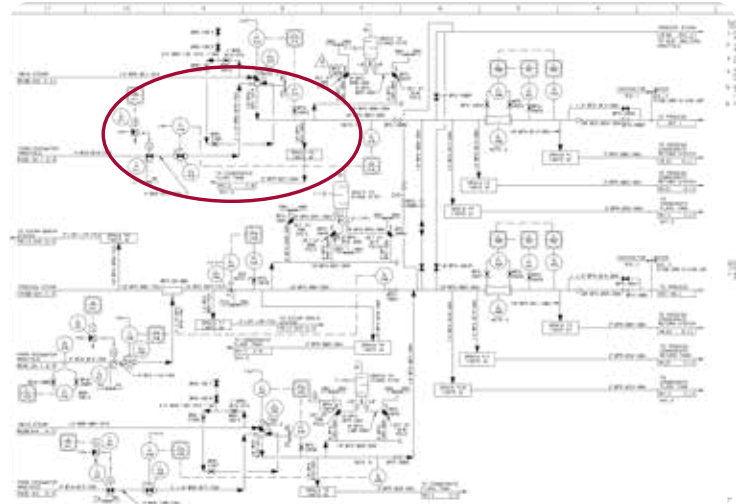
Site Visit, Walkdown, and Data Collection Scope

- Equipment and systems orientation.
- Controls configuration.
- Operator interviews.
- Walkdown based off P&ID or site configuration.
- Control system cabinet physical condition review.
- Documentation and material collection:
 - P&ID drawings
 - O&M manuals
 - Controls logic and schematic diagrams
 - Operations procedures
 - Electrical one-line diagrams
 - Management of Change (MOC) records
 - Maintenance records



Configuration and Operational Review Scope

- Perform a detailed review of equipment configuration to identify any risks based on operating profile and lack of or insufficient instrumentation for early risk detection.
- Perform a detailed review of the plant operational data from site historians and controllers.
- Review operational data with a focus on occurrences of specific events such as:
 - Startups
 - Shutdowns
 - STG operating to GT transition
 - Steady state operation
 - Load changes
 - Hydraulic trips
 - Overspeed testing (if available)



Controls Review Scope

- SI performs a thorough review of the controller logic that may present a risk to equipment, including:
 - Startup
 - Shutdown
 - STG operating, GT transition
 - Hydraulic trip
 - Unit overspeed protection
- A review of the process alarm management program.
- Assessment of the site quality assurance program effectiveness.



Protection Logic and Continuous Control Logic Physical Implementation Review

In this final phase, SI assesses the operational risks associated with the physical installation of protection and continuous control logic by reviewing instrumentation installation details and calibration settings, hard-wired logic implementation, and instrumentation redundancy.

Structural Integrity (SI) provides comprehensive, fully integrated solutions for life assessment, inspection, failure analysis, and online monitoring of gas turbines, steam turbines, generators, steam generation equipment, and plant auxiliaries. SI's multidisciplinary team has decades of experience, with a deep understanding of turbine-generator design, operation, maintenance, and industry issues. Our holistic approach ranges from proactive management plans to emergent issue analysis and inspections offering unprecedented value with an emphasis on maximizing the life of existing assets in a safe, risk-informed fashion.