High Energy Piping Programs & Solutions

A FULLY INTEGRATED APPROACH

A HIGHER LEVEL OF RELIABILITY®

ACUREN

HEP PROCESS MATRIX

Why have a HEP Program?

- Facilitate safe and reliable operation of high-temperature, high pressure piping systems
- Reduce the potential for catastrophic failures and potential downtime
- Mandated by some Jurisdictional authorities
- Covered Piping System (CPS) programs are required per ASME B31.1 Power Piping Code
- CSA B51 code requirement for High Energy Steam piping systems (HES)

Evaluation of Current Program

- Verification and discussion of the practices, procedures, processes and systems to assess the maturity of owner's current HEP program

Steps for Developing a HEP Program

- Circuitize relevant piping systems, as defined by B31.1/CSA B51 (i.e., define systems)
- Review previous inspection history, operating conditions, system excursions, modifications, and repairs
- Catalogue welds/ key components within each system
- Develop drawings of each system which identify inspection features and condition monitoring locations
- Perform walkdowns to visually inspect each system for evidence of mechanical or thermal distress
- Using various variables and consequence factors, develop a risk-based prioritization of components to inspect
- Develop short term & long term work scope packages, develop detailed inspection procedures including technologies, techniques, and data management requirements

Program Implementation

- Execution of the inspection work scope in accordance with the program requirements

Damage Mitigation and Repairs

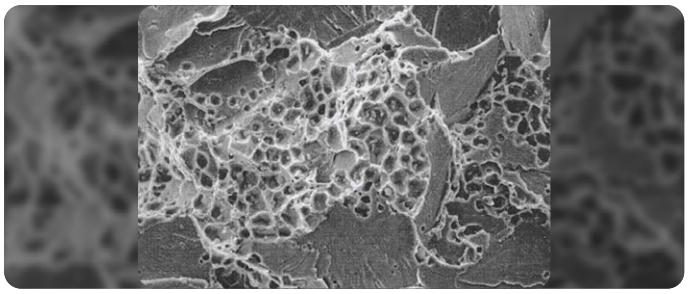
- Develop repair plans and procedures
- Remediation of HEP deficiencies

WHY ACUREN?

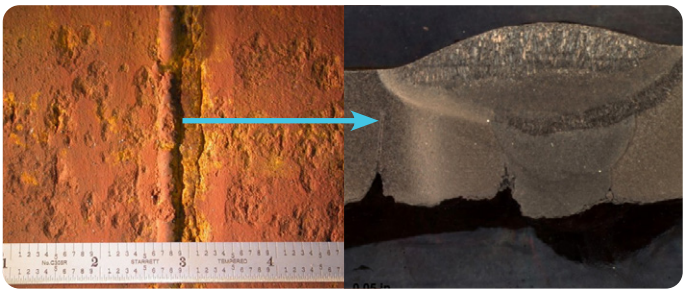
- A fully integrated approach, combining engineering, inspection, NDE, industrial trades and rope access services. Acuren leads the industry as the one true supplier that can be the single turnkey vendor to execute comprehensive HEP programs.
- Acuren innovation, advanced applications, and cutting-edge inspection solutions result in significant cost savings, reducing unnecessary mechanical scopes (insulation stripping only where required) or scaffolding, saving precious time and material waste while reducing exposure to potential hazards
- Leading provider of robust HEP programs, founded on sound engineering practice through unparalleled industry knowledge, leveraging decades of experience
- Rigorous training and competency programs for personnel
- Extensive safety and quality programs

Program Maintenance, Review, Continuous Improvement

- Risk calculation updated / revise long term work scope based on inspection results
- Continuous improvements in program throughout life-cycle



SEM examination revealed creep voids within a weld

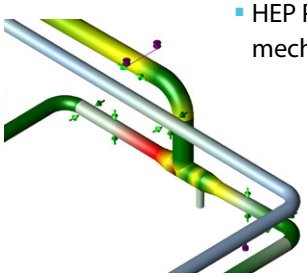


Corrosion-fatigue cracking in Cold Reheat Piping

Lab analysis found corrosion fatigue cracking to be 75% through-wall

Engineering Solutions & Asset Management Programs

- HEP Program Development
- Development, implementation and execution of Risk Based Inspection (RBI) programs
- In-situ & laboratory assessment assessment to identify high temperature damage mechanisms (creep, graphitization, etc.)
- Failure analysis performed by industry experts
- Fitness for service assessments (API 579)
- Repair plan development
- Piping stress analysis & finite elemental analysis (FEA)
- Field measurements for strain and vibration for design improvements
- Equipment condition assessments
    - NBIC/API 510/570



Piping stress analysis image to identify areas of concern

- HEP Programs target typical damage mechanisms including:
    - Creep
    - Fatigue
    - Overload due to elevated stresses
    - Flow-assisted corrosion (FAC)
    - Corrosion-Fatigue
    - Stress-corrosion cracking (SCC)
    - Graphitization

VISUAL INSPECTION SOLUTIONS

- Remote visual options (drones, cameras)
- Experienced visual inspectors perform external inspections of equipment:
    - Piping (API 570)
    - Pressure Vessels (API 510)
    - Boilers (NBIC, ABSA)
    - Structural (CWB, CWI)
    - Other
- Assess for HEP damage mechanisms
- Piping program management
    - Circuitization of piping
    - Develop of piping isometrics
    - Selection of suitable NDE method(s)
    - Selection of condition monitoring locations (CML's)

ROPE ACCESS & INTEGRATED SOLUTIONS

Rope Access Methods:

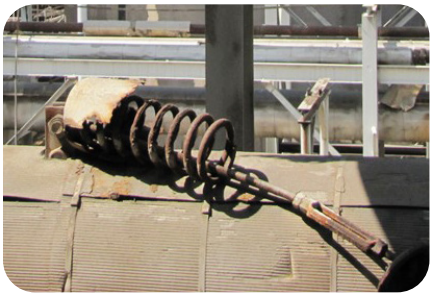
- Where scaffold or other means of access are not practical, Acuren can utilize rope access means to assess components
- IRATA & SPRAT certified organization
- All inspection, NDE and industrial services can be provided from ropes

Industrial Services:

- Journeyman/NCCER/PLUS certified (US) insulators
    - Insulation installation/removal/repairs including asbestos abatement
    - Lead/asbestos abatement
    - CML ports installed
    - Fireproofing
- Repairs/replacement
    - Welding & fabrication
    - Post-weld heat treatment
    - Weld repair inspection
    - Pipefitting
    - Support & hanger repairs, adjustments, and replacement

SPECIFIC TECHNIQUES FOR HEP PROGRAMS

- Magnetic Particle Testing (MT)
- Liquid Penetrant Testing (PT)
- Ultrasonic inspection methods
    - Traditional / automated UT
    - Phased Array (PAUT)
    - TOFD
- In-situ metallography
- Hardness Testing (HT)
- 3D laser scanning & modelling
- Positive Material Identification (PMI)
- Infrared Thermography (IR)
- Strain gaging
- Pulse Eddy Current (PEC)
- Radiography
    - Film-based
    - Real Time Radiography (RTR)
    - Computed/Digital Radiography (CR/DR)



Broken Hanger in HEP System


BEYOND INSPECTION
Acuren HEP experts can identify and predict where damage may occur to prevent untimely failures
VIEW OUR BROCHURES
ACUREN
CONTACT OUR HEP EXPERTS TODAY
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