

Piping System Assessment Program

A Complete Approach to Ensure Piping System Integrity

Stress Engineering Services, Inc. offers an all-encompassing approach to piping system integrity. The program comprises all necessary elements: a review of the design, a walkdown, analyses, inspections, evaluations, and documentation. The end result is a complete program for piping that maximizes life and minimizes risk. This approach is suitable for all piping systems, including covered piping systems (CPS) such as main steam and hot reheat lines (systems with high consequences of failure).

PIPING FAILURES CAN BE CATASTROPHIC

Piping systems are designed to ensure that pipe stresses and displacements operate within adequate safety margins. Piping failures can be expensive and can also place personnel at risk. Our engineering and materials experts regularly analyze piping failures stemming from:

- **Improper hanger operation (excessive deflection, broken hangers, improperly operating hangers)**
- **Fatigue (vibration-based and creep-based fatigue)**
- **Creep and creep rupture**
- **Flow-assisted corrosion (FAC)**

The goal is to avoid catastrophic failures.

A complete condition assessment of your piping can validate that the piping design is operating as expected, and also be used to establish the system's condition in terms of life, fitness for service, required inspection intervals, and expected future performance.

REGULATORY REQUIREMENTS

ASME B31.1 (Chapter VIII – Operation and Maintenance) requires a power piping fitness-for-service (FFS) program for CPS. This code has been adopted by over 35 US states and Canadian provinces. In 2016, the National Board Inspection Code Committee (NBIC) approved a ballot requiring piping systems to also be in compliance with B31.3.



Our experts examine hanger function and calibration. Engineering modeling ensures that reality matches predictions. Scoop sampling can be used to check material properties and look for damage.

We can assist in part, or your entire piping system assessment program:

Step 1: Collect and Review Design, Operating, Maintenance, and Inspection History.

Both new and old systems can be analyzed. Both hindcast and forecast damage can be predicted or measured.

Step 2: System Walkdown and Design Verification

Our experienced plant engineers examine all supports and hangers to verify that your modeled piping design matches reality. Often, a crucial part of this task is confirming hanger performance by our Rod-Load Measuring (RLM) system, an in-service measurement that determines piping loads without interrupting operation.

Step 3: As-Found Pipe Stress Analysis

Piping analysis based on real performance provides code checks and evaluates safe operations. Models examine hot and cold conditions, stresses, displacements, and fatigue.

Step 4: Creep Stress Analysis

Creep and fatigue damage are calculated along with remaining life using a detailed model. The approach is based on API 579-1/530 and Larson-Miller minimum and mean data.

Step 5: Appropriate Inspections

A condition assessment is typically conducted by one or more methods (e.g., Acoustic Emission Testing (AET), Field Metal Replication (FMR), Hardness Testing, or Scoop Sample Removal). This step provides valuable information regarding existing flaws, material properties, and the current state of the piping.

Step 6: Assess Need to Recalculate Models

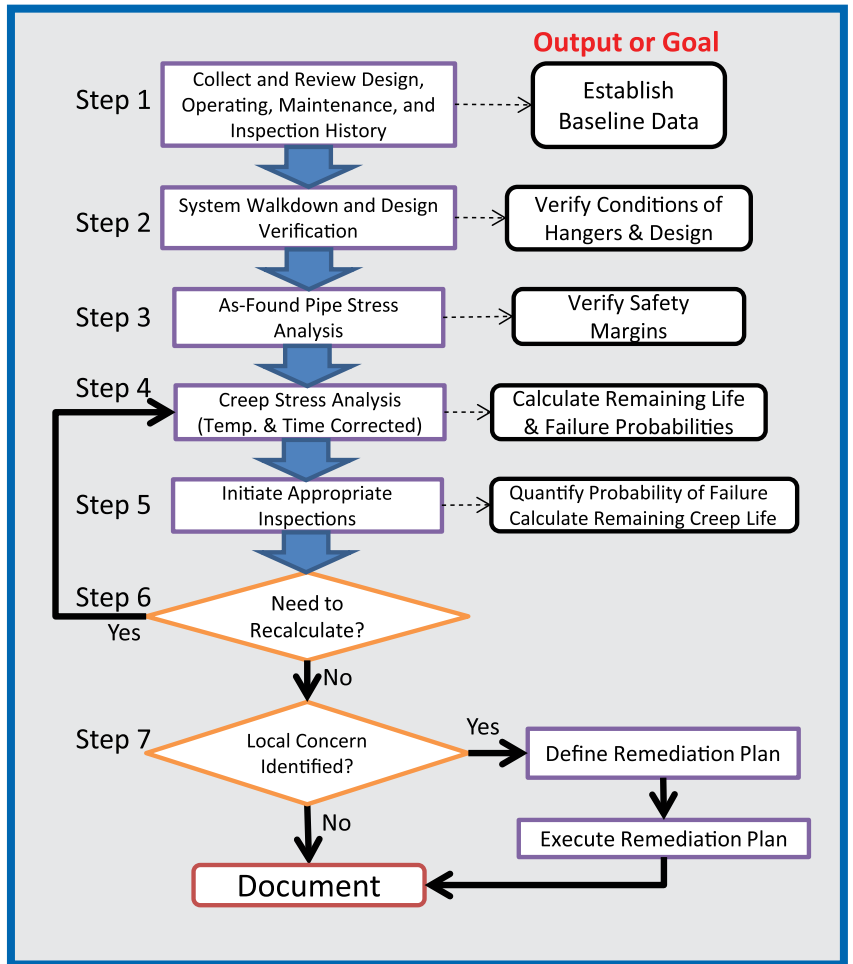
The results from Step 5 may create the need to recalculate the analysis or perform an FFS assessment.

Step 7: Examine Local Concerns

This activity includes the common run/repair/replace questions based on evaluations of flaws and codified safety margins.

Documentation

The above tasks are fully documented. This documentation is a vital part of record-keeping for a facility, particularly for creep situations and situations where operational conditions (especially time and temperature) significantly affect expected life. Once complete, the program provides a clear understanding of the state of your piping and the recommended inspection intervals based on the best practices available.



This is the most complete piping assessment package offered in the industry.



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