Out-of-Range Pipe Supports

KINECTRICS

Project Objective

Seismic issues can critically affect the operation of power stations and their systems, particularly pipework supports, which play a crucial role in maintaining safety and operational efficiency. In this project, a pipe support survey and audit conducted by Kinectrics revealed that two adjacent pipe supports were hitting their bottom stops, causing unintended restriction of movement and increased system stress. This situation, if left unresolved, could lead to increased wear and possible failure. The goal of this assessment was to evaluate the impact of this restriction and ensure the system's safe operation until the next outage, minimizing downtime and revenue loss.

Project Scope:

- The audit identified two supports at their bottom stops, leading to restricted movement and increased stress levels.
- Using historical and recent data, we compared observed and predicted displacements to determine the interference caused by the restricted movement.
- The modified system loads were evaluated to ensure they remained within safety margins. This analysis confirmed that the increased stresses would not exceed the system's safe life before the next outage.
- Based on the findings, we recommended that the reactor could safely return to service, with support replacement scheduled for the next outage to avoid costly delays and loss of generating capacity.

Location: United Kingdom

Technical Approach

1. Assessment of Pipe Support Interference: The first stage involved calculating the level of interference by comparing the predicted pipework displacements from computer pipework analysis to the observed movements. This analysis revealed inconsistencies between the design calculations and the actual movement of the supports during operation.

2. Modeling of Restricted Movement: The identified interference was incorporated into the computer pipework model. The supports that had bottomed were simulated by applying the calculated upward interference at each support point under normal and start-up conditions. This allowed for an accurate prediction of the impact on the pipe system's load and stress.

3. Analysis of Stress Ratios and System Loads: The modified pipework model was used to extract stress ratios and system moments at key welds during both normal operation and reactor start-up conditions. These values were compared to allowable limits as specified by the pipework codes and safe life assessments, ensuring that the system remained within safe operational parameters.

4. Comparison with Safe Life Limits: The analysis indicated a general increase in system loads and stress ratios in the modified scenario compared to the base case. However, the increases were minimal and did not exceed the safe life limits. The projected reduction in the safe life of the system was minor and would not impact operations before the next planned outage.

Value Added Results

Through careful analysis and simulation, Kinectrics successfully demonstrated that the pipe supports, despite bottoming out, posed no immediate risk to the safe operation of the reactor. The recommendations ensured that no costly delays were incurred, and the supports could be replaced during the next planned outage. Our ability to identify cost-effective solutions and prevent operational disruptions highlights their commitment to supporting the safe and efficient operation of critical infrastructure.

This project exemplifies Kinectrics expertise in managing complex operational challenges while minimizing client costs and downtime.