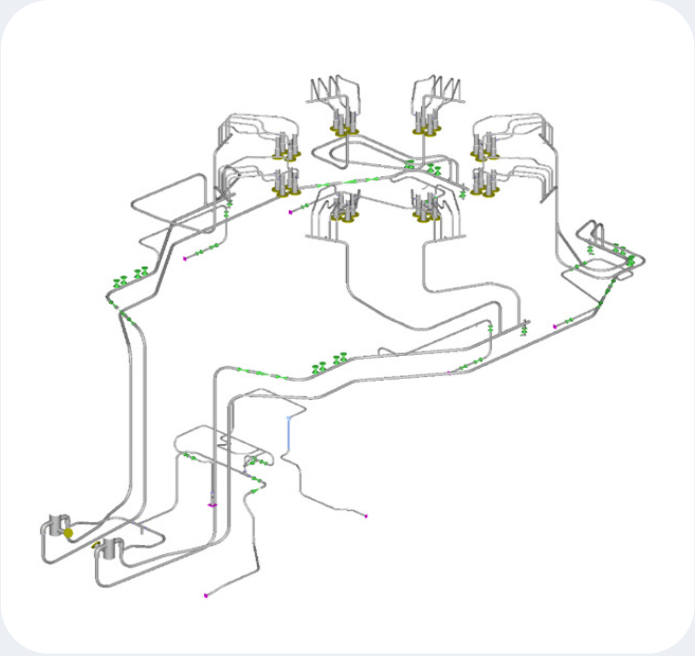
Consequences of Postulated Pipe Hanger Failure

KINECTRICS

Project Objective

Pipe hanger failure in high-temperature piping systems can lead to severe consequences, including increased stress on welds and components, ultimately resulting in premature creep damage. This project examines the consequences of a postulated pipe hanger failure within the context of Advanced Gas-cooled Reactor (AGR) power stations, focusing on the impact of such a failure on the structural integrity of critical piping systems. The assessment was conducted as part of Kinectrics ongoing collaboration with British Energy's (now EDF) Structural Analysis Group.



A hanger model

Project Scope:

The investigation found that failing pipe hangers could stress nearby piping, risking creep damage. This helped the client prioritise inspections on high-risk hangers, preventing failures and extending the piping system's lifespan. The project scope included:

- Conducting detailed flexibility and failure assessments to identify high-risk hangers.
- Providing clear and actionable recommendations for targeted inspections and maintenance.
- Offering insights into cost-effective measures to mitigate the risks associated with pipe hanger failures.

Client: EDF

Location: United Kingdom

The technical approach to assessing the consequences of pipe hanger failure involved the following key steps:

- Flexibility Analysis: We performed a flexibility analysis of the piping system under normal operating conditions with all hangers intact. This step was crucial in understanding the baseline stress distribution and identifying the potential impact of a hanger failure.
- Failure Scenario Assessment: Kinectrics identified specific hangers whose failure would lead to the most adverse effects on adjacent piping regions. This assessment was based on the flexibility analysis and focused on the increased forces and moments that would occur in the event of a hanger failure.
- Creep Life Evaluation: Using the stress data from the failure scenario assessment, we evaluated the impact on the creep lives of welds and other critical components. The analysis aimed to determine whether the increased stress due to a hanger failure would result in unacceptable levels of creep damage.

Value Added Results

Our comprehensive analysis enabled the client to take proactive measures, ensuring the continued safety and reliability of their operations.