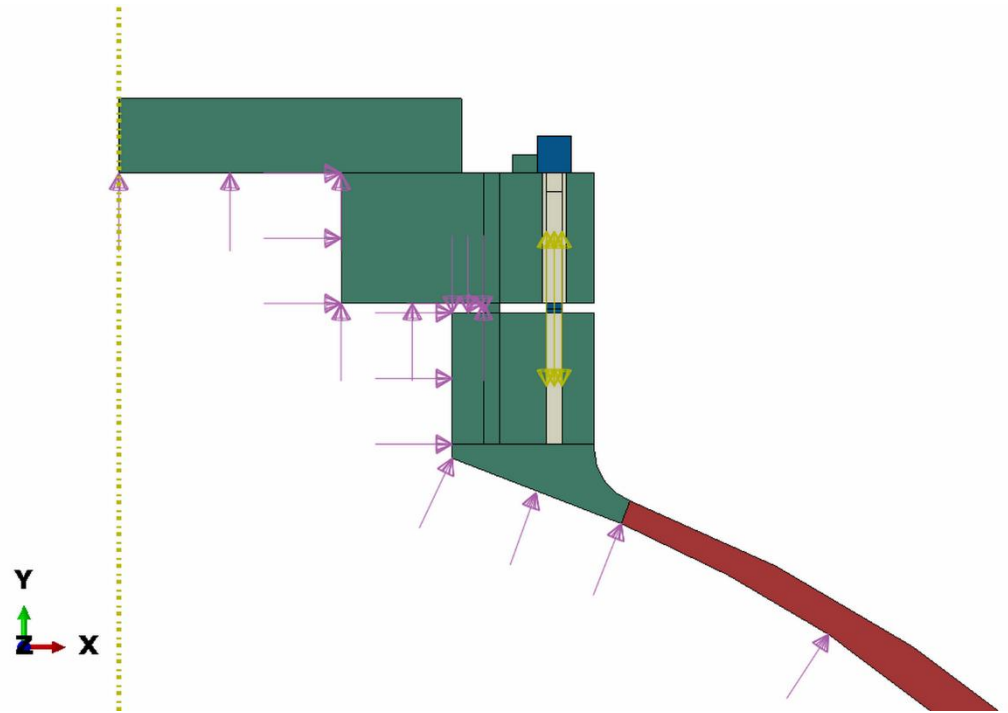


# Gasifier Vessel Fitness for Service

Fitness for Service Assessment for Reformer Top Nozzle | Indiana



**CLIENT**

Energy Holding Company

**BACKGROUND**

The top head of a high-temperature reformer was suffering dew point corrosion under the refractory meant to protect the low alloy steel shell from the intense heat of the process.

The upper part of this vessel was found to be susceptible to dew point corrosion. In this phenomenon, the shell becomes cold enough in localized areas to cause process fluids to condense on the wall, leading to localized corrosion in these lower temperature sections. The specific area of concern was the top head near the inlet nozzle, where corrosion had progressed substantially since the vessel was placed in service. WJE was engaged to perform analysis and a Fitness for Service (FFS) assessment of the flange head.

**SOLUTION**

For FFS assessments, advanced computer analyses are often employed to analyze nonuniform loads or material configurations. The assessment of the reformer head employed the ABAQUS FEA suite to evaluate the combined impact of bolt loads, gasket interactions, component contact, and nonuniform thinning based on inspections conducted by the plant's team.

Material models were used to mimic different minimum tensile strengths. Internal pressure was applied to all internal metal surfaces and bolt pretension was added. The models demonstrated that the corroded region was fit for service at the time of evaluation, but corrosion at the historical rate could result in the vessel falling below the assessment limit in less than two years from the time of reporting. WJE recommended that the plant explore options to repair, remediate, or replace the damaged components, and to plan for future surveillance of the area.

