

AssetCare Counts #13

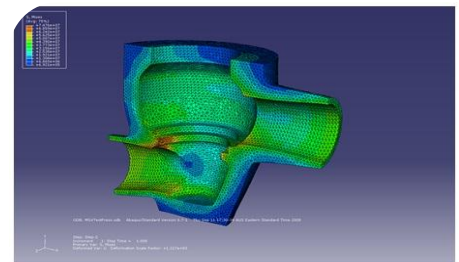
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▶ Remaining life assessment of pressure components

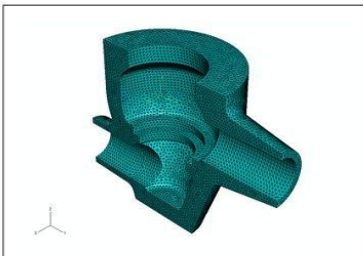
High temperature pressure equipment is subject to deterioration by fatigue and creep. AS3788 provides guidance for the assessment of the condition of pressure equipment to establish the safe remaining life. The assessment should be carried out when the component has reached 60% of its design life. Components that have no qualified design life should be assessed before 100,000 hours of operation.

The key types of damage that can occur are creep, fatigue, erosion (mechanical and electrical), corrosion, dielectric breakdown and rubbing wear.

Remaining life assessment is carried out using a level-based assessment which could be comprised of up to three levels. A Level One assessment has two recommended activities. The first is to assemble the important service factors, including design and maintenance details, service history and operating history. The second activity is to answer key questions - has the operation exceeded the design parameters, will it exceed these parameters during the extended life, has the design philosophy or materials been shown to be un-conservative since the component was made? If the pressure equipment fails a Level One assessment then a Level Two assessment is required.



Primary stress contours due to pressure.



FEA model of turbine stop valve constructed during Level Three assessment

A Level Two assessment will require new information be generated via inspection, simple stress analysis, measured dimensions and operating parameters. If the remaining life determined in a Level Two assessment is less than the projected unit life, a more precise Level Three assessment is implemented. Requirements for the Level Three assessment include measured material properties and a refined, detailed stress analysis using finite element analysis.

ALS Power Services is capable of conducting each level of assessment to help plant owners understand the condition of their plant. Typical areas of plant where assessments have been conducted are headers, valves, turbine casings and high energy piping. Assessments can be used to help determine long-term replacement strategies or short-term inspection management strategies on plant that is found to be damaged, giving plant owners confidence that they are managing their plant correctly and safely.

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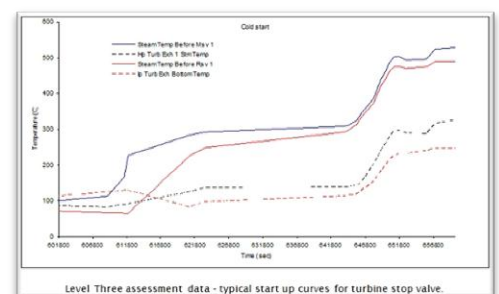
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Level Three assessment data - typical start up curves for turbine stop valve.