THIELSCH ENGINEERING

RUN, REPAIR, REPLACE?

The presence of progressive indications in critical components invariably leads to decisions about run, repair, or replacement. However, the presence of surface cracks in a thick-walled component may not mean a steam leak is imminent and in certain circumstances, operating with cracks may be acceptable. Assessments in such cases depend on accurate crack growth data and analytical procedures such as time of flight and phased array examinations. In view of the uncertainties in operating conditions and the lack of crack growth data on service-exposed material, many utilities opt for defect repair during planned outages.

Clearly such options can only be exercised if suitable weld repair procedures are available and if the integrity of the surrounding base material is intact. Much research has been done to improve weldment ductility by control of weld process variables to produce favorable microstructures or by modifications to weld metal composition.

Service experience often indicates that the first observable creep damage occurs as cracking at weldments. However, examination of weldments is not usually sufficient to ensure overall structural integrity. In many cases, welds can be successfully repaired without reducing the overall component life. When problems have been identified, alternatives to replacement sometimes exist.

Furthermore, even when replacement is inevitable, remedial action to allow continued operation may be necessary. Potential actions to prevent premature failure in critical components includes controlling temperature ramp rates to minimize thermal stresses, maintaining proper hanger support to minimize system loading, and proper control of welding processes and subsequent post-weld heat treatments.

When significant creep damage resulting in cracking has been identified, improvements in service performance are invariably derived by reducing peak operating temperatures and/or the rate of temperature changes. The subsequent loss of efficiency resulting from such action is usually severe enough that mechanical modification or alternative material selections are commonly required.