

# Thermal stress and creep analysis of boiler tubes

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## Abstract

During the course of this investigation, three major areas were encountered for which further work is needed. The first area is the creep behavior and life analysis of cracked boiler tubes. In the analysis a consideration of very simplified assumptions that the surface of the tube is clean and no crack initiated or pitting formed on the surface. In the actual boiler tubes, soot deposit, scale formation and cracks were commonly encountered on the surface of tubes. Transversal and longitudinal through crack or cracks to some depth are practically possible. Thus, the analysis of cracked tubes should be the next area of investigation. The second major area of further study may be the cases of surface pitted and corroded boiler tubes. While operation, boiler tubes are exposed to abrasion and corrosion by the particles in the flue gas and steam and/or water respectively. Therefore, somehow similar to the crack problems, the already developed finite element method was further developed to study the creep behavior of such eroded or corroded tubes. Another major area of further study is the analysis of swelled tubes and the case of large plastic deformations. Deposition of soot and scale on tube surface and shortage of feed water to the tube are typical factors which lead to localized overheating of tube material. Localized overheating or overall overheating will subject the tube to a net section collapse, plastic flow and also cause thermal stresses. These thermal stresses are due to the expansion and contraction of the boiler due to the fluctuation of the temperatures. Therefore, unlike the assumptions of small deformation analysis large deformations and material nonlinearity should be investigated during the plastic flow process.

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## Keywords

Boiler tubes, creep, thermal stress

## Biography

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