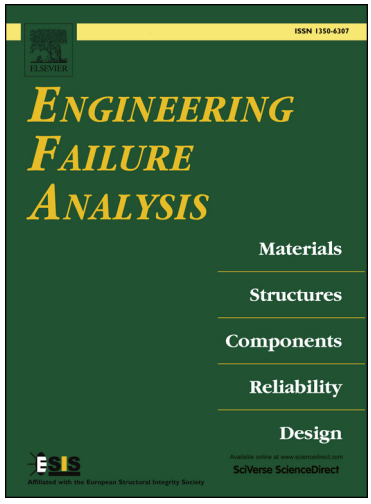

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Abstract

Remaining life assessment (RLA) of high temperature components calls for estimation current mechanical properties of the component material. For determination of mechanical properties of in-service components, large volumes of samples are required to be cut from components. The sample removal warrants post-sampling repair by welding and mandatory post weld heat treatment. The time and the efforts involved in these exercises often limits the RLA to less reliable levels relying on the material's original properties at the time of fabrication leading to over prediction**.**

Research is being carried out for estimation of mechanical properties of materials by destructive testing of miniature samples under various modes. Small punch test (SPT) technology is one such technique which has generated significant interest of the researchers. However challenges exist to establish procedure of testing and development of field implementable characteristic co-relation between SPT parameters and material properties. Though reports are available on room temperature (RT) properties on variety of materials to a great extent, studies on estimation of high temperature properties through SPT are sparingly available. An attempt has been made to develop correlations between SPT parameters and high temperature mechanical properties of Cr-Mo grade material. This paper describes salient features of the test setup developed & used for conducting test at high temperature, experimental results on one of the Cr-Mo grade material followed by development of correlation equation for estimating tensile properties.

Key words

SPT, Cr-Mo grade material, yield strength, ultimate tensile strength, elevated test temperature

1.0 Introduction

The typical operating conditions of process heater tubes of an oil refinery involve exposure of refinery infrastructure to temperatures as high as 700 °C in a very corrosive medium containing acid gases, erosive catalyst particles as well as enriched hydrogen. Ferritic grades of Cr-Mo steels ranging from 1Cr0.5Mo to 9Cr1Mo are used since decades and considered as the work horse of any refinery system. Medium Cr-Mo grade steels are predominantly used in various heater units due to their good oxidation limits, creep properties as well as weldability.