Failure analysis on tube break in a pyrolysis furnace

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Abstract

The failure analysis of an elbow tube of a pyrolysis furnace after three years of service which is only one third of the designed life span has been studied. An investigation to identify the root causes of the failed tube was carried out by macro inspections, chemical composition analysis, metallographic microscopy, scanning electron microscope (SEM) images and energy disperse spectroscope (EDS) analysis. Through analysis of the failed tube samples, we found no evidence of bulging and thinning, that the cracks originated from the pores and inclusions inside the fusion line of the inner wall, under high temperature and stress effects, that the cracks expanded towards the base material along the circumferential direction of the tube until it breaks.

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