1.12.15. COMBINATION OF NDE TECHNIQUES AND STRAIN MONITORING OF A STEAM PIPELINE

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Thermal power plants and refineries around the world have typically been in operation for many years and are approaching, or have exceeded, their design life. Their components such as boiler tubes, headers and steam pipes operate in a complex environment involving high temperature, pressure and corrosive atmosphere. Several damage mechanisms such as creep, fatigue, corrosion, oxidation, etc. become operative depending on the operating conditions. Beyond a critical temperature, creep acts as the dominant damage mechanism. The costs of replacement are high and there is no good economic or engineering reason to scrap such installations if they are in sound condition and if their safe operation can be extended. Hence, it has become an accepted procedure that such plants should be assessed and operation continued as long as it is safe to do so. In many service conditions, creep damage may occur at critical positions such as pipe bends or welds, which can result in failures at these locations. Therefore, it is very important to find out these locations with severe damage for predicting the service life of whole pipelines and making reliable maintenance strategies for the piping systems with operating at high temperatures. NDE techniques (e.g. hardness testing, ultrasonic tests, metallographic examination, etc.) combined with strain monitoring may be a good solution to provide an effective maintenance planning to components subjected to creep conditions. In this paper, a steam pipeline was investigated. In order to detect the most critical areas of the component, a finite element analysis was done considering the operating pressure and temperature. Then, surface replication and hardness test were made at the critical region. These tests showed cracks in the pipeline surface and hardness values were below the specification of the material. Strain and temperature monitoring have also been used. The results showed a strain increase during the pipeline operation at high temperature, an indicative of creep damage.