



Short communication

Role of physical and mechanical properties of stainless steels in expected thermal fatigue life of plenum barrier plate of a gas turbine frame

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ARTICLE INFO

Article history:

Received 2 June 2011

Received in revised form 25 July 2011

Accepted 4 August 2011

Available online 11 August 2011

Keywords:

Gas turbine

Thermal fatigue

Finite element

Materials selection

1. Introduction

Descriptions of the open cycle gas turbine operation, the operational backgrounds and the failure problem in Putrajaya Power Station Malaysia were reported by Rashid et al. [1]. According to the report, the concerns were the repeating findings of several obvious surface-crack spots on the weld joint zone of a plenum barrier plate of the gas turbine frame. Shielded Metal Arc Welding (SMAW) method was reported to be used for the welding process in assembling the plenum barrier plate. The modified model of the barrier plate was then presented for redesign consideration. It was found from thermal fatigue analyses, the life expectancies of modified models for the barrier plate design could withstand the operational loading and has a significant longer life than that of the original model.

Looking at the roles of materials in successful products, different physical and mechanical properties of materials can determine different responses of structures against thermal and mechanical loadings. In order to provide more alternatives to the operators or designers of power plants in selecting the material due to availability of the materials in the market, this work present analyses on effects of physical and mechanical properties of a number of alternative materials on the fatigue life expectancies through thermal fatigue analyses.

2. Material properties

The alternative materials from high strength stainless steels that have abilities to withstand high temperature operations are selected for considerations. The chemical compositions and physical and mechanical properties taken from different

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