

Abstract

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Predicting the residual stresses in steel T-section beams using Acoustic Emission Technique

The Mechanical machining processes such as machining, cutting and welding induce residual stresses in structural elements. Welding is considered one of the common causes of such residual stresses due to metal shrinkage effects. Mild steel T-sections are widely used in many structures such as (i.e. bridges, offshore platforms and marine vessels). Since, local heating during welding causes severe thermal gradients welding in the welded structure and the uneven cooling that follows produces residual stresses and distortion. The aim of this paper is predicting the presence of residual stresses using acoustic emission (AE) technique. Series of laboratory bending tests are carried out on four welded T-section beams. Four different welding sequences have been applied to generate different values of residual stresses. The raw AE signal was analyzed in time and frequency domains. The results showed promising indications that the AE could be used as a screening technique for monitoring residual stresses presented in the welded structures.