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Combined Fatigue Loading of Pre-deformed Metastable Austenitic Stainless Steel

Abstract: Fatigue behavior of structural components depends on the material's conditions at the end of thermomechanical treatment. During the manufacturing process the physical and mechanical properties are different to those of delivered materials. Metastable stainless austenitic steel AISI 316L is widely used in the chemical and processing industry. During the bending process the billet is partly deformed under tension and compression, leaving behind compression-tension residual stresses. During combined fatigue tensile-bending loading, the process of martensitic transformation continues and the residual stress distribution is rearranged. This results in a changed stress loading amplitude and loading ratio. The aim of this work is to present a model for determining the stress loading amplitude in order to create a S-N curve and determine the fatigue limit of pre-deformed components.

Bio: Prof. Dr. Nenad Gubeljak has extensive experience in fatigue crack propagation and fracture toughness testing of welded joints, structural steels and different engineering materials. He completed his Ph.D. on the study of fracture behaviour in mis-match welded joints and the determination of fracture behaviour by considering the effects of global and local strength mis-match on fracture toughness of welded joints. For his Ph.D. work he was awarded the Henry GRANJON Prize 1999 in the category of Design and Structural Integrity, by the International Institute of Welding (IIW). For his postdoctoral research, he was awarded the Marie Curie Fellowship from the European Commission (EC), for his project with title “An estimation of the integrity of a welded structure regarding constraints”. Nenad spent one year as a visiting researcher at the GKSS Research Centre Geesthacht, near Hamburg, Germany, funded by the EC. Today, he is the chair of Mechanics at the Faculty of Mechanical Engineering at the University of Maribor, Slovenia. He is a research partner and group leader on the COMET 2 project of the Austrian Academy of Sciences, which is run by the Material Center Leoben (MCL), Austria. He is also the principal investigator of the Slovenian scientific program, titled “Experimental and numerical analysis of non-linear mechanical systems”. Within the framework of the above research programs he focuses on “Structural Health Monitoring”, mainly fatigue crack initiation and propagation in order to prevent fatal failure of dynamically loaded structures with optimized topology in order to determined most critical zone of structural components.

Friday, October 5, 2018 at 10:30 am  
AME N722  
Refreshments and socializing prior to presentation