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# **Improved CWM platform for modelling welding procedures and their effects on structural behaviour**

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Akademisk avhandling  
som med tillstånd av Forsknings- och forskarutbildningsnämnden  
vid Högskolan Väst för vinnande av doktorsexamen i  
"Produktionsteknik" framläggs till offentlig granskning

Tisdagen den 15 september 2015, klockan 10.15 i C118 Högskolan Väst

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## Abstract

### **Title: Improved CWM platform for modelling welding procedures and their effects on structural behaviour**

A welding procedure specification is the document describing how a weld joint should be constructed. Arc weld processes are characterized by transient thermal behavior, leading to rapid changes in material properties and dynamic interaction between weld and base material. The objective of the project is to explore how the use of an improved CWM-platform affects representative stress and strain fields in order to assess welding procedure qualification records.

For this project, the accumulated thermal and mechanical influences from the first run to the final run are brought forward, in one and the same meshed geometrical model. Both the thermal and mechanical material model of the platform are designed to be used for modelling of the base- and weld material, promoting the simulation of the intricate combination of the thermal, elastic, and plastic strains on the plastic strain hardening and the formation of residual stress fields. The output of the simulation is mainly weld cooling times, residual stresses, and deformations.

This analysis is taken further by examining how residual stresses influence crack driving force under elastic and plastic loading. In addition, the output from the simulations can be used to assess the realism of the proposed welding parameters. The main experimental welding procedure examined comes from the IIW RSDP Round Robin Phase II benchmark project, where the main aim was to benchmark residual stress simulations. This work was found to contain many applicable challenges of a CWM-analysisproject.

Keywords: CWM; FEM; WELD; STRESS, EPFM

ISBN 978-91-87531-08-8 (Print Book) and 978-91-87531-07-1 (eBook)