

Bachelor/Master/Mini thesis

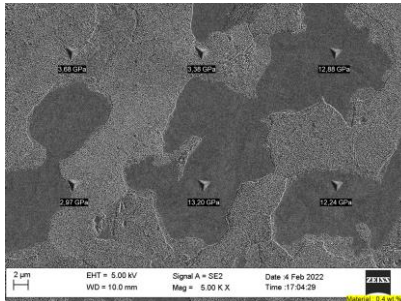
Investigation of optimal sampling conditions for nanomechanical properties of dual phase steel



Institut für
Metallkunde und
Materialphysik

RWTH Aachen University

Motivation:



[1] Charging an LD converter
POSCO, Korea

High strength steels are widely used in the vehicle industry for reducing vehicle weight without deteriorating strength of the structure parts. In general, decrease of elongation and ductility are inevitably accompanied by strength increase of materials which results in difficulties during forming process at the manufacturing line. However, DP steels which are composed of a hard martensite phase and a ductile ferrite phase, have high formability and sufficient strength due to its characteristic properties of each phase.

The aim for this project is to verify the nanomechanical properties of DP steel with high throughput screening. Through this method, it is possible to measure and compare quickly the properties of each phase present in DP steel. From this research, we expect to determine statically appropriate sampling numbers to obtain reliable results of nanomechanical tests.

Tasks:

- Literature review: Characteristic properties of DP steels
- Modeling tasks: Prediction of hardness value with optimal alloy composition at different annealing temperatures
- Experimental tasks: Phase fraction analysis with metallography and nanomechanical property evaluation by nanoindentation

What we offer:

- Access to modern instruments to characterize mechanical properties and microstructures
- A young enthusiastic team of material metallography engineers

The ideal candidate will:

- Have a great interest in iterative validation between simulation and metallography results
- Have thorough experience in metallography analysis and hardness measurement

Contact:

M.Sc. Gyeongwan Jo
Room E10, Tel.: +49(0)241 80-94089
jo@imm.rwth-aachen.de

Institut für Metallkunde
und Materialphysik

Direktorin:
Prof. Dr. Sandra Korte-Kerzel

Postanschrift/Mail:
RWTH Aachen
52056 Aachen
Deutschland

Gebäude/Deliveries:
Kopernikusstraße 14
52074 Aachen

Tel.: +49 (0)241 80-26855
Fax: +49 (0)241 80-22301

imm@imm.rwth-aachen.de
www.imm.rwth-aachen.de

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