

Bachelor/Master/Mini thesis

Investigation of nanomechanical properties in ferrite-martensite dual phase steel



Institut für
Metallkunde und
Materialphysik

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Motivation:

Specimen	0.126 wt.%C	0.149 wt.%C
Metallography		
Image analysis		
Martensite fraction	18,6 %	19,8 %



[1] Charging an LD converter
POSCO, Korea

High strength steel material is 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 steel materials, 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 study the properties of martensite phases that determine damage behavior of DP steel materials under various conditions. Based on the thermomechanical simulation program, the optimum alloy composition of DP steel with appropriate annealing temperature is predicted and mechanical properties of the actual specimens are compared for validation of obtained data.

Tasks:

- Literature review : Characteristic property of DP steel materials
- Modeling tasks : Prediction of optimum alloy composition with appropriate intercritical annealing temperature
- Experimental tasks : Phase fraction analysis with metallography and nanomechanical property evaluation with indentation equipment

What we offer:

- Method of alloy material simulation tool based on thermodynamic knowledge and its iterative validation with actual experiments
- 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

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