

Influence of higher partitioning temperatures on mechanical properties of heat treated high-strength steel alloyed with 1.3 % chromium

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Abstract:

This paper deals with the innovative Quenching and partitioning (QP) heat treatment (HT) of low-alloyed chromium steel, and is especially focused on the higher temperatures of partitioning as well as longer holding times and its influence on mechanical properties of the material. As part of the experiment various HT, metallographic analysis, hardness measurement, X-ray diffraction phase analysis (to determine retained austenite content), tensile test and Charpy impact test were performed. In QP treated specimens the best combination of UTS and elongation was observed after quenching in 200 °C salt bath and partitioning at 250 °C for 30 minutes. This specimen showed the UTS above 1900 MPa, elongation of 14 % and also good impact toughness (34 J). Equally good values of impact toughness (36 J) were also observed in the specimens partitioned at 300 °C or 320 °C for holding times up to 30 minutes. On the other side longer partitioning times at the temperature of 320 °C affected the elongation and impact toughness negatively.

Key words:

QP process, high strength steel, retained austenite, mechanical properties, microstructure