

**OPTIMISATION OF THE TRIP STEELS MICROSTRUCTURE AND ITS PROPERTIES
THROUGH A NEW HEAT TREATMENT PROCESS**

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It was revealed that it is possible to form a ferritic - bainitic microstructure with retained austenite in the 35CrSiMn5-5-4 structural steel. This microstructure was produced during intercritical annealing which allowed the determined volume fractions of austenite and ferrite to be obtained. The subsequent austempering performed in the temperature range of bainitic transformation led to obtaining a microstructure composed of carbide-free bainite with retained austenite and of the ferrite grains with carbides. After the aforementioned treatment, this steel may be classified as one of the multiphase steels (TRIP - Transformation induced plasticity) which belong to the broader group of Advanced High Strength Steels (AHSS).

The preliminary heat treatment conducted before isothermal quenching from the incomplete austenitisation led to the greater refinement of the microstructure, in which the width of ferritic areas was in the range of 200-700nm. The thickness of bainite plates was about 100-200 nm in both cases, while the average thickness of the austenite layers was about 100 nm. Due to this preliminary step of heat treatment, 35CrSiMn5-5-4 steel gains higher strength and plasticity parameters in comparison to the steel after the treatment without the preliminary heat treatment step.

Keywords: Multiphase steels, phase transformation simulations, dilatometric tests, phase transformation in Fe alloys, heat treatment

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