

## عنوان مقاله:

The structure-property relationship in a desulfurised and degassing hot work W500 tool steel

## محل انتشار:

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## خلاصه مقاله:

The effect of secondary steelmaking processes such as desulphurization, removal of inclusions and vacuum degassing followed by hot forging and hardening heat treatment on the microstructure and mechanical properties of a hot-work w500 tool steel have been studied in details. In order to follow the progress of secondary steel making, the content of impurity elements such as S, P, O, H and N were measured. These elements influence the mechanical testing and the microstructure of the steel. The results show that desulfurization treatment can be accelerated at higher temperature of 1680 °C and 15 minutes holding time for silicon and aluminum with contents of 0.33% and 0.056% in the molten steel, respectively. In this condition, the removal percentage of sulfur has been reached to about 90% relative to the initial sulfur content. For the degassing sample A, the strength and the hardness, after hot working and quenching – tempering, have been increased from 976 to 2020 MPa and 29 to 52 RC, respectively. Whereas for the normal sample B, the associated strength and the hardness have been changed from 870 to 1845 MPa and 21 to 55 RC, respectively. The difference between mechanical properties of sample A and sample B can be related to the presence of Al<sub>2</sub>O<sub>3</sub> clusters, silicate inclusions, and a longer filamentary inclusion in the microstructure of sample B after hot-forging. Microstructural observations show that the morphology of pearlite in the forged sample A is more uniform and carbide particles are also much finer than these particles in the non-degassing forged sample B.

## کلمات کلیدی:

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