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SOLUBILITY PRODUCTS OF NB IN AN ANNEALED Fe30Mn STEEL

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ABSTRACT

The adverse influence of niobium (Nb) on an annealed high manganese (Mn) steel is still an active issue of discussion between automobile companies and steel manufacturers. Some controversy exists in the literature concerning the influence of Nb solubility on microstructure and thereby on mechanical properties. In this work, solubility of Nb in Fe30Mn annealed alloy was the aim and pure Nb was added in as conventional cast Fe30Mn alloy in 0.05, 0.1, 0.2, 0.4, 0.6 and 1% additions. The cast samples were homogenized at 1250oC for 5 hours and annealed at 1200oC for 5, 10, 30 and 60 minutes, the microstructure was investigated using TEM and SEM-EDX and precipitates chemically tested. Solubility was theoretically studied based on Gladman assumptions and was also examined by Thermo-Calc analysis. The result of this work is a comparison between the microstructure analysis and theoretical studies, and it has been found that Nb was soluble in Fe30Mn austenite phase and has had a solute drag effect where Nb(C,N) and NbN precipitates were seen and the effect was pinning effect.

Keywords: Solubility, Solute, Pinning, Thermo-Calc.