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Plastic Deformation Effect on Wear and Corrosion resistance of Super Martensitic Stainless Steel

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Abstract: The microstructure and the mechanical properties of a super martensitic stainless steel (SMSS) were investigated in this study. Test specimens were taken from seamless tube generally used in oil and gas industries. The specimens were plasti- cally deformed by tension from its as-received state to different levels of elongation at 2%, 10%, and 15%, respectively. The focus was to study the influence of plastic deformation on the tribological behavior against alumina balls in dry conditions and the corrosion resistance in 3.5% NaCl solution. Analysis results showed an abrasive wear as the main wear mechanism. Plastic deformation prior to sliding wear test increases wear resistance as the deformation rate increases. Based on the elec- trochemical experiments, all of the specimens showed an increase in their corrosion resistance i.e., the corrosion potential Ecorr (vs. Ag/AgCl) tends to move toward more noble values with respect to the initial potential. The greatest polarization resistance was displayed by the specimen with 10% of deformation rate.

Keywords : Super Martensitic Stainless Steel, Cold deformation, wear, corrosion