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EFFECT OF FERRITE-PEARLITE LAYERING ON DUCTILE TO BRITTLE TRANSITION TEMPERATURE OF API-X60 STEEL

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Abstract:
Homogeneous steel structure is preferred for high to low grade piping steel. Microsegregation of alloying elements ruins the homogeneous structure of hot rolled steel and form ferrite-pearlite layering. The effects of ferrite-pearlite layering both on mechanical properties and ductile to brittle transition temperature have been investigated in the presented paper. API-X60 grade piping steel was analysed as it is more susceptible to the formation of layered structure compared to other types of steel. Different heat treatments were designed to remove the layering. Optical and scanning microscopes have been used for the identification of layered structure. Tensile, hardness and Charpy impact test were performed to investigate the effects of layering on the mechanical properties of steel. The results show that layering has no significant effect on steel strength, although some adverse effect on ductility and impact values were observed. This study revealed that the layered structure increases ductile to brittle transition temperature especially in transverse direction.

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