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Precipitation behavior of AlN and its influence on the microstructure and mechanical performance of a hot rolled C-Mn steel

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The influence of Al content level on the lower-yield strength and impact behavior in plain carbon steel under hot rolling conditions has been examined. A ferrite/pearlite microstructure was obtained with ~10% volume fraction pearlite. Although increasing Al from 0.02% to 0.16% did not significantly affect the strength, a considerable improvement in impact behavior occurred, the impact transition temperature (ITT) decreasing by 40o C. This was mainly attributed to the removal of N from solution although there was some benefit from refinement of the grain boundary carbides and refinement of the grain size by the precipitation of AlN. Yield strength was not affected because the reduction in strength from N removal by the Al was counter-balanced by the solid solution hardening from the high Al content. The next stage in this hot rolling programme will be to see whether similar improvements can be found when Nb is added as a microalloying addition.

Biography

Abdullah Qaban has completed his MPhil Degree and transferred into PhD in 2015 at City, University of London and his main interest is on the mechanical and chemical properties of steels.

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