Microstructure influence on the bendability of hot rolled martensitic steels

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Abstract

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Bendability is an essential requirement for application of ultrahigh strength martensitic steels. Achieving a high bendability in these steels compared to high strength low alloy (HSLA) or dual phase (DP) of steels is very challenging. In this work, bendability of a hot rolled ultrahigh strength steel was investigated and correlations were made with various hot rolling conditions. These studies revealed the different causes of bendability differences in the investigated steel. Among them are microstructural features of the undeformed samples, such as decarburized zone thickness on the rolling plane, microsegregation of elements, texture and morphology of phases. All these microstructural characteristics were analyzed in the surface layers of the materials by a variety of characterization techniques such as scanning electron microscopy (SEM), electron back scatter diffraction (EBSD), electron probe microanalysis (EPMA) and X-ray diffraction (XRD). To elucidate the mode of deformation during bending, some specimens after the bending tests were also characterized. In this paper, all these results will be presented and discussed.

Keywords: bendability, characterization, microstructure, deformation

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