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Texture, misorientation and mechanical anisotropy in a deformed dual phase stainless steel weld joint

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Abstract: The deformation behavior of a duplex stainless steel weld joint is studied. A detailed texture analysis shows that the increase of the deformation percentage leads to a reinforcement of all possible {hkl}?111?and {hkl}?100? components in austenite, and of the {hkl} ?110? components in ferrite for both the base metal (BM) and the heat affected zone (HAZ). In the weld metal (WM), a strong scatter of the crystallographic orientation relationship (OR) initially found in the solidification microstructure is recorded after deformation. The analysis of the Kernel Average Misorientation (KAM) distribution shows that the deformation is more concentrated in the base metal than in the other parts of the weld joint. The final mechanical behavior studied through microhardness measurement and micromechanical calculations, allows us to separate the contribution of both microstructural and textural evolution to the overall strain hardening of the weld joint.

Keywords : duplex stainless steel, deformation texture, mechanical anisotropy, TIG welding