

Texture, microstructure and anisotropic properties in annealed 2205 duplex stainless steel welds

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Abstract: The effect of welding and subsequent annealing on the evolution of the crystallographic texture and the anisotropic properties in a 2205 duplex stainless steel was studied. A strong texture was found in the base metal for both austenite and ferrite phases. The austenite texture is composed of rolling (copper and brass) and recrystallization (cube) components whereas the ferrite texture contains mainly a marked $\langle 001 \rangle // RD$ fibre with a major rotated cube component. The texture evolution during welding and annealing was characterized in the base metal, heat affected zone and weld metal; the corresponding phase proportions and misorientation values were also calculated. The analysis of all these data allows improving the understanding of the recovery, recrystallization and grain growth mechanisms occurring during the various steps of the treatment. Finally, a micromechanical model was used to calculate some mechanical properties from the measured texture, and to confirm that the optimal annealing treatment is about 1050 °C.

Keywords : duplex stainless steel, TIG welding, texture, anisotropy of mechanical properties, EBSD