

## Deformation and Crystallization in a 7075-T651 Friction Stir Weld

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**Abstract :** The deformation and the crystallization in a 7075-T651 friction stir weld, in particular for regions directly in contact with the mechanical action of the rotating probe, have been investigated by means of optical microscopy. The investigation enabled to identify regions of the weld differently affected by the deformation caused by the welding process. The highly deformed grains in the horizontal direction close to the plate margin were indicative of shear movements along the horizontal plane, while highly deformed grains along the plate margin in the vertical direction were indicative of vertical shear movements of opposite directions, which superimposed the shear movement along the horizontal plane. The vertical shear movements were not homogeneous through the plate thickness. The microstructure indicated that after the probe passes, the grain growth may take place under static conditions. The small grains microstructure of the nugget region, formed after the main dynamic recrystallization process, develops to an equiaxed microstructure. A material transport influenced by the rotating shoulder was also observed from the trailing to the advancing side of the weld.

**Keywords :** AA7075-T651, friction stir welding, deformation, crystallization

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