

Bake Hardening Behavior of Ultrafine Grained and Nano-Grained AA6061 Aluminum Alloy

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Abstract : In this study, the effects of grain size of AA6061 aluminum on the bake hardening have been investigated. The grains of sample sheets refined by applying 4, 8, and 12 passes of ECAP and their microstructures and mechanical properties were investigated. EBSD and TEM studies of the sheets showed grain refinement, and the EBSD micrograph of the alloy ECAPed for 12 passes showed nano-grained (NG) ~95nm in size. Then, the bake hardenability of processed sheet was compared by pre-straining to 6% followed by baking at 200°C for 20 min. The results show that in case of baking at 200°C, there was an increase about 108%, 93%, and 72% in the bake hardening for 12, 8, and 4 passes, respectively. The maximum in bake hardenability (120 MPa) and final yield stress (583 MPa) were pertaining to the ultra-fine grain specimen pre-strained 6% followed by baking at 200°C.

Keywords : bake hardening, ultrafine grain, nano grain, AA6061 aluminum,

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