

HEAT TREATMENT OF RAPIDLY SOLIDIFIED AND PLASTICALLY CONSOLIDATED 6061 ALUMINUM ALLOY

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Abstract

According to Hall-Petch relationship there is correspondence between structure refinement and yield strength increase. Application of rapid solidification (RS) as well as sever plastic deformation (SPD) techniques gives an opportunity for further increase/enhancement of strength in precipitation hardened aluminum alloys. In the present work, rapid solidification of 6061 aluminum alloy, combined with following plastic consolidation was performed. RS materials were produced by melt-spinning and gas atomization processes, while plastic consolidation was performed utilizing by hot extrusion. For comparison purposes cast and extruded materials was produced as well. Optimal T6 heat treatment procedures were applied to all types of tested alloys. It has been shown that each kind of alloy have similar response to heat treatment.

It was found that the strength of RS 6061 alloys is mainly controlled by precipitation strengthening; no additional strengthening mechanism such as grain strengthening contributes to the overall mechanical properties.

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