

## Microstructure and Mechanical Properties of the Forged Mg-Gd Alloy

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The Mg-5.6Gd-0.6Y-0.4Nd-0.2Zn-0.2Zr (wt. %) alloy was prepared by metal mold casting. Then the alloy was subjected to hot forging. The microstructure and mechanical properties of the solution-treated, hot-forged and aged alloy samples were studied. The effects of deformation processes on the microstructure and mechanical properties were discussed, and the strengthening mechanisms of alloy were also investigated. The results revealed that the coarse second phases distribute along the dendrite boundaries in the solution-treated alloy. After hot forging, the second phases were broken into small particles and the grains get uniformity. Tensile test results showed that the strength of alloy was greatly improved after hot deformation processes. The forged alloy showed remarkable age hardening response at aging temperature of 180°C. The peak hardness was obtained by the time of 72h. The ultimate tensile strength and yield strength of the peak-aged alloy were 275MPa, 181MPa at room temperature, and 209MPa, 127MPa at 300°C, respectively. The high mechanical properties were mainly attributed to the fine microstructure and fine dispersed metastable precipitates in the matrix.

**Keywords:** Mg-Gd alloy; Microstructure; Mechanical properties; Strengthening mechanisms

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