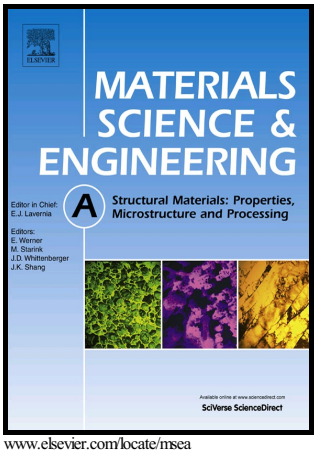

www.elsevier.com/locate/msea

Effect of deformation temperature on texture and mechanical properties of ZK60 magnesium alloy sheet rolled by multi-pass lowered-temperature rolling

Wenke Wang, Wenzhen Chen, Wencong Zhang, Guorong Cui, Erde Wang

PII: S0921-5093(17)31623-4
DOI: https://doi.org/10.1016/j.msea.2017.12.024
Reference: MSA35866

To appear in: *Materials Science & Engineering A*

Received date: 30 October 2017
Revised date: 7 December 2017
Accepted date: 8 December 2017

Cite this article as: Wenke Wang, Wenzhen Chen, Wencong Zhang, Guorong Cui and Erde Wang, Effect of deformation temperature on texture and mechanical properties of ZK60 magnesium alloy sheet rolled by multi-pass lowered-temperature rolling, *Materials Science & Engineering A*, https://doi.org/10.1016/j.msea.2017.12.024

Effect of deformation temperature on texture and mechanical properties of ZK60 magnesium alloy sheet rolled by multi-pass lowered-temperature rolling

Wenke Wang, Wenzhen Chen*, Wencong Zhang*, Guorong Cui, Erde Wang

School of Materials Science and Engineering, Harbin Institute of Technology, Weihai 264209, PR China

*Corresponding author. Postal Address: Room A301, School of Materials Science and Engineering, Harbin Institute of Technology, Weihai 264209, PR China. Tel.: +86 631 5672167; fax: +86 631 5672167. E–mail address: nclwens@hit.edu.cn (Wenzhen Chen), zwinc@hitwh.edu.cn (Wencong Zhang)

Abstract

ZK60 magnesium alloy sheets with various texture states were successfully fabricated by controlling the rolling temperature in multi-pass lowered-temperature rolling. The microstructure including texture and the mechanical properties of the resulting sheets were investigated. Results showed that dynamic recrystallization (DRX) during current rolling process could be realized at lower deformation temperature when the thickness reduction per pass was larger than 30%, and with its help, the grain size was significantly refined and the microstructure homogeneity strikingly improved. In this circumstance, deformation temperature mainly influenced the texture state of the resulting sheets, implying that with the increase of deformation temperature the distribution of (0002) basal planes remained stable along the rolling direction but gradually increased along the transverse direction. The calculation results about the friction stress for various deformation modes indicated that the changing ratios of the critical resolved shear stress (CRSS) for the non-basal slip to that for basal slip resulted in this texture difference. Additionally, for the samples with the dominant deformation mode of basal slip, the yield stress gradually decreased and the uniform elongation increased with the weakening of basal texture. However, if dominant deformation mode changed, an abrupt change would occur in their values. This change of yield stress came from the change of CRSS, while uniform elongation from strain hardening rate.