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Title: The effect of homogenization on microstructure and hot ductility behaviour of AZ91 magnesium alloy

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Abstract: Grade AZ91 is a casting magnesium alloy for ambient temperature applications. Because of good castability, formability and also for economical considerations, this alloy has vast applications in automotive industries. Microstructure of this alloy after casting includes α solid solution, β precipitates ($Mg_{17}Al_{12}$) in grain boundaries and $\alpha + \beta$ eutectic phase. Morphology, distribution and the amount of precipitates play the crucial role during deformation process and their behaviour can be controlled by selection the appropriate heat treatment procedure. In this study, homogenization heat treatment on AZ91 alloy at 415 °C for 9, 18 and 24 hours was performed and the influence of heat treatment on hot deformation behaviour was investigated. Hot tensile test in the temperature range of 380-440 °C and initial strain rate of 0.001 and 0.1 s⁻¹ was carried out and the results revealed that the highest tensile strength and simultaneously the maximum ductility were obtained in the sample held at 415 °C for 24 hours and drawn at 400 °C with initial strain rate of 0.1 s⁻¹. Furthermore, microstructure and the extension of precipitates presence after homogenization heat treatment also were investigated by metallographical examination.

Keywords: AZ91, homogenization heat treatment, β precipitates, hot deformation, microstructure

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