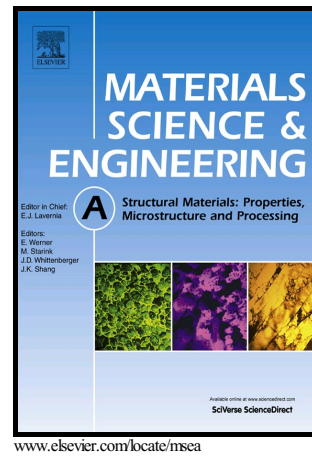


Author's Accepted Manuscript

Effect of ingot grain refinement on the tensile properties of 2024 Al alloy sheets

Wei Haigen, Xia Fuzhong, Wang. Mingpu



PII: S0921-5093(16)31346-6
DOI: <http://dx.doi.org/10.1016/j.msea.2016.11.016>
Reference: MSA34341

To appear in: *Materials Science & Engineering A*

Cite this article as: Wei Haigen, Xia Fuzhong and Wang. Mingpu, Effect of ingot grain refinement on the tensile properties of 2024 Al alloy sheets, *Material Science & Engineering A*, <http://dx.doi.org/10.1016/j.msea.2016.11.016>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain

Effect of ingot grain refinement on the tensile properties of 2024 Al alloy sheetsWei Haigen ^a, Xia Fuzhong ^a, Wang Mingpu ^{a,*}^a School of materials science and engineering, Central South University, Changsha, 410083, China

* Corresponding author.

E-mail address: wangmp@csu.edu.cn

Abstract

Microstructures of the coarse grain (CG) and fine grain (FG) 2024 Al alloy ingots prepared by different casting procedures are investigated, and the microstructures and tensile properties of the two naturally aged CG and FG 2024 Al alloy sheets prepared from the two ingots are compared. Metallographic observation reveals similar recrystallized grain structures of the two solution treated 2024 Al alloy sheets, but EBSD analysis demonstrates that a non-complete recrystallized substructure is formed in the CG sheet, whereas the FG sheet recrystallizes completely after solution treatment. SEM observation indicates that the remaining phases in the FG sheet are less, smaller and are more dispersedly distributed than that in the CG sheet. These microstructural differences between the two sheets result in slightly lower strengths and higher ductilities in the directions parallel to the rolling plane, and markedly higher strength and ductility in the ND direction for the naturally aged FG sheet. These findings suggest the possibility of improving the mechanical properties, including toughness and fatigue properties, of Al profiles by refining their ingot grain structures.

Keywords: grain refinement; mechanical characterization; aluminum alloys; casting; fracture

Introduction

There have been many investigations indicating that the tensile properties, fracture toughness and fatigue properties of Al alloys are determined mainly by their purities, microstructures (including grain size and substructure) and the types, sizes, contents and distributions of the precipitates and impurities in the alloys [1-5]. Based on what has been revealed, several effective ways which can improve the mechanical properties of Al alloys have been proposed and some of

Download English Version:

<https://daneshyari.com/en/article/5456373>

Download Persian Version:

<https://daneshyari.com/article/5456373>

[Daneshyari.com](https://daneshyari.com)