

Accepted Manuscript

Title: Ultrasonic grain refinement of die cast copper alloys

Authors: H. Puga, J. Barbosa, J.M. Machado, C. Vilarinho

PII: S0924-0136(18)30376-5

DOI: <https://doi.org/10.1016/j.jmatprotec.2018.08.034>

Reference: PROTEC 15899

To appear in: *Journal of Materials Processing Technology*

Received date: 9-3-2018

Revised date: 24-7-2018

Accepted date: 23-8-2018

Please cite this article as: Puga H, Barbosa J, Machado JM, Vilarinho C, Ultrasonic grain refinement of die cast copper alloys, *Journal of Materials Processing Tech.* (2018), <https://doi.org/10.1016/j.jmatprotec.2018.08.034>

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 proof before it is published in its final 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.



Ultrasonic grain refinement of die cast copper alloys

Puga H^{1*}, Barbosa J¹, Machado J. M.¹, Vilarinho C²

¹ CMEMS - Centre for Micro-Electro Mechanical Systems

² MEtRiCS - Mechanical Engineering and Resource Sustainability Center

University of Minho, Campus of Azurém, 4800-058 Guimarães, Portugal

Tel.: +351 253 510 220

Author Correspondence: puga@dem.uminho.pt

Abstract

In this study, the effect of ultrasound as an alternative melt refinement technique of commercially available brass alloys and its impact in the microstructural and mechanical properties is analysed. A Cu-Zn alloy was cast in different conditions: without melt treatment, chemically refined and ultrasonically refined at different temperatures. Ultrasonic treatment was found to be more efficient than chemical refinement, promoting lower grain size and higher roundness of the α -phase and decreased the ratio of the α/β phases. The best results were achieved for 940 °C melt refinement temperature. The microstructure morphology improved the alloy mechanical properties, namely ultimate tensile strength, yield stress and elongation, which attained 386 MPa, 192 MPa and 11.5%, respectively, for that melt refinement temperature.

Keywords: Ultrasonic treatment; Copper alloys; Grain refinement; Casting

1. Introduction

The casting of brass alloys traditionally leads to coarse and heterogeneous microstructures, even when the die casting process is used, requiring suitable melt treatment to refine and modify the microstructure morphology to promote an increase in the castings sanity and mechanical behaviour. As already demonstrated by Sadayappan (2002), together with the pouring temperature, grain refinement is a required treatment to enhance the mechanical performance of the final product and the alloy fluidity/castability characteristics. Since high cooling rates are not always achievable, particularly when high thickness sections are present in the casting or low

Download English Version:

<https://daneshyari.com/en/article/11004029>

Download Persian Version:

<https://daneshyari.com/article/11004029>

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