

ALUMINUM MELT CLEANLINESS PERFORMANCE EVALUATION USING PoDFA (POROUS DISK FILTRATION APPARATUS) TECHNOLOGY

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Prezența incluziunilor nemetalice solide în aliajele de aluminiu poate provoca scăderea valorilor proprietăților mecanice ale produselor turnate, creșterea porozității gazoase, o prelucrabilitate prin aşchiere slabă, micșorarea fluidității și o calitate slabă a suprafeței.

Technicile pentru determinarea incluziunilor pot fi: metalografie cantitativă, analize chimice, teste volumetrice, tehnici nedestructive și altele.

Scopul lucrării este studiul evaluării purității topiturilor din aliaje de aluminiu 5083 prin tehnica PoDFA.

Datele obținute prin analiză arată că probele din aliaj 5083 sunt pure. Conținutul de incluziuni este cuprins între 0.011 mm³/kg și 0.025 mm³/kg, principalele incluziuni fiind TiB₂, Al₄C₃, Al₂O₃, MgO, spinel și material refractar.

The presence of solid non-metallic inclusions in aluminum alloys can cause reduction in mechanical properties of castings, increased gas porosity, poor machinability, decrease in fluidity and poor surface quality.

Techniques for inclusions assessment can be: quantitative metallography, chemical analysis, volumetric tests, nondestructive techniques and so on.

The focus of this paper is to study the assessment of melt cleanliness in 5083 aluminum alloy using PoDFA technique.

Analysis data reflect the cleanliness of 5083 alloy actually sampled. The inclusions content was between 0.011 mm³/kg and 0.025 mm³/kg, the main inclusions being TiB₂, Al₄C₃, Al₂O₃, MgO, spinel and refractory material.

Keywords: aluminum, cleanliness, PoDFA, inclusions

1. Introduction

Aluminum alloys are characterized by their low specific weight, low melting point, negligible gas solubility with the exception of hydrogen, excellent castability, good machinability, and good corrosion resistance. Premium quality castings are an essential requisite for the critical structural components used in automotive and aeronautics. The production of such castings requires that inclusions and porosity be minimized (or even eliminated) to suppress their

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Aluminum Melt Cleanliness Performance Evaluation Using Podfa

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Light Metals 2013 Barry Sadler, 2017-08-18 [The Encyclopedia of Advanced Materials](#) David Bloor, 1994 *Transactions* , 1991 **Aluminium** , 2004 **Metals Abstracts** , 1998 **3rd International Conference on Molten Aluminum Processing** , 1992 **Foundry Processes** Seymour Katz, Craig F. Landefeld, 1988-06 For a number of years it has been a General Motors Research Laboratories custom to hold a symposium on a subject which is new and emerging and to invite the best people in the world in that subject to come together to talk to each other Initially I had some difficulty in regarding foundry processes as a new and emerging subject Copper alloys have been in foundry practice for about six thousand years Foundrymen working with those alloys have been recognized as such for nearly all that time Iron has a much shorter history probably only three or four thousand years So what s new What is new is that a subject which has always been so complex and so difficult that it could only be a craft skill with bits and pieces of knowledge and bits and pieces of insight has begun to yield to new abilities to solve very complex problems We do this now because we can handle

great amounts of data by computational means using new and more complicated theoretical treatments than we could deal with before In fact we have a new technology with which we can attack these terribly difficult problems Thus foundry processing is becoming a new subject because new things can be done with it **Light Metals 1997** Christian Bickert,R. I. L. Guthrie,Canadian Institute of Mining, Metallurgy and Petroleum,1997 **Molten Aluminum Cleanliness** Gallo Rafael,Thomas Susan P.,2021 All aluminum casting operations struggle with two major impurity issues which limit aluminum alloy castings from achieving their full consistent capability inclusions and hydrogen gas caused porosity Drawing on decades of experience in aluminum casting industry expert Rafael Gallo provides a comprehensive discussion on impurities their root causes and practical ways to minimize casting defects The book discusses common aluminum melting practices how those practices can create oxide and hydrogen gas and how to achieve greater melt cleanliness by proper fluxing degassing and flux injection processes The book provides practical applications foundry case studies and state of the art molten metal analytical techniques This is a must have technical resource for aluminum foundries

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