

Accepted Manuscript

Title: High surface quality welding of aluminum using adjustable ring-mode fiber laser

Authors: Martin Ruthandi Maina, Yasuhiro Okamoto, Akira Okada, Matti Närhi, Jarno Kangastupa, Jorma Vihinen



PII: S0924-0136(18)30135-3
DOI: <https://doi.org/10.1016/j.jmatprotec.2018.03.030>
Reference: PROTEC 15700

To appear in: *Journal of Materials Processing Technology*

Received date: 25-12-2017
Revised date: 2-3-2018
Accepted date: 31-3-2018

Please cite this article as: Maina MR, Okamoto Y, Okada A, Närhi M, Kangastupa J, Vihinen J, High surface quality welding of aluminum using adjustable ring-mode fiber laser, *Journal of Materials Processing Tech.* (2010), <https://doi.org/10.1016/j.jmatprotec.2018.03.030>

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.

High surface quality welding of aluminum using adjustable ring-mode fiber laser

Martin Ruthandi MAINA^{1*}, Yasuhiro OKAMOTO¹, Akira OKADA¹,

Matti NÄRHI², Jarno KANGASTUPA² and Jorma VIHINEN³

¹ Nontraditional Machining Laboratory, Okayama University, 3-1-1 Tsushimanaka, Okayama 700-8530 Japan

² Corelase Oy, Kauhakorvenkatu 52, 33720 Tampere, Finland

³ Laser Application Laboratory, Tampere University of Technology, Finland

*maina@ntmlab.mech.okayama-u.ac.jp

Abstract

A method to improve penetration and stabilize the welding phenomenon at a high welding speed has been described through experimental and numerical investigations. Using a high power laser beam consisting of a center and a ring part, influences of shielding gas direction and flow rate, laser power density, and welding mode defined by variable intensity distribution have been clarified. The weld bead was evaluated in terms of width, height, shape and roughness. Dual-mode laser irradiation of center and ring power made it possible to stabilize the welding process. The center power helps to achieve sufficient deep penetration, while ring power ensures good temperature distribution. Good surface quality and deep penetration welding could be achieved with dual-mode welding, using low flow rate of shielding gas supplied from the backside direction.

Keywords: Adjustable ring-mode fiber laser; Aluminum; Laser welding; Shielding gas; Surface quality.

Download English Version:

<https://daneshyari.com/en/article/7176337>

Download Persian Version:

<https://daneshyari.com/article/7176337>

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