ISSN 2300-1674

BIULETYN
INSTYTUTU SPAWALNICTWA

No. 6/2013

INSTITUTE OF WELDING BULLETIN

BIULETYN INSTYTUTU SPAWALNICTWA

No. 6 BIMONTHLY Volume 57

CONTENTS

INSTITUTE OF WELDING

The International Institute of Welding
and The European Federation for Welding,
Joining and Cutting member

Summaries of the articles

J. Rykała, T. Pfeifer – Robotised CMT welding of 6xxx series aluminium alloys

The article presents the use of low-energy and standard welding methods (CMT and MIG-Pulse) for joining elements made of hard-to-weld 6xxx series aluminium alloys as well as the course of technological tests aimed at the determination of the usability of the CMT and MIG-Pulse methods for welding butt joints made of 2.0 mm thick sheets. The work also discusses the basic difficulties related to welding 6xxx series aluminium alloys, presents the specific character of welding by means of "typical" and low arc energy methods as well as presents the selected results and analysis of macro/microscopic metallographic tests and strength tests of the welded joints. The authors indicate that CMT welding ensures high quality and aesthetics of welded joints made of aluminium alloys regarded as difficult to weld.

M. St. Węglowski, C. Hamilton, St. Dymek - Numerical modelling of Friction Stir Processing of AlSi9Mg aluminium casting alloy

The work presents the assumptions of a complex numerical thermo-kinetic model for Friction Stir Processing. The model makes it possible to calculate the under-tool temperature of the surface of a material being modified as well as to determine lines corresponding to the shifting of a material modified during FSP. The calculation results indicate the influence of a tool rate of rotation and of a tool travel rate on the concentration of lines and on the surface temperature. The article also reveals that a material being modified is composed of two zones in which the material is shifted, i.e. the primary and secondary zone.

K. Krasnowski - Effect of heat treatment of S420MC steel joints on their mechanical properties and fatigue strength

The article presents the results of tests focused on the effect of stress relief annealing on the mechanical properties and fatigue strength of joints made of S420MC steel grade belonging to a group of thermo-mechanically control processed steels. The article contains the description of the aforesaid tests and presents the results of the basic mechanical tests as well as of internal stress measurements. The text also presents information about fatigue categories experimentally determined for the four most popular types of welded joints at their initial state and after stress relief annealing. In addition, the article informs that the stress relief annealing process recommended by German guidelines SEW 088 does not result in an increase of the fatigue strength of S420MC steel welded joints.

H. Pasek-Siurek, M. Piątek, T. Szebeszczyk - Welding variables monitoring system in the FSW method – FSW weld monitor

The article describes the basic principles of the FSW method, its advantages and limitations, discusses tests and process analyses developed in various research programmes as well as presents the design and measuring capacity of a system for measuring and recording torque and pressure force in the FSW method developed at Instytut Spawalnictwa.

A. Sawicki - Approximations of arc voltage-current characteristics in electrotechnological devices

The usefulness of different voltage-current characteristics is defined for describing

different properties (static, dynamic, energy, frequency etc.) of an arc in the electrical circuits of electrotechnological devices. The influence of different physical factors on the shape of characteristics has been analysed. The study presents the analytical forms of functions developed for approximating the static and commutative characteristics of an arc in AC plasma torches with a pre-set parameter in the form of a gas mass stream and/or a plasma column length.

Biuletyn Instytutu Spawalnictwa
ISSN 2300-1674
Publisher:
Instytut Spawalnictwa (The Institute of Welding)
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