BIULETYN
INSTYTUTU SPAWALNICTWA

No. 02/2012

WELDING INSTITUTE BULLETIN
BIULETYN
INSTYTUTU SPAWALNICTWA

No. 02 BIMONTHLY Volume 56

CONTENTS

INSTITUTE OF WELDING

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

S. Kowieski, Z. Mikno, A. Pietras - Welding of advanced high-strength steels

Resistance spot welding is commonly applied in the production of steel car structures. The article presents processes during the welding of high-strength steel sheets with protective coatings (including recently introduced protective-coated advanced steels with an organic layer).

Special attention was given to tests investigating the welding of advanced high-strength TRIP-type steels. These steels, when welded with a simple one-pulse welding programme, are characterised by very high hardness in the welding area, and as a result, undergo a rupture in the trans-crystallisation plane during peel testing. In order to improve the plasticity of a joint, it proved appropriate to apply a two-pulse welding technology while joining such steels. It was ascertained that the use of an appropriately adjusted second current pulse would make it possible to obtain lower metal hardness in a weld nugget. During peel testing, joints welded with the second heating current pulse are destroyed by the complete peeling of a weld nugget.

D. Miara, A. Pietras - Friction stir welding (FSW) casting aluminium alloys with wrought alloys

Friction stir welding (FSW) is a friction welding technology particularly useful for joining aluminium alloys which are difficult to weld or even unweldable by means of other methods. The study presents selected results of tests of butt welding of casting aluminium alloys and results of tests related to joining casting aluminium alloys and wrought alloys. According to the test results, casting alloys (and casting alloys with wrought alloys) can be joined by means of FSW obtaining relatively high quality of joints within a limited range of welding conditions. The quality of joints depends on applied welding process parameters, i.e. rotational speed of the tool, linear welding rate, forces and torques/moments. The structure of the weld is proper. It is possible to observe small micro-cracks in the weld, particularly in the area of intermetallic phases. The surfaces of the face and root of the weld are free from material discontinuities. During visual inspection, no imperfections such as "no joint" or porosity were detected.

M. St. Węglowski – Modern toughened steels – their properties and advantages

The article presents the characteristics of toughened steels, their mechanical properties and production methods. Special emphasis is given to metallurgical purity and the deterioration of plastic properties accompanied by an increase in mechanical properties. The study also emphasises the advantages of using steels characterised by higher mechanical properties and discusses problems occurring during welding very high-strength steels. Special attention is given to cold cracking, welding -induced HAZ softening and failing to obtain a required level of toughness in the weld and HAZ. The article also provides information about criteria related to the selection of filler metals.

J. Czuchryj, K. Hyc – Dye-penetrant method assessment of the size of surface discontinuities in products made of carbon structural steel

Some of the oldest and most common non

-destructive tests used in the industrial practice are liquid-penetrant inspections. They enable, however, the detection of surfacing discontinuities only. Nevertheless, the possibility of estimating the size of these discontinuities may be useful in the technical diagnostics of products subject to inspections. This inspired the work aimed to determine the dependence between the size of an indication and the time of its development in the function of the size of a discontinuity. This article contains research results, their analysis and final conclusions.

Biuletyn Instytutu Spawalnictwa
PL ISSN 0867-583X

Publisher:
Instytut Spawalnictwa (The Institute of Welding)

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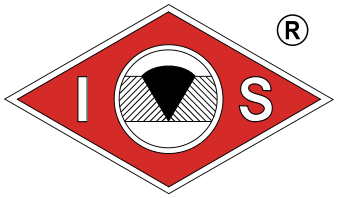
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