CO_2 Arc Spot Welding in Steel (Rept II)

—Dynamic Deformation Characteristics of Base Plate—

by Hidehiko Ono, Ren Obata, Tomihiko Teramoto and Takahiro Matsuda

The dynamic deformation occurring on the welded plate during arc spot welding was investigated.

As a result, it was observed that the welded plate deformed to the plus side of the plate (welding arc side) at about the same time as arc ignition and the deformation reached a maximum soon after. When the deformation reached the maximum, it reversed itself, reached zero, and then proceeded towards a maximum at the minus side (back side) of the plate.

In terms of arc time, in mild steel (plate thickness<8 mm), the deformation toward the plus side reached its maximum value in less than 50% of arc time and returned to zero beofre the arc was extinguished (i.e. within the arc time).

However, these characteristics changed with the material welded, as has been shown by similar experiments on stainless steel and aluminium alloy plate.

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Automatic Gouging by Air Carbon-Arc Method (Report 1)

—Effect of Gouging Conditions on Arc, Heat Input, Groove Shape and Metal Removal—

by Noboru Kimata, Shozaburo Ohta, Hidenori Suzaki and Tetsuro Miura

Automatic gouging by air carbon-arc method has been widely used as a step in welding work and in consequence the demand for all-position operation is mounting. The automatic gouging devices are classified into two types from the standpoint of electrode feed speed control: one type utilizing arc voltage for the control purpose and the other utilizing constant feed rate. The latter is one recently developed and is found appropriate for operating in all positions because of its light weight and easy operation.

In this report, gouging in flat position of steel plate was tried,using the above constant electrode feed type device as the first step to application of this method to circumferential pipe welds. Then the effects of various gouging conditions (characteristics of electric power source, gouging speed, electrode feed speed, electrode diameter and snape of cross section, and torch angle) on arc voltage, gouging current, arc stability (continuity), heat input, groove shape, amount of removed metal and melting efficiency were studied.

The main results are as follows:

1) The stability of arc largely depends on the characteristics of electric power source and the amount of fed electrode per unit gouge length (W_r).

2) The heat input (H) and removed metal per unit gouge length (W_m), ratio W_m/H and that of groove depth to groove width (d/w), an index of groove shape, are affected by gouging speed (V_h) and W_r. The ratio d/w is also affected by torch angle and the shape of electrode section.

3) If V_r and V_g are vraied under constant ratio V_r/V_g as in practical use, W_m and melting efficiency (η, ratio of heat content of molten metal to heat input) are held almost constant except for smaller values of V_g (and V_r), V_r being the feed speeed of electrode.

4) Linear regression analyses are made of data obtained under constant V_g, showing that there is close relation between W_r and W_m as well as between ratio d/w and η.

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