M e E ec de

KYCVC"Ujkp

Rtqfwevkqp"Gpikpggtkpi"Tgugctej"Fgrv0."

Abstract:

High speed and high performance submerged arc welding (SAW) with multiple electrodes is used for the corner joint welding of box column for the structural steel fabricated in Shimizu Works. The authors have developed a system to control the penetration depth of the welding and its associated system, and have adopted them into

satisfactory and stable performance of welds, which was used to be highly dependent on the skill of experienced operators, have been achieved by the system.

Submerged arc welding with multiple electrodes (multi-electrode SAW), which has the advantages qh" jkij" ghŁekgpe{" cpf" jkij" urggf." ku" ykfgn{" wugf" kp" ł cv" rqukvkqp" dwvv" lqkpvu" kp" hcdtkecvgf" uvggn." yjgtg" vjg" technique demonstrates its effectiveness. However, dgecwug" vjg" ygnf" ku" eqxgtgf" ykvj" łwz" cpf" ecppqv" dg" observed when using this welding method, it is not posukdng" vq" cflwuv" vjg" ygnfkpi" eqpfkvkqpu" fwtkpi" ygnfkpi" kp" tgurqpug" vq" vjg" rtqeguu." cpf" vjgtghqtg" fghgevu" oc{" occur. Furthermore, because the phenomenon of welding dgcf"hqt ocvkqp"ku" cnuq" eq orngz" cpf" kpxqnxgu" pw ogtqwu" tgncvgf" rctc ogvgtu." vjgqtgvkecn" enctkŁecvkqp" qh" ygnfkpi" rjgpq ogpc"ku" fkhŁewnv."cpf" ogvjqfu"qh"eqpvtqnnkpi" ygnfing conditions have not been established. For this rea-"3"ujqyu"cp"gzcorng"qh"5"gnge

trodes.) at by Submerged Arc Welding (SAW) with





Vgejpkecn"Tgugctej"Egpvgt. JFE Engineering

^{*1} I tqwr"Ocpcigt." Ygnfkpi "Vgejpke" I tqwr."

Vjku"hwpevkqp"cwvqocvkecnn{"cflwuvu"vjg" ygnfkpi"eqpditions based on the penetration depth monitoring data and controls the penetration depth to a uniform value. Vjku" ocmgu"kv" rquukdng"vq"tgfweg"vjg"ykfvj"qh"łwevwcvkqpu"kp"vjg"rgpgvtcvkqp"fgrvj"kp"gcej"lqkpv"kp"ownvk/gngevtqfg"UCY"qh"dqz"eqnwop"eqtpgt"lqkpvu0"Vjg"eqpegrv"of the penetration depth control method is described below.

(2) shows the relationship between the results of monitoring of the arc position and the shape of the rgpgvtcvkqp" dgcf" qp"vjg" dcem" ukfg" *gswkxcngpv"vq"vjg" rgpgvtcvkqp" fgrvj+"kp"qpg"ukfg" ygnfkpi0"Vjg"gzrgevgf" relationship between the estimated arc position and vjg" ujcrg" qh" vjg" rgpgvtcvkqp" dgcf" qp" vjg" dcem" ukfg" ycu"eqpŁtogf0

 $\label{eq:Vjg"cte" rqukvkqp"ku" fgLpg f"cu"vjg"uwo"*L + L_a) of vjg" yktg" gzvgpukqp"*L) and arc length (L_a), and is calculated from measurable parameters (welding current, welding voltage, wire feed speed). Penetration is convtqmg f"d{"cflwuvkpi"vjg" ygnfkpi"ewttgpv"uq"vjcv"vjku"guvkmated arc position is the correct value as set in advance. shows the parameters used to predict the arc position.$

(1) shows the relationship between the arc rqukvkqp" cpf" rgpgvtcvkqp" yjgp" ygnfkpi" łcv" rncvgu0" From this, the arc position and penetration show sub-uvcpvkcmn{"vjg"ucog" xcnwgu." eqpŁtokpi"vjcv"vjg" tgnc-vkqpujkr"ku"cu"gzrgevgf0

Application of the developed control method to y gn fkp i "qh" eqtpgt" lqkpvu"qh" dqz" eqnw o pu" y cu" uvw fkg f0"Yjgp" ygnfkpi" eqtpgt" lqkpvu." rgpgvtcvkqp" ku" kfgpvkcal to the penetration depth of the leading electrode. Vjgtghqtg."hqt"gngevtqfg"eqpvtqn"kp"vjku"v{rg"qh"ygnfkpi." penetration control is limited to the leading electrode, $cpf"vjg"qvjgt"gngevtqfgu"ctg"qpn{"oqpkvqtgf0"Cu"lqkpvu"$ y jkej "ctg" uwdlgev" vq" eqpvtqn." eqpvtqn" y cu" k o rng o gpvg f" d{"ugngevkpi"itqqxgu"ykvj"c"nctigt"tqqv"hceg"cpf"itqqxgu" y kvj "c"nctigt"tqqv"icr."eqpukfgtkpi "gttqt"kp"vjg"ceewtce{" of the grooves. As a result, in grooves with a larger root hceg." ucvkuhcevqt { "eqpvtqn" y cu" tgcnk | gf" d { "cflwuvkpi" vjg" current corresponding to the condition of the groove, and in grooves with a larger root gap, control had been rgthqtogf" d{" ejcpikpi" vjg" ewttgpv" cu" vjg" tqqv" icr" kpetgcug f0" V j gug" tguwnvu" eqpŁt o g f" v j cv" v j g" r gpgvtcvkqp" control method using the arc position during welding * o 1 vjg"ql _V 3 qp o