

A METHOD OF DETERMINING THE PROCESS FUNCTION TO THE FLUXSHIELDED ARC WELDING FOR THE PENETRATION OF THE WELDING SEAM h_p BASED ON THE PROCESSING PARAMETERS

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In the paper it is determined a mathematical model for calculating the penetration h_p depending on: the welding arc voltage U_a , the welding current strength I_s , the rate of welding v_s and the feed rate of electrode v_e . $h_p = f(U_a, I_s, v_s, v_e)$

The researches goal was to obtain a process function for the technological parameters of dismantled assemble process through automatic electrical welding using flux layers. The experimental researches have been done on a reduced octagonal plan (2^{4-1}) [HEU 00].

For the measurement units avoidance, there has been made a procedure to establish levels and parameters codes of control $FC = \{U_a, I_s, v_s, v_e\}$, as well as noise factors $FZ = \{U_a I_s, U_a v_s, I_s v_s\}$. See tabel 1.

TABEL 1		LEVELS	
Independent variables (explanatory)	COD	-1	+1
NORMAL MEASUREMENT			
Spring tension U_a , [V]	U_a	28	38
The intensity of the welding electric current I_s , [A]	I_s	500	650
The welding speed v_s , [cm/min]	V_s	112	168
The electrode advancing speed v_e , [cm/min]	V_e	120	160

Following the expermental data, there have been obtained the mathematic equation model:

$$\begin{aligned}
 h_p = & 7,1875 + 0,7275 \cdot \frac{U_a - 33}{5} + 0,1925 \cdot \frac{I_s - 575}{75} + 0,1125 \cdot \frac{v_s - 140}{28} + 0,3575 \cdot \frac{v_e - 140}{20} + \\
 & + 0,543 \left(\frac{U_a - 33}{5} \cdot \frac{I_s - 575}{75} + \frac{v_s - 140}{28} \cdot \frac{v_e - 140}{20} \right) + 0,1925 \left(\frac{U_a - 33}{5} \cdot \frac{v_s - 140}{28} + \frac{I_s - 575}{75} \cdot \frac{v_e - 140}{20} \right) \\
 & - 0,833 \left(\frac{I_s - 575}{75} \cdot \frac{v_s - 140}{28} + \frac{U_a - 33}{5} \cdot \frac{v_e - 140}{20} \right)
 \end{aligned}$$

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