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IMPACT OF WELDING PARAMETERS AT SHAFT OR AXES SURFACING PROCESS

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ABSTRACT
This paper presents impact of welding main factors analysis as: current intensity, voltage and welding speed at seam hardness of shaft or axes surfacing, which surfacing will be done at mining equipment factory in "Kosovamont"-Palaj. This factory is a part of Kosovo Power Corporation-KPK. Shaft or axes surfacing seam will by our experiment goal.
Keywords: surfacing dimensions, hardness of thermal influence area, shaft and axes.

1. INTRODUCTION
Welding regime parameters have an impact at conditions of additional material at a liquid state, at metallurgical reactions of oxidation, at refining, at conditions and speed of crystallization, etc. It means that changing of welding regime parameters cause changes at metal seam and at area of heating impact.

2. WELDING REGIME PARAMETERS AND THEIR ANALYSIS
Welding regime parameters have a leading role in the quality of surface through surfacing of shafts and axes. Selecting and regulating right parameters offer stable electric and with this qualitative welded set. Main factors which impact at reparation process of shafts and axes through welding and which has an impact at quality of surfaced layer are known as welding regime parameters. In our concrete case we are going to choose welding regime parameters of a leading drum shaft of belt I Φ630X1400. Welding regime parameters which mainly effect at welding process and also at quality of surfaced shaft with surface welding will be:

- Current Intensity
- Arc voltage
- Wire free length
- Wire diameter
- Welding speed
- Quantity of protective gas
- Chemical consisting of base and filling material
- Thickness of base material etc.

In this paper we are done the analyses current intensity, voltage and welding speed, because, those parameters have main impact at quality of shafts and axes surfacing through welding and also those parameters effect at hardness of seam and at thermal impact area too.

2.1 Current Intensity

Current Intensity is chosen according to electrode (wire)-speed. The highest Intensity corresponds to the highest speed of wire-movement. We must be careful not to overload the wire with a high Intensity, because it could cause the disorder of the welding parameters and that way we won't get a quality seam.

2.2 Arc voltage

Arc-voltage, which is also known as the welding-voltage, together with current intensity represents the most important parameters of welding regime, which impact the quality of the weld. Arc voltage depends on the length of arc and is regulated there from the electric source. Higher voltage than needed cause the melting-metal drops to fling out of the liquid. A way lower voltage can cause burn and porosity of the surfaced part of axes.

2.3 The welding speed

With the speed of welding we understand the speed of arc displacement during welding. Speed must be chosen according the other welding parameters. The welding speed impacts the depth, width and over-height of the seam, as well as on the heat level in the surfaced zone.

3. BASIS AND FILING MATERIAL CHARACTERISTICS

Experiments are done with basis material: 42CrMo 4.
The filling material is the welding electrode, which is also used in technique MAG.
The electrode or wire chosen has the following characteristics:
Electrode VAC 60, this is a basic electrode for welding a high demanded steel constructions, metal recovery 115% Re-Dry 400^{o}C/1h.

Table 1. Chemical composition of basic materials

Material	C	Si	Mn	Cr	Mo
42CrMo 4	0.41	0.20	0.75	1.05	0.23

Table 2. Mechanical properties of basic materials

Material	R_v [N/mm^2]	Rm [N/mm^2]	A[%]	KV [J]
42CrMo 4	780	1000	11	210

Table 3. Chemical composition of filing materials

Material	C	Si	Mn	P	S
VAC 60	0.08	0.90	1.50	0.025	0.025

Table 4. Mechanical properties of filing materials

Material	R_p [N/mm^2]	Rm [N/mm^2]	A_5[%]	A_V [J]
VAC 60	410-490	510-640	>22	>47

4. CHOOSING THE LEVEL OF EXPERIMENTAL FACTORS

The factor levels which impact surfacing are shown in the table below. During the execution of the experiment the vertical factors were checked: current, voltage and the welding speed.

The measurements on the surfacing axe are: over-highness (hr), depth (hp), e cross-section (b).

Table 5. Factor levels which impact surfacing

Factor level	Factor		
	I(A)	U(V)	V(m/min)
1	600	35	0.35
2	550	33	0.30
3	500	30	0.25

5. THE HARDNESS OF THE MATERIAL

The measuring of hardness of the material is done before and after processing process.
Hardness before surfacing: 36HRc
Hardness after surfacing: 40 HRc
Hardness after heat-processing: 46HRc

Figure 1. Hardness tester MIC-10.

Figure 2. Surfacing process of the axsis.

Figure 3.The surfacing layer of an axes part as well as the leading-belt Φ630X1400 after surfacing.

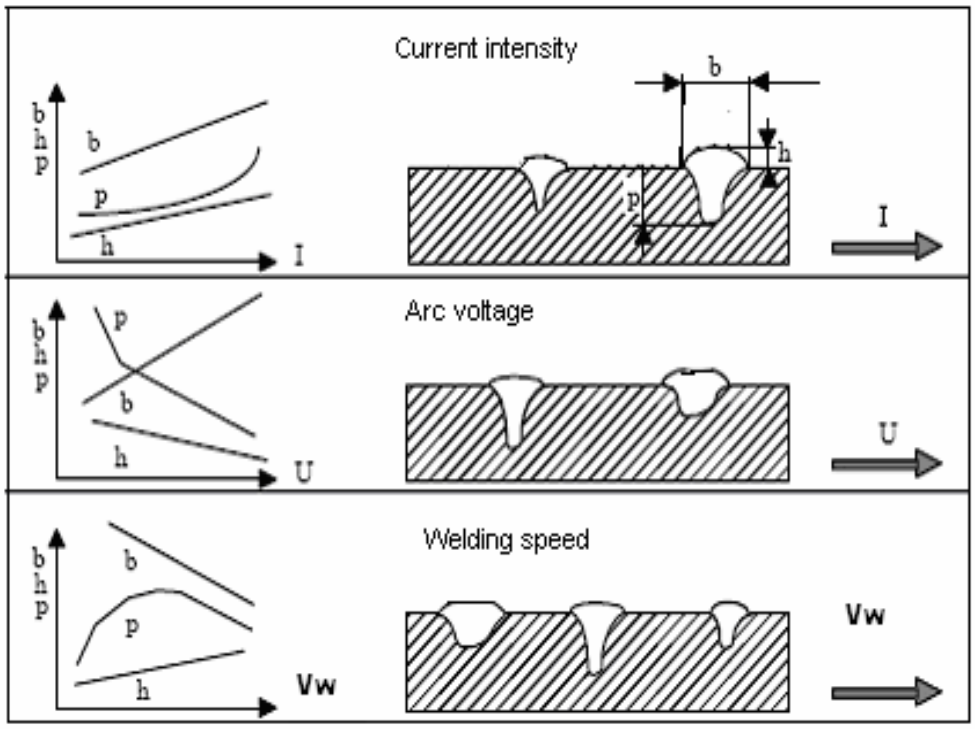

Figure 4.Welding regime parameters of surfacing

6. CONCLUSION

Leaning on the results achieved during the measurements and the proper analysis during the surfacing and the heat affected zone, we get to the considerable tempering and transforming of the area that impacts the hardness. This means that mechanical attributes of surfacing are slightly better than mechanical attributes of the base material, thus it's not a problem during the mechanical processing, and so we can conclude that surfacing of the leading shafts and axis is qualitative.

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