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QUALITY CONTROL OF WELD REPAIRED DETAILS IN PALAJ - KASTRIOT, KOSOVA

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ABSTRACT
Welding repair of machinery details has the purpose to improve the geometrical form and obtain again the desirable fits of them. In Palaj – Kastriot everyday is performed the weld repair of different machinery details such as shafts, axes, bearing housing, gear housing etc.
After repair every detail is inspected by NDT methods and techniques.
In this study is shown the procedure of quality control of different weld repaired details and result of their inspection.
Keywords: Weld repair, quality control, details,

1. INTRODUCTION
Regardless of the fact that welding technology today is improved, like to other processes of productivity, it is almost impossible to not display mistakes. That is why the control after welding repair has to be done all the time.
There are a lot of factors that impact in the success of repairing details. Some of them are listed below;

- Right choice of welding parameters
- Right choice of welding technique during repaired process
- Welder should be qualified and knows in detail welding technique used in repairing process
- Welder should follow the technological rules
- Basic and filler material should have such properties that are suitable with the method of welding used during repaired process.

After repair control is pretty important process to determine whether the reparation of details by welding was successful and whether the repaired details have gained necessary mechanical and chemical properties that were required before the process started.
In this study is shown the process of quality control of different details that are repaired by welding in Palaj, Kastriot, Kosova.

2. AFTER WELDING REPAIR CONTROL OF DETAILS

As above mentioned, during the welding repair process the presence of mistakes is almost inevitable. Mistakes that appear to the repaired details in general are described as:

- Internal mistakes such as porosity, cracks, scum etc. These mistakes affects in the homogeneity of details;
- Discontinuous of seam;
- Structural change of chemical composition or mechanical properties of repaired details because of very high temperatures used during the welding.

In Palaj, successfully is done the reparation of different details by welding and their quality control. Different details are repaired such as: shafts (different types), axis, gear boxes, bearing housing etc. Their quality control is done permanently and very professionally.

After repair control includes:

- Visual control
- Control of mechanical properties (hardness)
- Control using NDT (Non-destructive testing) methods such as with liquid penetrant, ultrasound, radiographic etc.

3. VISUAL CONTROL

Visual control method represents the very first method of quality control of repaired details. Visual control includes the control of shape and dimensions of seam and whether visually is possible to notice any porosity or crack after repair.

In the figure 1a are shown details where the seam (repaired part) is almost perfect. It is very hard to remark any mistake visually. While, in the figure 1b are shown the details that were not successfully repaired by welding. Visual control shows porosity and cracks and the seam is not continuous at all.

a) b)

Figure 1. Visual control; a) Details repaired by welding successfully; b) Details that are not repaired by welding properly

4. HARDNESS CONTROL OF THE REPAIRED DETAILS BY WELDING

Welding repair of machinery details besides the purpose to improve the geometrical form and obtain again the desirable fits, it also raises the hardness of them. In Palaj, to measure the hardness of repaired details is used the Unit MIC 10 Krautkramer (figure 2). Before measurement, it is necessary that details to be cleaned. Three or more consecutive measures are done and in the end is found the average value.

Figure 2. Unit MIC Krautkramer and the way of measurement of the hardness of different details

The results of hardness measurement of some details done in Palaj, before repair, after repair or after heat treatment if it was necessary, are given in the table below.

Table1. Hardness control of some weld repaired details measured in Palaj

Details		Basic Material	Hardness		
			Before repair	After repair	After heat treatment
1	Shaft Φ 247 x 1097 mm of the gear box SRS 400	**42CrMoS4**	22 HRC	25 HRC	30 HRC
2	Bearing housing of active tumbler Φ800 x 2100 mm	**42CrMo4**	19 HRC	22 HRC	
3	Shaft Φ215x1560 mm of the main wheel of gear box SRS 315	**Ck60**	23 HRC	28 HRC	38 HRC
4	Electromotive shaft 315 kW	**Ck45**	18 HRC	23 HRC	

5. LIQUID PENETRANT AND ULTRASOUND CONTROL OF REPAIRED DETAILS

Liquid penetrant control is very successful method to find mistakes in the surface (till 5 mm deep) of repaired details. It is an easy method and very practical.

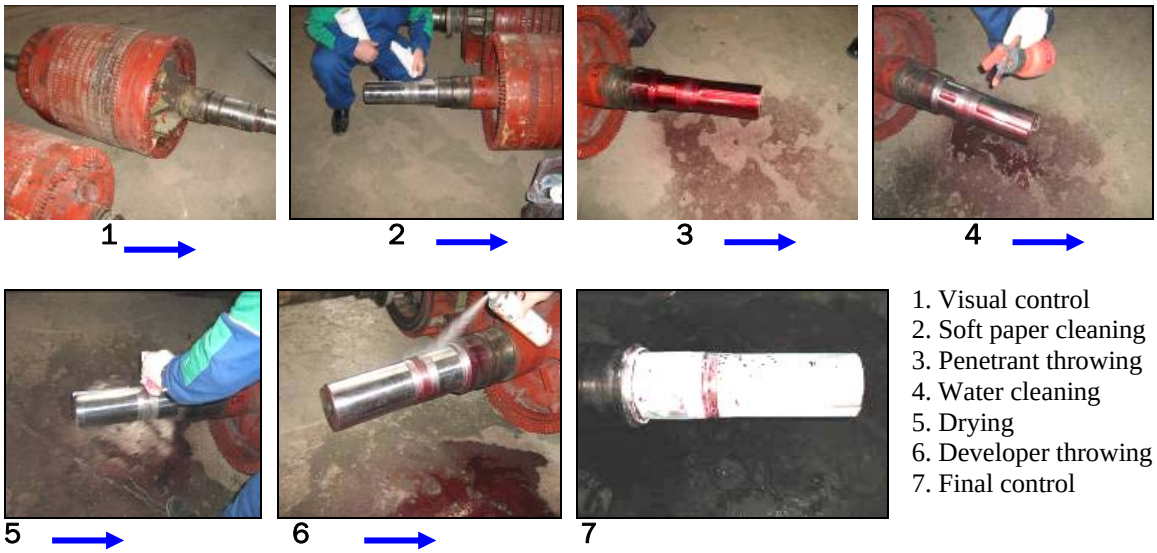

Figure 3. The phases of liquid penetrant control of electromotive shaft 315 kW

In this study I have shown the procedure of quality control of an electromotive shaft 315 kW repaired in Palaj. Procedure, illustrated with pictures is given in the figure 3. The type of Penetrant used was MR 68 C, red color. Developer used was Developer MR 70, white color.

As it is shown in the figure 3 the number of red dots in the repaired area is pretty small, which shows that electromotive shaft was repaired successfully. So, the mistakes (cracks or porosities) during the repair process almost do not exist.

The other details that have been controlled by liquid penetrant or ultrasound are given in the figure 4. Results show that to both of them is very small number of surface cracks or porosities, means that they were repaired successfully.

Figure 4. Details controlled by liquid penetrant and ultrasound

6. CONCLUSION

Repair by welding of different details is everyday work in Kosova Power Corporation (KPC) and its department "Kosovamont" in Palaj – Kastriot. Due to the economical problems the corporation has right know and because of the urgency for productivity of power, corporation is forced to repair most of the damaged details instead to replace them with new.

Quality control of repaired details is done permanently and as is shown in this study most of the results are positive, means that their repair is done properly and very professionally. The control includes visual control, control of mechanical properties (hardness) and NDT methods where liquid penetrant and ultrasound methods are used mostly. In some cases radiographic control is done as well.

Researches i have done in Palaj using the different methods of control and different type of details, shows that welding repair in most of the cases is done very successfully. Most of repaired details are incorporated in working process and their working hours after repair satisfy the expenses.

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