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THE RESULTS OF LABORATORY STUDIES CONDUCTED TO DEVELOP THE TECHNOLOGY OF RESTORATION OF SHAFTS

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Abstract: The microhardness of the layers obtained by contact welding of steel tapes of different brands on the worn surfaces of the shafts was studied.
To do this, the surface of the roller part was welded using 4 types of steel tapes: 50, 40X, 65G, U8A. As the carbon content increased, the microhardness of welded steel tapes also increased.

Keywords: Detail, shaft, steel, recovery, metal sheet, steel, welding material, coating material, wear rate, microhardness, hardness test, welding seam, current pulse, steel tape, contact welding.

Introduction

The method of electro-contact welding of metal layers (steel and tapes) is widely used in the reconstruction of the working surfaces of parts working on fixed joints. The advantages of the electrocontact welding method are the non-overheating of the parts, the ability to obtain a metal layer of different hardness and corrosion resistance, relatively low consumption of welding material, the ability to control the thickness of the weld seam according to the amount of corrosion of the workpiece. such as good working conditions.

Electromechanical treatment is more effective when fixed joints have a wear of up to 0.2 mm. This method does not require additional coating material for the restoration of parts, during processing the surface of the part is hardened, increases its wear resistance and fatigue resistance. Galvanic coating restoration processes are the same and are recommended for use in the restoration of many parts of the same type.

Statistical analysis of the data obtained from the study of shaft neck wear in bearing joints showed that the maximum amount of wear in them does not exceed 0.1… 0.17 mm, and the ovality does not exceed 0.01… 0.002 mm.

The following results were obtained when studying the microhardness of the layers obtained by contact welding of steel tapes of different brands to the worn surfaces of the shafts.

To do this, the surface of the roller part was welded using 4 types of steel tapes: 50, 40X, 65G, U8A. In the coating, the width of the working surface of the roller-electrode was taken to be 4 mm. The resulting weld layer was obtained using helical welds. The value of the axial thrust for the formation of helical welds is 2.8 ,0 3.0 mm / rpm. was taken to be equal to. This ensured that the adjacent screw seams overlapped by about 30% (0.5… 0.6 mm).

The microhardness of the obtained weld layer was measured under a PMT-3 microscope.

In all weld seams obtained for the hardness test, it was observed that the stiffness of the seam is the highest between the screw and the lowest between them, and that the stiffness passes smoothly from maximum to minimum and from minimum to maximum.

As the carbon content increased, the microhardness of welded steel tapes also increased. Therefore, the microhardness of the sample welded with U8A steel tape was the highest ($N_m \approx 800$). It was found that the microhardness of the welded sample of 40X alloy steel tape ($N_m \approx 700$) is slightly higher than the microhardness of the welded specimen of 50X steel strip ($N_m \approx 650$). This is due to the presence of chromium carbide in 40X steel.

It is known that in the reconstruction of worn parts by contact welding, the welded

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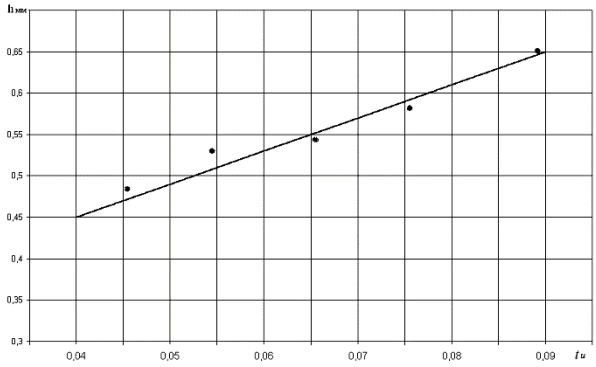
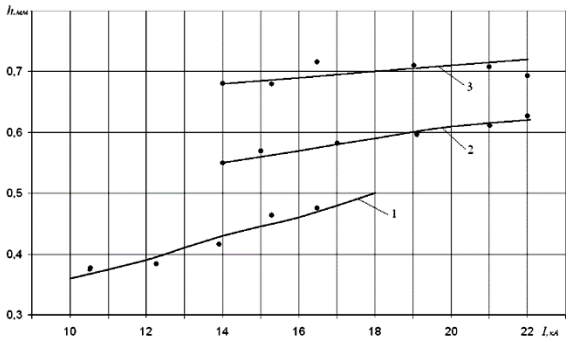
points formed by intermittent current pulses are used in the form of helical welds, which to some extent overlap each other. The weld strength of the weld and the strength of the part depend to some extent on the welding modes and, consequently, the depth and speed of thermal exposure. Therefore, we studied the effect of current and pulse time on the depth of thermal exposure.



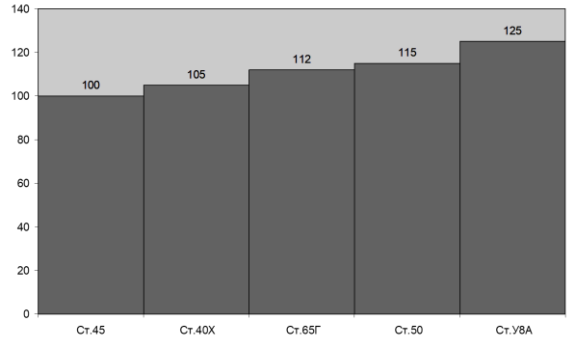
Picture 1. Graph of the dependence of the depth of thermal impact of the weld on the time of the current pulse.



Picture 2. The depth of the thermal effect of the weld depends on the current dependence graph

1- Current pulse time t_p = 0,04 s;
2- Current pulse time t_p = 0,06 s;
3- Current pulse time t_p = 0,08 s.

We know that in the preparation of the connecting surfaces of shafts with bearings, depending on the amount of carbon and other alloying elements, their surface layer is heated or cemented by high-frequency current. When restoring such parts, structural changes occur on their heat-treated surfaces, and as a result, they lose their original properties. The graphs show that the depth of the thermal effect of the current increases with increasing current strength and pulse time in the restoration of worn parts by contact welding. This, in turn, indicates that it is possible to harden the surface layer of the regenerated part to the required thickness during the welding process. This raises the question of how the hardening of the welded layer affects its weld strength. Therefore, experiments were conducted to determine the weld strength of the coating layer by contact welding of steel tapes of different brands. Its results are shown in the figure below.



Picture 3. Relative welding strength (in%) of steel tapes of different grades coated with contact welding to steel specimens of St.45.

As can be seen from the picture, the welding strength of steel strips with high corrosion resistance is also higher than that of st.45.

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