Kakhovskyi Y., Kakhovskyi M., Ievdokymenko A.
(Paton Electric Welding Institute of NAS of Ukraine, Kyiv)

ACTUALITY OF DEVELOPMENT OF WELDING AND REPAIR TECHNOLOGY FOR THE HYDROENERGY INDUSTRY EQUIPMENT

E-mail: m.kakhovskyi@gmail.com

Nowadays, 103 hydraulic units are in operation of Ukrainian hydropower industry. During their long-term operation, the housing of the impeller chamber is subject to destruction due to wear, which leads to decreasing of generating capacity of the hydroelectric power plant, failure of the water turbine and starting of the repairing processes.

The hydraulic unit consists of the water hydroturbine and the hydroelectric generator connected by a general shaft and located in the metal-concrete case of the impeller chamber. The impeller chamber is a metal structure of low-alloy low-carbon steel (Steel 3), covered with a cladding layer of high-alloy corrosion-resistant steel Cr18Ni10Ti.

Currently, the repair technology is to restore the geometry of the surface by manual arc welding with coated electrodes for low-alloy low-carbon steels and surfacing layer of high-alloy corrosion-resistant steel.

However, this technology has disadvantages, including the spells and cracks in the weld metal due to the formation of martensitic layers, low productivity of manual arc welding, as well as long downtime of the production cycle of the hydropower plant [1].

The purpose of research is to develop a simplified and faster technology for welding and repair work at hydropower plant objects. To achieve this goal, it is proposed to develop a technology of restoration of the impeller chamber by mechanized arc welding with self-shielded flux-cored wire.

This type of welding wires is characterized by relatively increased surfacing productivity, the ability to vary the type of weld metal in a wide range, as well as

due to the optimized gas-slag-forming system to provide high mechanical properties of weld metal and possibility of welding in all spatial positions.

In addition, the absence of the need to use shielding gas cylinders has a positive effect on the mobility of welding work in any places and in tight spaces.

To solve scientific problems, it is necessary to choose the optimal alloying system of the weld metal [2, 3], which will provide high anti-corrosion and wear-resistant properties of cavitation and hydroabrasive types of wear, as well as the absence of brittle martensitic layers during surfacing of dissimilar types of steels.

Development and further industrial implementation of this repair and restoration technology and self-shielded flux-cored wire should increase the technical and operational characteristics of the restored hydropower equipment due to high cavitation and corrosion resistance of the weld metal, simplify technology and accelerate welding and repair work, as well as increase service life of hydraulic units and provide economic effect by shorter downtime of hydroelectric power stations production cycle.

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