Abstract

In the presented dissertation, research issues were addressed in the field of fabrication of hardfaced layers obtained by methods with increased energy density: (i) plasma hardfacing (PTAW) and (ii) laser hardfacing (LMDW). The motivation for the study of these methods was the possible achievement of layers with better wear properties than the conventional and commonly used industrial arc methods, mainly FCAW.

The study examined both the influence of surfacing technology and the selection of process parameters. An important assumption of the study was the use of the same supplementary materials (powder wires) that were previously used at the plant for the FCAW method. Due to different technologies applied to each method, it was necessary to develop an individual test plan for making individual stitches. Then, in the next part of the paper, the research methodology is described.

The next section presents and discusses the test results. The test samples included single stitches, which were characterized in terms of their macro-and microstructure, degree of mixing, quality of surfacing and microhardness. Then, based on the relevant criteria, parameters were selected for forming full layers. One of the most important elements of the work was the determination of the functional properties of the full layers, i.e., resistance to metal-mineral abrasive wear and the determination of corrosion resistance in a salt chamber.

The results of the study showed that the microstructure, degree of mixing and microhardness of both individual stitches and full layers are clearly related to the surfacing technology and the selected parameters. Correlations were also observed between abrasion and corrosion resistance and the type of additive material and the surfacing process. The work was concluded with a discussion of directions for further research and a summary.

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