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Selection of the Optimal Reparation Technology for Working Parts Subjected to Abrasive Wear

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Abstract. The aim of this paper is to perceive possibilities for extension of the working life of parts exposed to abrasive wear. For this problem to be successfully solved it is necessary to understand the mechanism of abrasive wear which leads to damage of the working parts. The optimal technology of hard-facing is determined based on voluminous model investigations, where the microhardness and wear resistance of the hard-faced layer were examined. The selected technology was then tested on the real hard-faced parts.

Keywords: hard-facing, abrasive wear, reparation, hardness, microstructure

1. Introduction

Considering that wear is the inevitable phenomenon in industrial systems, the tendency should be to decrease it to the lowest possible extent. Abrasive wear is the most dominant type of wear. In order to extend the working life of parts subjected to abrasive wear, they are, the most frequently, hard-faced with some of the welding technologies. Thus hard-faced parts usually exhibit longer working life than the newly manufactured non hard-faced parts, what is also accompanied by the significant positive techno-economical effects.

The numerous experimental investigations on models have led to establishing of the relationship between the input and output parameters of the hard-facing process. The input parameters are the base metal properties and the required properties of the hard-faced layer, while the output parameters are properties of the hard-faced layer metal, its microstructure, microhardness, wear resistance, corrosion resistance, toughness, etc.

2. Basic Causes of the Working Parts Damages

Main causes of working surfaces damages of various parts of machines and devices are the tribological processes, while the costs caused by them are exceptionally high. For decreasing those costs, it is necessary to possess modern knowledge from the area of tribology that are related both to design and exploitation of parts, bearing in mind all the requirements for more economically efficient material consumption, rational consumption of energy resources, as well as for efficient maintenance and increase of the working life and reliability of products [1].

2.1 Abrasive Wear

Abrasive wear is defined as the process of the surface material destruction caused by sliding of harder material (abrasive) over the softer material, what causes the plastic deformation and leads to micro destructions, the most often plowing of the softer material surface. Abrasive wear includes more than a half of all the types of wear. The parts that are the most exposed to abrasive wear are parts of agricultural machines, elements of transportation devices, working parts in metallurgical plants, parts of railway equipment, hydraulic turbine wheels, drills for oil and water wells, sand-blasting equipment parts, civil engineering mechanization parts and others. The abrasive wear mechanism consists of appearance of hard particles, their adhesion and sticking to the surface of the

