Vol. 34, No. 3 (2012) 138-151

Tribology in Industry

www.tribology.fink.rs

RESEARCH

Reparatory and Manufacturing Hard-Facing of Working Parts Made of Stainless Steels in Confectionary Industry

S. Rakić[a], V. Lazić[b], S. Aleksandrović[b], S. Mitrović[b], R. Nikolić[b,c], D. Milosavljević[b], R. Čukić[b]

[a] *AD "Paraćinka" Paraćin, Branka Krsmanovića 99, 35250 Paraćin, Serbia.*
[b] *University of Kragujevac, Faculty of Engineering, Sestre Janjić 6, 34000 Kragujevac, Serbia.*
[c] *University of Žilina, Faculty of Civil Engineering, Univerzitna 1, 010 26 Žilina, Slovakia.*

Keywords:

Reparatory
Hardfacing
Filler material
Confectionery industry
Wear
Hardness
Microstructure
Shape punch

Corresponding author:

V. Lazić
University of Kragujevac, Faculty of Engineering, Sestre Janjić 6, 34000 Kragujevac, Serbia.
E-mail: vlazic@kg.ac.rs

A B S T R A C T

In this paper, for the sake of improving the reparatory hard-facing technology is especially analyzed reparatory hard-facing of tools for manufacturing compressed products in confectionary industry. Those products are being made of a mixture consisting of several powdery components, which is compressed under high pressure. In that way the connection between particles is realized, thus achieving certain hardness and strength of the confectionary product. The considered tool is made of high-alloyed stainless steel. The tool contains 30 identical working places. Besides the production process wear, on those tools, from time to time, appear mechanical damage on some of the products' shape punches, as cracks at the edges, where the products' final shapes are formed. Those damages are small, size wise, but they cause strong effect on the products' final shape. The aggravating circumstance is that the shape punch is extremely loaded in pressure, thus after the reparatory hard-facing, the additional heat treatment is necessary. Mechanical properties in the heat affected zone (HAZ) are being leveled by annealing and what also partially reduces the residual internal stresses.

1. INTRODUCTION

The first part of the paper analyzes the damage of the shape punches and explores the possibility of their repair hardfacing. It also describes predominant types of wear - abrasive, adhesive and fatigue wear. The second part of the paper deals with repair hardfacing procedures. After the filler materials and the repair procedures had been chosen and technological hardfacing parameters defined, hardfacing was performed first on the models and then on the real parts. The models were used for metallographic analysis, microstructure measurements and tribological investigations. The real hardfaced parts were mounted on the tool holder and used in the production process where they were exposed to real operating conditions, after which, the wear scar width was measured. In the final part of the paper, commentary on the obtained results was given. Figure 1 shows a new shape punch before it is placed in service.