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RESEARCHES RELATED TO THE CONSTRUCTIVE IMPROVEMENT OF TEETH USED ON WORKING PARTS OF EXCAVATING-LOADING EQUIPMENT FOR SOILS AND ROCKS

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Abstract: *On the basis of a detailed analysis of the different shapes of teeth used on working parts of the excavating-loading equipment for soils and rocks, new shapes of such teeth were conceived and designed. The paper deals with the results of laboratory testing of the ware of these teeth, and the economic assessment of the efficiency of short and long term use of these teeth.*

1. INTRODUCTION

The desertion of the teeth used on excavating-loading equipment, have their origin both in the phase of construction, fabrication and function, but especially in due to a various intensive efforts during the work process.

The teeth manufacture, and especially the casting generate sometimes structural imperfections, which could not be detected by usual or complex tests. Metallurgical hiding desertions, tempered cracks, etc. could generate the steel fatigue and crack which will yield at the accumulation of strong tensile in the critical sections.

But the majority of the pieces are broken due to the unfavorable work conditions and less then constructive desertions.

Tat is why is very important to chose in a professional way the work equipment configuration, in correlation with working conditions, the type of machines, the soils and rocks particularities, etc.

2. THE TEETH WITH GEODYNAMIC PROFILE

These profile teeth are at the wear surfaces, complementary wave surfaces which during the work process are introducing in rocks well oriented vibrating energies which

produce rock excavation (fig.1). Are also moved neighbouring area which improve the next excavation step.

During the deep penetration of the teeth, the excavated material grains are detached and turned on the wave surfaces, replacing in this way the slide friction with the turned friction.

The geodynamic profile, have the advantage that both surfaces wear is uniform comparing with the traditional teeth were the wear intensity is 1:6. This thing permit a better and a long term function in report with the other teeth where the posterior surfaces are earlier weared.

Fig.1. The teeth with geodynamic profile

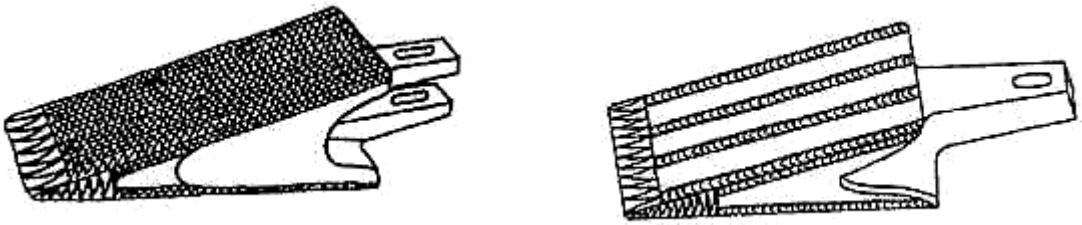
3. THE ORIGINAL TECHNICAL SOLUTIONS OF HARDENING ON SURFACE THROUGH WELDING OF EXECUTION ORGANS TEETH

The hardening on surface through welding allow a significant extension of exploitation period for the pieces exposed at wear, with difference of excavating – loading machines rocks and soils.

The most important conditions in obtaining such of results are the exactly identification of the dominant wear types and the most suitable selection of technology respectively of the consumables for the superficial hardening treatment of the surface.

Considering that the dominant wear types, specifically on grabs teeth, are the abrasion and the impact, have proposed two hardening procedures, of ESAB inspiratory, of which materialization is possible through technologies and sedimentation materials from the same companies portofolio.

The procedures assume the different welding methods for impact and abrasion, as determined factors, being fated to pre meet at the best efficiently the specific effects of these subversively phenomena.



A1 A2

Fig. 2. The hardening on surface through welding of grabs teeth submitted to impact

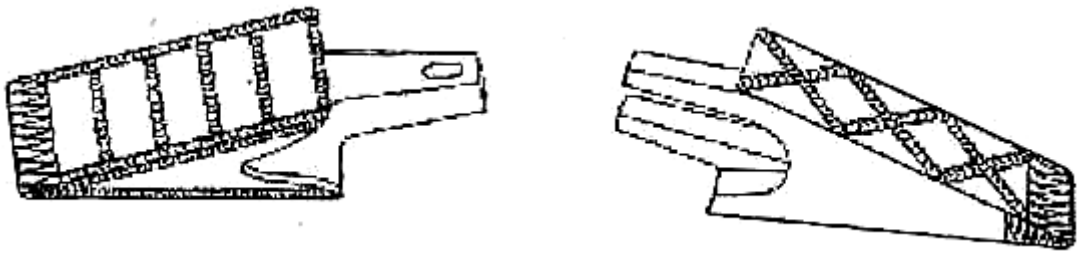
In figures 2 and A2 are presented the welding methods of the grabs teeth in wear case, having as preponderant factor the impact.

Usually, the grabs teeth that work at hard impact are made from manganese steels.

For the teeth that work in rough materials, very rugose, as rocks and minerals of small dimensions, the hardening is made through sedimentation of cordons by longitudinal welding, very close on the active edges and faces altogether. (figure no. 2.A.1).

If it has excavated and it has loaded pieces, bunches, big blocks, is sufficient the execution of some welding cordons, longitudinal, more distant, which don't allow the contact with the base material, more spineless than sedimental metal.(figure no 2.A.2).

The heads and edges of the faces are also strengthened due to maintain much more the cutting and penetrable capacity.



B1 B2

Fig. 3. The hardening on surface through welding of grabs teeth submitted abrasion

The teeth that work in abrasive environments, like sand, aggregate, salt, close-grained soils, are in general, built from weak alloy steels, hardened, but also from manganese steels that can be hardening like models presented previous.

The weak alloy steels are pre warm at approximate 200^{o} C, when the manganese steels are welding cold.

The mode selection in which position the layers and the cordons of hardening, belong to experience and the specific conditions for each situation in part.

In figure no. 2.B.1 and B.2 has proposed the execution of some transversal or oblique, that consolidate the active faces, the heads and cutting edges strengthened remaining forwards obligatory.

Through extension, is possible even recomandable the strengthened through hardening process with welding of those wear modules of grabs of excavating soils and rocks (blades, cutters, walls, corners) that work in very aggressive mediums even when the variations, their frequency, generate serious problems of output and efficiency.

4. REFERENCES

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