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STUDYS REGARDING ATTITUDE OF MILL HAMMERS IN EXPLOITATION

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Abstract: *This paper presents a study on sustainability of assets of active surface of grinding hammers coal from power plants. On the samples are made hardness measurements on four active surface coal grinding hammers, before putting them into service and well-defined intervals of time in service. The active areas deteriorate relatively quickly and a variant of increasing their sustainability is to increase surface hardness of the surface active layer of crushed coal hammer. In areas considered filing is made by welding a metal material type wire FILINOX 307. This paper is a macroscopic and microscopic analysis and hardness test by layer.*
Key words: *powder metallurgy, titanium, sparks plasma sintering, tribology*

1. INTRODUCTION

Reliability is the probability that a product under well defined conditions, the functions for which it was created during a time t (at a time). Product quality is determined by all the properties (characteristics) of its useful that we can observe measure or at least try and compare with a standard.

Reliability is thus able to maintain the temporal quality of the product. Reliability has four distinct forms:

- Reliability estimate (projected)
- Reliable experimental (laboratory) can cause accelerated methods (overstressing) normal;
- Operational reliability (actual) - determine the actual operating conditions;
- Rated reliability (life) - is part of the product and is guaranteed by the supplier. Reliability of nominal lifetime is one of the most active elements of power plants. The main factors affecting reliability are rated:
- Such as steel - structural condition and maintain them unchanged for a while as much;
- A technological nature - malleable hot and cold welded joints, which should not alter the structural state but on the contrary to improve
- Thermo-mechanical in nature - high temperatures and pressures cause operating times than applications that affect the structural state and mechanical characteristics
- Chemical - environmental action work, water, steam, gases, which cause corrosion and erosion of material

The most important factor is such that metal is strongly influenced by other factors but in particular those of thermal and mechanical nature.

Following preparation plant and associated coal dust burning a mill we observed reduced operating time because the hammer mill used in grinding wears away quickly. The life of these hammers are relatively small, is extended by classical methods of loading the active parts welding. Among the methods used can remember MIG-MAG, MAG each in several variants.

Coal crushing mill is serves to dry and grind the coal. To get the coal to the desired size, the mill must operate at optimum parameters which give the technical characteristics for each mill.

Mill technical features four are: flow of raw coal 44 tons / hour; nominal torque spindle mill 614 rpm; drive motor speed 1000 rpm; drive motor power 1000kW; grinding fineness R0, 09 ... 45-55; 4-5 R1; separator temperature 120-180; humidity 14% powder; temperature gas absorbed (maximum) 900-970; full flow fluid transported 22, 49 m3N / S; dust concentration 0.31 kg dust / kg fluid; 2750mm outer diameter of the fan mill; 1980 mm diameter fan; numbers of hammers 3 lines x 6 hammers; hammers disposed in line, among I. III, V

2. RESULTS AND DISCUSSIONS

Cast steels are used for parts requiring high strength and toughness, they are much better of economically and technologically than other types of steel.

Casting properties are great for non alloy OT 40 OT 70 (STAS 600-82) or 200-400W….340-550W as ISO 3755-1995, but are used because they are weldable cast steel (the only allied with preheating to 300-500^{0}C). European standard for work is SREN 1090 -3/2008.

For alloy steel casting were 0.1 ... 0.6% C, 0.4 to 0.8% Mn, 0.25 to 0.6% and max. -0.05% 0.04 S .These steels usually apply heat treatment to achieve higher values of mechanical properties. Low alloy steels are frequently in composition Cr, Ni, Mo, Mn and Co, they are harder to cast with melting temperatures and higher flood flow and to introduce additions of Mn, Si, Cu, V, P. these steels are used for casting parts as a result of heat treatment and recovery or improvement of normalization (quenching plus return) to obtain high mechanical properties and well balanced.

It was chose for study the active element type coal grinding mills which is a hammer. There is a set of 6 hammers arranged in three rows.

Following technical analysis of mill hammers, we identified the affected areas during the milling process and have been charged by welding.

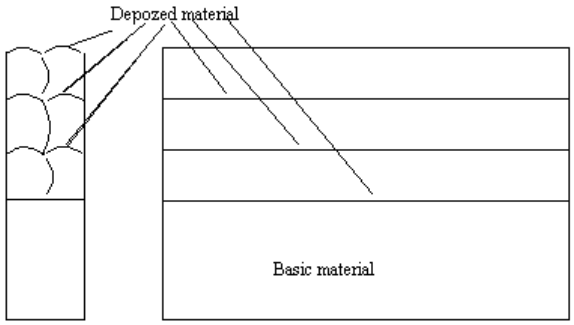

Fig. 1. Layers deposited by welding on hammers

In the experiments have used basic materials, alloyed steel castings which were loaded by welding MIG / MAG (131) Gas Ar / 2% O2 (M13/EN439).

Starting materials used were 10 mm thick plates taken from hammers to crush coal were machined steel castings made by 340-550W (ISO 3755).

In experiments were used as filler material wire FILINOX mark 307 (EN ISO 14343) with a diameter of 1.2 mm.

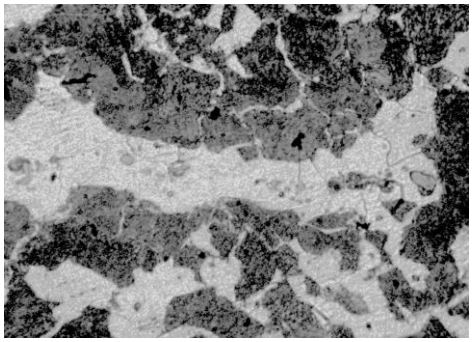

Fig. 2. Basic material structure, Nital 2%, 100 x

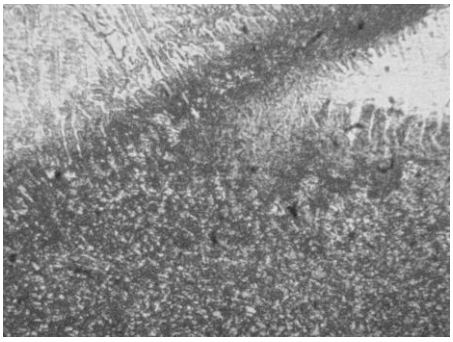

Fig. 3. Thermally influenced zone structure, (Nital 2%, 100x)

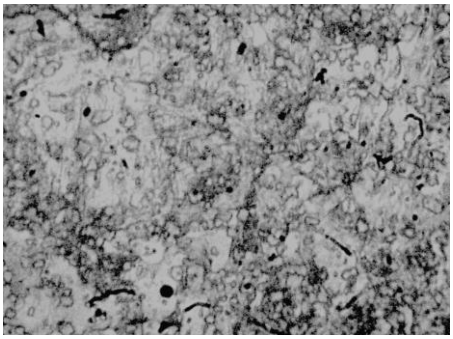

Fig. 4. Material deposed structure (ferric chloride 500x)

Hardness measurements for samples analyzed allowed the determination of minimum and maximum values for each area analyzed. There has been attempts hardness according to EN ISO 506507-4. Values obtained were:

Basic material 211 – 244 HV5 (MB)
Thermally influenced zone 210 – 265 HV5 (ZIT)
Material deposed 355 – 715 HV5. (MD)

On the processed surfaces appeared uniformly dispersed goal in the hammers material, this had results from the process of cast mill hammers (Safta & Safta, 2006).

Areas mill hammers which were loaded with hard alloys welded were machined before uploading. After processing the casting surface defects occurred (goals) in diameter max. 5 mm, dispersed uniformly on all surfaces. Loading hard alloys welding was carried out over these goals(Arzt & Grahle, 2006).

The research was limited at the welding process MIG/MAG. In the future the research plans contains another type of welding process with different elements which can improve the wear resistance of active surface of grinding hammers coal from power plants.

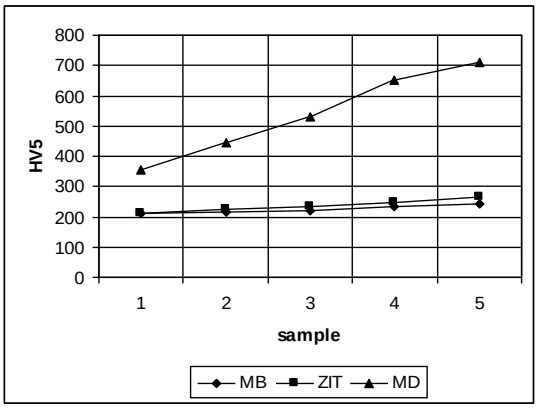

Fig. 5. Hardness measurements for samples

3. CONCLUSIONS

The metal base (MB) there is ferrite-pearlite structures, the ferrite are placed inter-dendritic. No defects were observed casting (Truşculescu & Demian M, 2006).

Thermally influenced zone have developed pearlite structures with ferrite needle and network No defects were observed.

The metals deposited by welding structures are tough, formed by martensite and complex carbides located mainly intra-interdendritic

Areas examined showed no evidence of defects. Analysis of microstructures and hardness measurements see that trend appears fragile due to structural constituent's inhomogeneous hard place on deposition section by welding. Given that life for these methods of loading and welding are known are satisfactory, for the future can be find other way of the mill refurbishment for the hammers.

From the figure 5 can be observe that the hardness of the welding elements are different for the basic material, thermally influenced zone and material deposed.

For each type of material zone the hardness is different, and increases from the basic material to the material deposed.

In the basic material thermally influenced zone hardness measurements show that there is uniformity of values, but in the material deposed there is a fluctuation of the hardness values. These values fluctuations of hardness on the surface of the material determine a different comportment at stress and of course there is a different wear resistance at the hammer.

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