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ASSESSMENT, BASED ON THE SCAN, THE APPEARANCE OF FINISHED SURFACES BY FINPLAST METHOD

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Abstract: *This paper presents the possibility of using scanning method to analyze the mechanical processed surfaces. For example the author presents the effect on antifriction alloy surfaces finished by FINPLAST process.*
Keywords: *sliding bearings, FINPLAST, scanner*

1. OVERVIEW

FINPLAST method [DID-2004], is an original method proposed by the author, for finishing by cold plastic deformation of antifriction materials surfaces of sliding bearings. Starting from the necessity of making a comprehensive study of the effect of finishing by FINPLAST method, on the quality and performance tribological of antifriction materials. At first, the author proposes the use of the scanning process.

The process allows for efficient visual analysis of these effects by a process very fast and easy.

Benefits are given, besides the speed and convenience to achieve image, increased possibility to select and playback of details which shows the interest of greater scope than the microscopic, actively and directly control the image below to register, can select meaningful and interesting details. Also, possibility of direct use of reports desired magnification, by requirements, possibilities of filtering and correction, spins, cuttings of areas of interest, etc. After registration, digital image thus obtained, are subordinated to all features and benefits of these types of images. For review and evaluation process were taken into account the following parameters:

- Type of alloy: *AlSn10 ,* obtained by plating hot, and CuPb5 obtained by sintering heat;
- Value finishing force F [daN];
- Number of passes n ;[i]
- Lubrication or not contact during finishing;

Varying these parameters were obtained sample surfaces, encoded with a group of two numbers that identifies and the detail presented.

2. DESCRIPTION AND ANALYSIS OF THE EXPERIMENTAL RESULTS

In *fig.6.1.1.* render scanned image at 1:1 scale of the alloy AlSn10, and in *fig.6.1.2* of the alloy CuPb5 . For determinations was used with a regular scanner performance.

Each image is accompanied by describing the characteristics of private technological parameters. Details were made by cutting the original image and its corresponding increase. Number detail is identical to the proof of which was detached details. For alloy AlSn10, this number indicated above each sample, in fig 6.4.1. reproduced at 1:1 scale. Under every detail are shown values of technological parameters , used for each sample. The first number 1 indicate AlSn10, and number 2, alloy CuPb5.

By abbreviation z.n.f are specified areas that have not undergone finplast method. They represent a benchmark for comparing the resulting surface finish turning. There was an excessive of these areas (z.n.f.) compared to the other under the deformed plastic finish.

This is explained by the existence of preferential orientation of crystal surfaces, resulting from contact with the cutting tool, that increase reflective surface. Can discern roughness surface resulting from the previous finish turning plastic deformation. Surface opacity subject finplast, shows a clear change in the relative position of the crystal surfaces resulting from turning. After finishing, the crystals were shifted by very different directions. As a general observation, all surface finishes by finplast process, regardless of the parameters used, shows a significant change in comparison with (znf).

Details of differences render the figure, depending on the parameters used. It may be noted, much darker color of finished surfaces in the presence of lubricant. One explanation may be uniform pressure on each socket roughness, due to the lubricant.

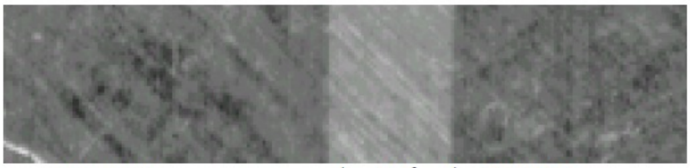
Darker areas correspond to deeper portions of roughness, when the reflected wave go a long way and impresses less receiver optical scanner. In terms of tribological [DUD1984], homogeneity of the contact surface roughness greater importance than size. Accordingly, alternation as homogeneous bright areas with the darkest in terms of tribological is advantageous.

In the case of alloy *AlSn10* indifferent what kind of finishing parameters used, results a surface with rough homogeneous, in which, in the most part, roughness after turning disappeared. Also process significantly change the characteristics of rough surfaces, obtained by turning.

1.1 1.2 1.3. 1.4. 1.5. 16. 1.7. 1.8. 1.9. 1.10. 1.11.

Fig. 6.1.1. scanned image of evidence study from AlSn10 (scale 1:1)

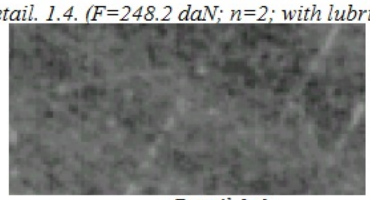
Detail. 1.1. (F=248.2 daN; n=1; without lubrication)

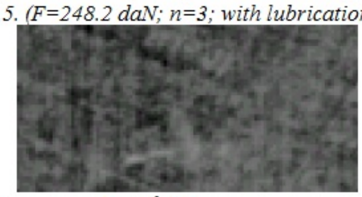


Detail 1.2 ^ *z.n.f.* ^ *Detail1.3*

(F=248.2 daN; n=2; without lubrication) *(F=248.2 daN; n=1; with lubrication)*

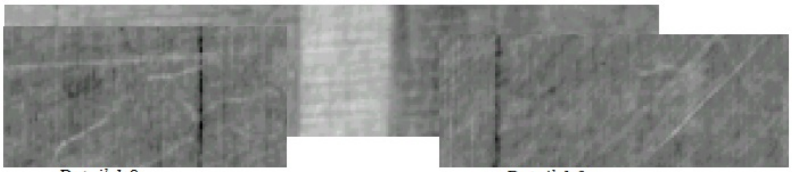
Detail. 1.4. (F=248.2 daN; n=2; with lubrication) *Detail. 1.5. (F=248.2 daN; n=3; with lubrication)*





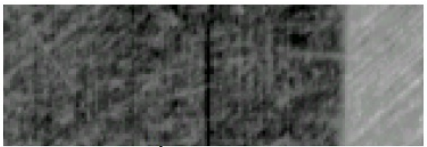
Detail 1.6 ^ *z.n.f.* ^ *Detail 1.7*

(F=328.5 daN; n=1; with lubrication) *(F=328.5 daN; n=2; without lubrication)*



Detail 1.8
(F=456.2 daN; n=1; with lubrication)

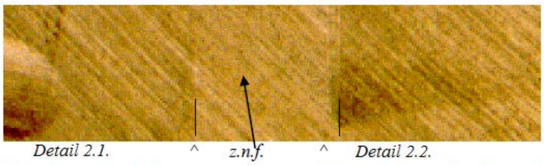
Detail 1.9
(F=456.2 daN; n=5; without lubrication)



z.n.f ^ *Detail 1.10*
(F=143 daN; n=5; with lubrication)

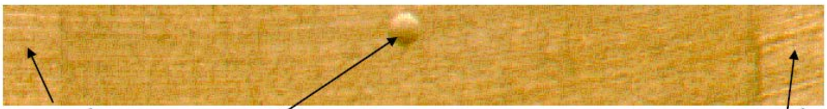
Detail 1.11 ^ *z.n.f*
(F=77.5 daN; n=1; with lubrication)

Fig.6.1.2 Scanned image of CuPb5 samples and details.



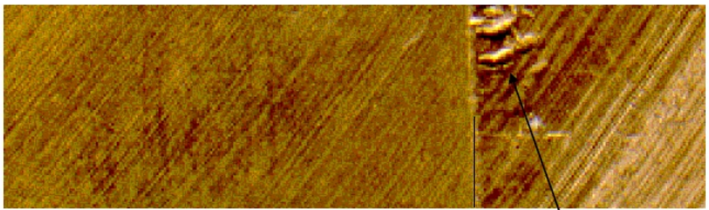
Detail 2.1. ^ z.n.f. ^ Detail 2.2.
(F=77.5 daN; n=1; without lubrication) (F=248.2 daN; n=1; without lubrication)

Detail 2.2. ^ z.n.f. ^ Detail 2.3.
(F= 248,.2; daN; n=1;without lubrication) (F=248.2 daN; n=2; without lubrication)



z.n.f.^ Detail 2.4. (F=248.2 daN; n=3; without lubrication) ^ z.n.f
Footprint ball from determining microhardness

z.n.f.. ^ Detail 2.5 (F=328.5 daN; n=1;with lubrication)



Detail 2.6. ^z.n.f.
(F=328;5 daN; n=1; with lubrication) ***Cutting defect corrected***

Peculiarities effect finish forming finplast, for alloy *CuPb5* is based sintered details accompanying figure 6.1.2. All the details show that sintered alloy surface is modified compared with the alloy particular *AlSn10* plated.

All surfaces finished by FINPLAST, in CuPb5 alloy presents some differences compared to the first alloy. In all cases resulted from cutting rough character remains. The essential feature is correlated with the specific properties of the sintered material, characterized by a mass phenomenon hardening these alloys. To this is added, features of components of the alloy of Cu grains, crystals harder than Al. Another explanation is that after turning, the surface area of the resulting unbalanced structure, relatively tense due SIA layer (layer influenced Turning) [DID, 2004]. In the case of sintered alloy, powders of structure, shows on the outside surface toughest. After sintering, the particles formed a balance structure, tight in turn because of process. After turning, when it removes some of the sintered layer, voltage because of new states, superficial layer hardens, forming a hardened layer. By pressing roller, this surface tougher, suffer a „diving” in weight of the substrate, more porous and eased. Layer Geometrical is change less. From the details presented, apparent that different roughness height diminishes, depending on the processing parameters used in. This is even more evident as the deformed areas by comparing finplast, of the standard, *z.n.f..* in the vicinity, irrespective of the technology used finishing.

3. CONCLUSIONS

- It is obvious that using the most advanced scanners detalirere level will increase significantly.
- Regardless of the technological parameters of the process, microgeometry FINPLAST effect on tribological surfaces is significant;
- Very low roughness pressing roller produce a finished surface roughness by homogenization process FINPLAST;
- AlSn10 alloy obtained by plating hot, undergoes transformations of microgeometry more significant value than CuPb5 alloy obtained by hot sintering;
- If AlSn10 alloy surfaces obtained are much closer to the ideal, for certain parameters of FINPLAST;
- For sintered materials, surface layer is significantly hardened by strain hardening, and the effect FINPLAST, proportionately less.

BIBLIOGRAPHY:

[1] [DUD1984] Dudley, D., F.,Theory and Practice of Lubrification for Engineers. John Wiley&Sons, Inc. 1984
[2] [DID2004] Dumitru Dascalu, Nou procedeu de finisare FINPLAST, Editura Printech, 2004.