WEAR BEHAVIOUR OF SINTERED REFRACTORY NANOMATERIALS PRODUCED BY HOT ISOSTATIC PRESSING (HIP)

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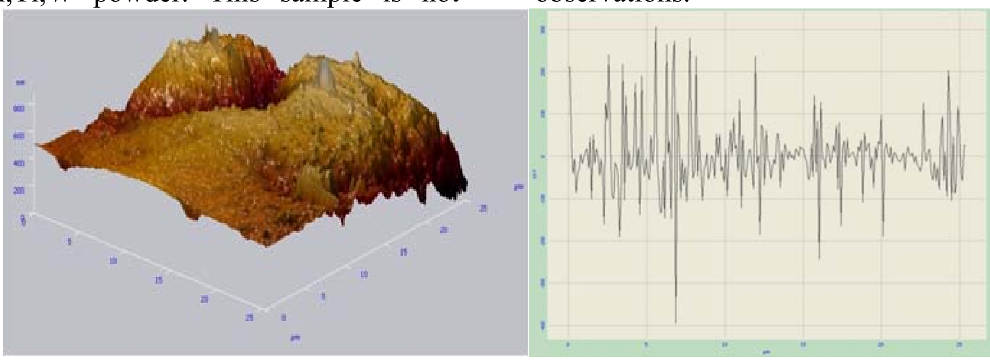
We propose an experimental study of the surface to dry and analysis of the evolution parameters roughness. The simplified model was proposed to predict the metrological parameters in the contact area of the deformed surface. The model is based on the analysis of the topography 3D of the deformed surface.
The hot isostatic pressing (HIP) is the only process that will develop fully dense samples, from Fe,Cr,Mo,Ni,Ti,W powder. This sample is hot pressed at 1500°C under 150Mpa of argon pressure. Moreover, the grain size of the consolidated samples was analyzed by SEM, ABSD and optical microscopy.

Study aims to characterize the topography of sintered materials obtained by wear tests. Therefore it is interesting initially in the evolution of wear for the loads applied and to characterize the different roughness emerging from 3D AFM observations.



(a) (b)

Figure1. a)- measurement 3D of surface topography in order to investigate its frictional behaviour.
b) Profile corresponding to real area.

The essential differences in surface topography of samples loaded in dry condition are confirmed in the analysis of roughness parameter evolution. The following 3D parameters were considered:
In the unloaded state, flattened asperities can be observed on the deformed surface Fig 1.a. The real contact area corresponding to the maximal load attained in the surface compression experiment can be identified from measurement of the deformed roughness after unloading.

The identification of the real contact area was carried out using a special algorithm based on single profile analysis. The single, randomly selected profiles, i.e., their coordinate's xi, zi, were extracted from the measured topography of the deformed surface. It should be noted that the profiles obtained in this way have a common reference level Fig 1.b. The selected profiles also have the same direction, which, in the case of anisotropic surfaces (turning, grinding) should be perpendicular to the direction of the movement of the machiningtool. The proposed model was applied to analyze a wear of four kinds of rough surfaces. The predicted values were compared with experimental results Table 1.

Max	Min	Peak-to-peak, Ry	Ten point height, Rz
577,339 nm	430,073 nm	147,266 nm	506,714 nm
Average	Average Roughness, Ra	Root-mean-square, Rq	Dispersion
510,674 nm	28,7048 nm	511,831	34,3946 nm
Surface skewness, Rsk	Coefficient of kurtosis, Rka	Entropy	Redundance
-0,157453	-0,696865	7,88768	-0,0936811

Table1. Roughness parameters of the deformed surfaces of the samples figure 1.a