

# ANALYSIS OF TiN AND Ti(C,N) THIN FILMS COATED BY PNCVD

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**Abstract:** *In the Pressure Normal Chemical Vapour Deposition ( PNCVD) coating technique, Spectrometry analysis gives the concentration profiles of the compound elements from the superficial coated layer and the layer thickness . Scanning electron microscopy is a good method than can be used in order to estimate the grain sizes of the compounds and to have an impression about the substrate cover uniformity. A minimum roughness value is necessary for the substrate in order to achieve an uniform and efficient covering. The XRD analyses confirm the existing of interstitial compounds like  $Co_3N$  and  $Fe_3N$  in these zones. After the coating processes , first of all the microhardness of the coating variants HV0,100, HV0.050 have been measured. Corrosion test in water samples covered with TiN and Ti(C,N) channel are stronger compared with uncoated samples TiN.*

**Keywords:** *PNCVD coating, SEM, thickness, Spectrometry, microhardnes*

## 1. Introduction

For tools manufacturing, the improvement of wear resistance has been made using coating technology. Thus, good results have been obtained for TiN, Ti(C,N) layers. In order to achieve these deposition,  $TiCl_4$  as Ti , precursor and  $N_2$  ,  $(CH_4)$  as a nitrogen (carbon) source have been used .

For wear resistant applications, in the case of widia, a minimum deposition temperature is required in order to not disturb the previous hardened and tempered structure.

The pressure normale activation conditions are necessary in these cases , in order to excite the reactants and to be able to break bonds in the precursor or activate the precursor to react with co-reacts.  $TiCl_4$  is frequently used during CVD processes assisted

PNCVD for wear resistant applications [1].

The high – strength electric field over the boundary layer between the temperature and surface causes the acceleration of ions to the surface .

Optical emission spectrometry (OES) can be used to find chemical composition profiles

of the coatings in depth . Thus, minimum 60 % titanium has been considered like a inside boundary of the layers thickness .

Scanning Electrons Microscopy ( SEM) analysis method has the possility to provide information about the covering grade of the substrate and the compound crystal sizes too.

## 2. Methods

### 2.1. Materials

The constructive and active geometry of the plates types T.P.U.N. 22.04.08 P30 have been tested and dimensions of samples used were:

$$\alpha = 8, \gamma = 12, \chi = 60, \Psi = 0$$

For the purpose of the experiments the maximum limit of the cutting speed was taken higher than the usual speeds to obtain a plate durability under the most difficult operation condition which should not excessively increase the time of the experiments and the material consumption [2].