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► To cite this version:

W. Ruppert. HARDNESS AND DIMENSIONS OF STEELS WITH HARD COATINGS PRODUCED BY CHEMICAL VAPOUR DEPOSITION AT MEDIUM TEMPERATURES. Journal de Physique Colloques, 1989, 50 (C5), pp.C5-421-C5-421. 10.1051/jphyscol:1989550 . jpa-00229580

**HAL Id: jpa-00229580**

**<https://hal.science/jpa-00229580>**

Submitted on 4 Feb 2008

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**HARDNESS AND DIMENSIONS OF STEELS WITH HARD COATINGS PRODUCED BY CHEMICAL VAPOUR DEPOSITION AT MEDIUM TEMPERATURES**

W. RUPPERT

*Matternstrasse 50, D-6000 Frankfurt am Main, F.R.G.*

Chemical Vapour Deposition (CVD) of hard coatings onto steels requires thorough controlling of dimensions and hardness. Dimensional and hardness problems depend on the metallurgical properties of the base and the heat treatments which are applied to the steel before and at the application of CVD. Some information on the control of the dimensions and the hardness of high-carbon high-chromium tool steels which have to be coated with hard compounds by CVD at high temperatures (HTCVD) was already presented some years ago (1).

The paper which is now proposed will deal with some dimensional and hardness problems which are connected to the production of hard coatings on tool steels by means of CVD at medium temperatures (MTCVD). Such processes are usually applied to tools which have been already heat-treated (at least quenched and tempered) and finally worked (ground and polished). Thus MTCVD involves an additional heat treatment (tempering) and may provoke metallurgical reactions in the base which cause changes in dimensions and hardness.

Starting with some components in the microstructure of steels and their specific volumes, an introduction into the dimensional changes of steels due to hardening, tempering and subcooling will be presented. The dimensional stability of steels depends predominantly on the retained austenite and the degree of supersaturation with alloying elements.

The hardness of high-carbon high-chromium tool steels will be discussed by means of spatial diagrams which show the hardness HV30 as a function of austenitizing temperature  $T_a$  and tempering temperature  $T_t$  at constant tempering time  $t_t$ , and also as a function of  $T_a$  and  $t_t$  at constant  $T_t$ . The influence of multiple tempering will be discussed with respect to the application of MTCVD.

(1) Ruppert, W; Thin Solid Films, 40 (1977) 27 - 40.