10th International Conference on Composite Science and Technology
ICCST/10
A. L. Araújo, J. R. Correia, C. M. Mota Soares, et al. (Editors)

Abstract ID-78

FRICTION AND WEAR PERFORMANCE OF TICN ON M4 HIGH SPEED STEEL FOR THEIR USE IN FINE BLANKING PROCESS

Karla Judith Moreno Bello[(1)], J. Santos García Miranda[(1)], Daniel Aguilera Camacho[(1)], Ana Arizmendi Morquecho[(2)], Abad Arenas[(1)]

[(1)]Instituto Tecnológico de Celaya, Mexico
moreno_bello_karla@yahoo.com.mx, daniel.aguilera@itcelaya.edu.mx, m1303087@itcelaya.edu.mx, santos.garcia@itcelaya.edu.mx

[(2)]Centro de Investigación de Materiales Avanzados, Mexico
ana.arizmendi@cimav.edu.mx

Keywords: TiCN, M4 High speed steel, Friction, Wear

Summary: Fine blanking process is an advanced technique of precision cutting by which can be obtained blanking parts with small dimensional tolerance, high geometry accuracy and smooth surfaces. This process has the possibility of reducing the number of process operations, reducing production time and cost as well as improving part quality and process repeatability. The fine blanking principle is based on the application of hydrostatic pressure on the workpiece through the use of a high blankholder force and a counterpunch force. The severe plastic deformation generated in the workpiece that takes places under cold working conditions caused changes in the material properties and shape of the workpieces affecting the dimension accuracy of the parts. In this point, TiCN coatings have been used as protective coatings on the surface of cutting and forming metals tools, working under heavy load/temperature conditions in high humidity or corrosive environments. The focus of the present work is to investigate the friction and wear performance of TiCN on M4 high speed steel (M4 HSS) in order to analyze their viability as working tools in fine blanking process. Friction tests were carried out on CSM Instruments Tribometer by pin-on-disk test in dry and wet conditions using oil as lubricant. The temperatures during the test for the wet conditions were maintained between 26±1°C and 50±1°C, respectively. The values of coefficient of friction (μ) were obtained directly from the Tribox 4.1 software. Tungsten Carbide (WC) ball with a diameter of 6 mm, roughness Ra = 0.02 μm and hardness of 1770 HV was slid on the M4 HSS substrate coated with the TiCN. The worn surfaces of the coatings were characterized by Scanning Electron Microscopy (SEM). The best wear performance of TiCN coatings was observed with lubrication condition at 50±1°C, obtaining lower friction coefficients and volume loss than those similar under dry condition.