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Tribological Aspects of Advanced Roll Material in Cold Rolling of Stainless Steel

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Abstract : Vancron 40, a nitrided powder metallurgical tool Steel, is used in cold work applications where the predominant failure mechanisms are adhesive wear or galling. Typical applications of Vancron 40 are among others fine blanking, cold extrusion, deep drawing and cold work rolls for cluster mills. Vancron 40 positive results for cold work rolls for cluster mills and as a tool for some severe metal forming process makes it competitive compared to other type of work rolls that require higher precision, among others in cold rolling of thin stainless steel, which required high surface finish quality. In this project, three roll materials for cold rolling of stainless steel strip was examined, Vancron 40, Narva 12B (a high-carbon, high-chromium tool steel alloyed with tungsten) and Supra 3 (a Chromium-molybdenum tungsten-vanadium alloyed high speed steel). The purpose of this project was to study the depth profiles of the ironed stainless steel strips, emergence of galling and to study the lubrication performance used by steel industries. Laboratory experiments were conducted to examine scratch of the strip, galling and surface roughness of the roll materials under severe tribological conditions. The critical sliding length for onset of galling was estimated for stainless steel with four different lubricants. Laboratory experiments result of performance evaluation of resistance capability of rolls toward adhesive wear under severe conditions for low and high reductions. Vancron 40 in combination with cold rolling lubricant gave good surface quality, prevents galling of metal surfaces and good bearing capacity.

Keywords : Vancron 40, cold rolling, adhesive wear, galling, surface finish, lubricant, stainless steel
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