AN ALTERNATIVE TO HARD CHROME PLATING BY USING THERMAL SPRAYING FOR VARIOUS TRIBOLOGICAL CONDITIONS

C. Trevisiol [a*], Y-M. Chen [a], R. Jacques [a], K. Leclerc [a], D. Cazé [a]
*celine.trevisiol@cetim.fr
[a] *Cetim, Laboratoire Tribologie, Pôle Matériaux Métalliques et Surface, Senlis, France.*

KEYWORDS
Coating; friction; wear; replacement of hexavalent chromium.

ABSTRACT
Electrolytic hard chromium coatings are widely used for their good tribological performances. Confronted to more restrictive safety and environmental requirements, manufacturers need to find alternative solutions to the use of hard chrome plating. Among these, plasma projection techniques and HVOF (High Velocity Oxy Fuel) correspond to interesting candidates. Therefore, a contribution in this field is proposed by comparing the tribological performances of hard chromium with thermal spraying coatings by using different tribological tests to experimentally simulate different wear conditions.

First, the wear and friction behaviour of the coated specimens in the case of pin-on-disc friction tests have been compared (Figure 1 (a-b)). Even if the friction coefficient values are quite similar for the different specimens, it is shown that the four tested thermal spraying coatings present a much lower wear than the hard chromium spraying coatings.
Second, the abrasion wear resistance of the coated pins in the case of pin-on-plate tests were investigated. Indeed, in this test, the coated pin is sliding against a fresh abrasive paper. It is underlined that NiCrMo coating improves slightly the abrasion wear resistance compared to the hard chromium spraying coatings.
Third, complementary tests were performed to compare Al_2O_3 and WC thermal spraying coatings by using a reciprocating ball-on-plate test. It is shown that the WC coating presents a much lower wear and a much more stable friction coefficient than the Al_2O_3 coating.

This study enables to underline that thermal spraying coatings represent a good alternative to the use of hard chromium spraying coatings in terms of wear in particular. Moreover, thermal spraying has advantages in terms of productivity and can use a wide range of materials. Therefore, efforts are currently devoted to testing more optimised thermal spraying coatings by comparing different wear initial conditions.

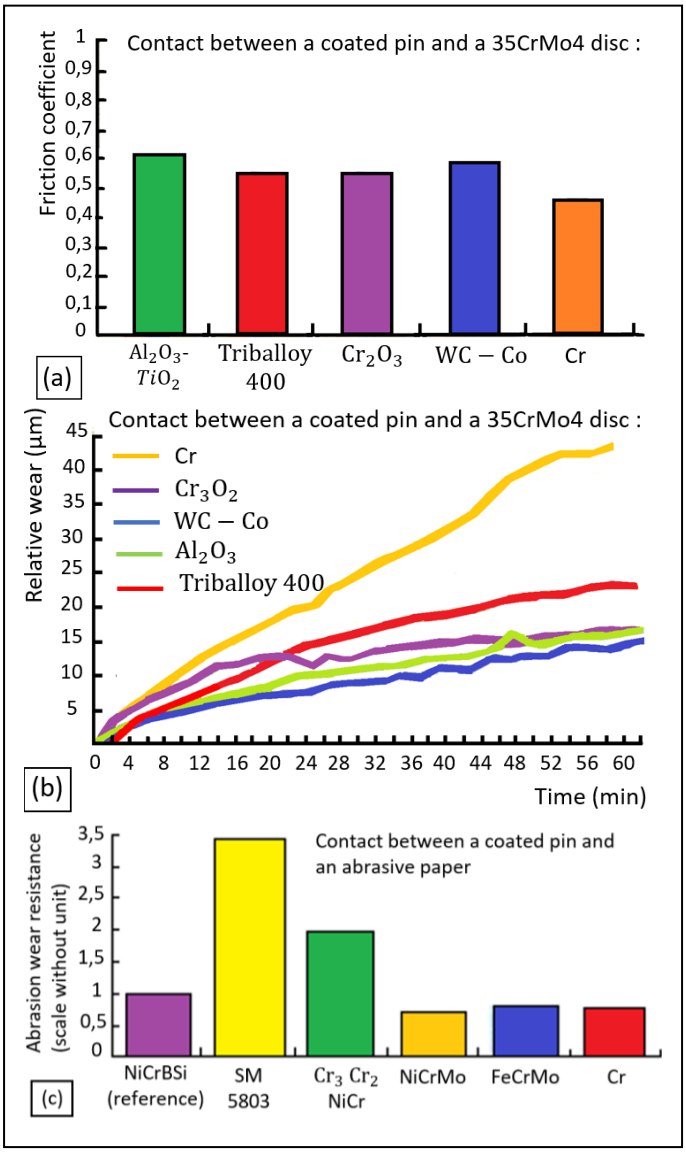

Fig.1 (a) Averaged friction coefficients and relative wear evolutions for the pin-on-disc test and (c) abrasion wear resistance for the pion-on-plate test.