

## Investigation of wear behavior of magnesium phosphate coating on AISI 4130 steel

Paper Presenter: P. Saffarzade<sup>1</sup>

P. Saffarzade<sup>2</sup>, A. Amadeh<sup>3</sup>,

School of Metallurgy and Materials Engineering, College of Engineering, University of Tehran  
p.saffarzade@ut.ac.ir

### Abstract

Phosphating is one of the oldest methods to increase the corrosion resistance of steel substrates. This coating is a conversion coating which in addition to corrosion resistance, improves the tonality, and increases the lubrication and friction behavior of industrial parts. Magnesium phosphate coating is a new type of phosphate coatings that is anticipated in near future to be a replacement for other conventional zinc and manganese phosphate coatings currently used in industry. In this paper, magnesium phosphate coating was applied on AISI 4130 steel substrate. Formation of the coating was confirmed by X-ray diffraction method and  $\text{MgHPO}_4 \cdot 3\text{H}_2\text{O}$  has been detected. The effect of process parameters such as pH and temperature of the bath on coating thickness and wear behavior were investigated. The coatings morphology has been also investigated by SEM. At the end the friction behavior was studied through sliding wear test, with a conventional pin-on-disc configuration. A stearate soap and oil were used as lubricants. It was indicated that an increase in pH as well as bath temperature increased the size of phosphate crystals which reduces the wear resistance of the coating.

**Keywords:** Phosphate Coating, Magnesium phosphate coating, pH and temperature of the bath, Wear behavior.

<sup>1,2</sup> - Master student of Metallurgy and Materials Engineering at University of Tehran

<sup>3</sup> - Full Professor of Metallurgy and Materials Engineering at University of Tehran