

Interface characteristics between PVD- AlTiN and electroplated hard chrome by duplex process

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Abstract:

Most of the hard coatings have good corrosion resistance on certain applications. The traditional way for corrosion resistance accepted by industries are electroplated hard chrome. However, in some severe environment, hard chrome can not pass corrosion tests, as a result, PVD hard coatings are applied on hard chrome to even further enhance corrosion resistance in some special applications. In this research, we are investigating the unique application of cathodic arc technology in depositing AlTiN hard coating film onto electroplated hard chrome PH17-4 stainless steel 1-inch OD shafts. The requirement for the AlTiN multi-layer coating is to take into consideration of residual stress between the hard chrome layer and AlTiN coating to ensure great adhesion between two materials. Also, the residual chemicals from hard chroming process will be analyzed and the removal of chromium oxide will be addressed in both pre-coating cleaning and in-chamber cleaning processes. This research will reveals the effect of coating process on the sensitive to temperature of the duplex coatings which related to the residual stress. Meanwhile, it is critical to monitor whether

any released on the hard chrome surface, causing contamination of chrome surface in the coating process. Results of this research will enhance corrosion resistance by applying both hard chrome and hard coating by PVD cathodic arc process.