

Investigation of the Surface Properties of Nitride Coating Created Using Conventional and Active Screen Plasma Nitriding on Al

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Abstract

Active screen plasma nitriding (ASPN) is an emerging surface engineering technology that offers many advantages over the conventional plasma nitriding (CPN). In this research aimed to investigate the nitride coating FeN or AlN created on Al1050 by using in conventional plasma nitriding and active screen plasma nitriding. At first the rectangular cube-shaped samples with dimensions, $20 \times 20 \times 5 \text{ mm}^3$ prepared. Then under atmosphere %20 H_2 -%80 N_2 , at 500 °C, 80% duty cycle and the frequency of 10 KHz for 2, 5, 10 and 15 hours were plasma nitrided. The coatings were characterized using GIXRD, FESEM and AFM. The dominate phase in the ASPN of compound layer was $\epsilon\text{-Fe}_{2-3}\text{N}$ and the dominate phase in the CPN was AlN, Also with increasing processing time, the layer thickness was increased. According to FESEM results the sample surface was formed of Nano sized iron nitride particle. The results showed that the morphology of the surface of samples coated with the method CPN are formed the nitride particles with irregular shapes. While the Surface of samples coated with the method of ASPN, to form hexagonal nitride particles covered with uniform distribution.

Keywords: CPN, ASPN, Aluminum, nitride coating.