PENGARUH VARIASI ARUS LISTRIK TERHADAP KEKERASAN PERMUKAAN DAN KETEBALAN LAPISAN OKSIDA HASIL *ANODIZING* ALUMINIUM SERI 5

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ABSTRAK

Anodizing merupakan proses pelapisan secara elektrolisis yang merubah aluminium menjadi aluminium oksida, pada permukaan yang akan dilapisi. Proses *anodizing* banyak digunakan dalam industri manufaktur khususnya dibidang otomotif karena banyak mempunyai keunggulan antara lain : tahan terhadap goresan, mudah dalam perawatan dan menambah nilai dekoratif. Tujuan dari penelitian ini untuk mengetahui bagaimana pengaruh variasi arus listrik terhadap kekerasan permukaan dan ketebalan lapisan oksida dalam proses *anodizing* aluminium seri 5.

Spesimen penelitian ini adalah plat aluminium seri 5, dengan dimensi panjang 40 mm, lebar 30 mm dan tebal 8 mm. Spesimen di amplas dengan 3 kali proses pengamplasan menggunakan amplas logam seri P1000, P2000, dan C5000 yang dilanjutkan dengan proses *cleaning* dengan larutan natrium karbonat (Na_2CO_3) konsentrasi 50 gram/1000 ml air reverse osmosis. Dilanjutkan dengan proses *etching*, *desmut*, *anodizing* menggunakan konsentrasi larutan asam sulfat (H_2SO_4) 400 ml berbanding 600 ml air reverse osmosis. Variasi arus listrik yang digunakan pada proses *anodizing* sebesar 1 Ampere, 3 Ampere, 5 Ampere, dengan waktu pencelupan 15 menit dan tegangan konstan 24 Volt. Setelah itu dilakukan proses *dyeing* dan *sealing*. Pengujian yang dilakukan meliputi pengujian kekerasan (*vikers*) dan ketebalan lapisan oksida (*coating thickness gauge*).

Hasil dari pengujian kekerasan rata-rata yaitu sebesar 57.52 *VHN*, 55.26 *VHN*, dan 54.73 *VHN* secara berurutan. Nilai kekerasan tertinggi sebesar 57.52 *VHN* didapat pada arus listrik 1 Ampere, kemudian nilai ketebalan lapisan oksida tertinggi pada proses *anodizing* terdapat pada kuat arus 5 Ampere sebesar 6.40 µm. Dari hasil tersebut dapat disimpulkan bahwa semakin besar arus yang digunakan, nilai kekerasan aluminium menurun dan ketebalan lapisan oksida bertambah.

Kata kunci : Anodizing, aluminium seri 5, variasi arus, kekerasan, dan ketebalan lapisan oksida.

THE EFFECT OF ELECTRIC CURRENT VARIATION ON SURFACE HARDNESS AND THICKNESS OF OXIDE COATING RESULTED FROM ANODIZING ALUMINUM SERIES 5

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ABSTRACT

Anodizing is an electrolytic coating process that converts aluminum into aluminum oxide, on the surface being coated. Anodizing process is widely used in manufacturing industry, especially in the automotive field because it has many advantages such as: resistant to scratches, easy to care and add decorative value. The purpose of this research is to find out the effect of electric current variation on surface hardness and oxide layer thickness in anodizing aluminum process of series 5.

Specimens of the study is aluminum plate series 5, with dimensions 40 mm long, 30 mm wide and 8 mm thick. The specimen was sandpaper with 3 times sanding process using P1000, P2000 and C5000 series metal sandpaper followed by cleaning process with sodium carbonate (Na_2CO_3) solution concentration 50 gram / 1000 ml reverse osmosis water. The process is then followed by etching, desmut, anodizing process using a concentration of 400 ml sulfuric acid (H_2SO_4) solution per 600 ml of reverse osmosis water. Variations of electric current used in the anodizing process are 1 Ampere, 3 Ampere, 5 Ampere, with a dyeing time of 15 minutes and a constant voltage of 24 Volts. It is then followed by dyeing and sealing process. Tests carried out in this study include testing of hardness (vikers) and the thickness of the oxide layer (coating thickness gauge).

The results of the hardness testing were averagely 57.52 VHN, 55.26 VHN, and 54.73 VHN respectively. The highest hardness value is 57.52 VHN wich is obtained at 1 Ampere electric current, then the highest oxide coating thickness value in the anodizing process is 6.4 μm in the electric current at 5 Ampere. From these results it can be concluded that the greater the current is used, the aluminum hardness value decreases and the oxide layer thickness increases.

Keywords: Anodizing, aluminum 5 series, current variation, hardness, and oxide layer thickness.