ABSTRACT

**THE EFFECT OF
ANODE-CATHODE DISTANCE AND CURRENT LEVELER
TOWARD THE COATING THICKNESS AND CATHODE EFFICIENCY
ON ACID COPPER ELECTROPLATING
FOR MEDIUM CARBON STEEL**

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Coating process is one of the ways to advance the surface characteristics of materials, such as for decorative purpose or even for protection against corrosion. Coating process using conventional electroplating methods has the imperfection, which is the current distribution is uneven, causing non-uniformity coating thickness and surface appearance. Anode-cathode distance determines the amount of electrical power and has a great influence on coating thickness uniformity. For that, the research conducted on the effect of anode-cathode distance and current leveler toward coating thickness and cathode efficiency.

The base metal is medium carbon steel AISI 1045, with the pure copper is used to cover the base metal, and the electrolyte that is used to play the role as electroplating agent is copper sulfate. This research uses specimens of medium carbon steel which accounted for 36 pieces with a length of 40 mm, width 25 mm and 4 mm thick. Electroplating process carried out using a variation of anode-

cathode distance of 12, 16, and 20 cm, and positioned current position leveler anode-cathode distance of a quarter, half, and three forth from the distance of anode-cathode. Then each treatment condition is repeated 3 times.

The research result shows that the largest coating mass takes place at the anode-cathode distance of 20 cm and 15 cm positions of current leveler from the anode, that is equal to 0.137 grams and the smallest one is on the anode-cathode distance of 12 cm with the position of leveler at 6 cm from anode, that is equal to 0.097 grams. The thinnest coating thickness is on the anode-cathode distance of 12 cm that is equal to 0.01667 mm. Whereas the thickest one is on the anode-cathode distance of 20 cm that is equal to 0.02639 mm. Current leveler also affects the coating thickness. Using current leveler leads coating thickness lean uniformly, while when without current leveler, coating thickness tends to be thicker at the edge or the cathode pole. The distribution of efficiency levels of copper coating process on medium carbon steel AISI 1045 with acid copper electrolyte is in the range of 65,54 to 92.57%.

Keywords: electroplating, copper, the anode-cathode distance, current leveler, coating thickness, cathode efficiency