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The Effect of Barrel Vibration Intensity to the Plating Thickness Distribution

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Abstract

In chip plating, several parameters must be taken into consideration. Current density, solution concentration, pH, solution temperature, components volume, chip and media ratio, barrel geometrical shape were most likely found to have an effect to the process yields. The 3 types of barrels utilized in chip plating industry are the conventional rotating barrel, vibrational barrel(vibarrel), and the centrifugal type. Conventional rotating barrel is a close type and is commonly used. The components inside the barrel are circulated by the barrel's rotation at a horizontal axis. Process yield has known to have higher thickness deviation. The vibrational barrel is an open type which offers a wide exposure to electrolyte resulting to a stable thickness deviation. It rotates in a vertical axis coupled with multi-vibration action to facilitate mixed up and easy transportation of components. The centrifugal barrel has its plated work centrifugally compacted against the cathode ring for superior electrical contact with simultaneous rotary motion. This experiment has determined the effect of barrel vibration intensity to the plating thickness distribution. The procedures carried out in the experiment involved the overall plating process., cleaning, rinse, Nickel plating, Tin-Lead plating. Plating time was adjusted to meet the required specification. All other parameters were maintained constant. Two trials were performed to confirm the consistency of the result. The thickness data of the experiment conducted showed that the average mean value obtained from higher vibrational intensity is nearer to the standard mean. The distribution curve shown has a narrower specification limits and it has a reduced variation around the target value.

Generally, intensity control in vi-barrel facilitates mixed up and easy transportation of components. However, it is desirable to maintain an optimum vibration intensity to prevent solution intrusion into the chips' internal electrode. A cathodic reaction can occur in the interface of the external and internal electrode.

$$2H_2O + e \rightarrow 2OH + H_2$$

Hydrogen can penetrate into the body and create pressure which can cause cracks. At high intensity, the chip's motion becomes stronger, its contact between each other is delayed and so plating action is being controlled. However, the strong impact created by its collision can damage the external electrode's structure thereby resulting to bad plating condition.

1 lot of chip was divided into two equal partion. Each portion was loaded to the same barrel one after the other. Nickel plating and tin-lead plating was performed in the same statio n. Portion A maintained the normal barrel vibration intensity and portion B vibration intensity was increased two steps higher. All other parameters, current, solution condition were maintained constant. Generally, plating method and procedures were carried out in a best way to maintain the best plating condition. After plating, samples were taken out from each portion, molded and polished. Plating thickness was investigated for both. To check consistency of results, 2nd trial was done now using different lot of another characteristics.