

Characterization on Epoxy Auto Purging Time

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Keywords— Epoxy Auto purging time; Epoxy Dispense; Die Attach; Inconsistent Dispense pattern.

I. INTRODUCTION

Die attach, also known as die bonding, is the process of attaching (or bonding) a die (or chip) to a substrate, leadframe or another die. This process can take on many forms and can be applied in many different ways. The common die attach material is Epoxy.

Epoxy Dispensed through dispensing needle or nozzle by controlled volume on the leadframe. The location of the dispensing is controlled with vision control system in the die attach equipment as illustrated in Figure 1.

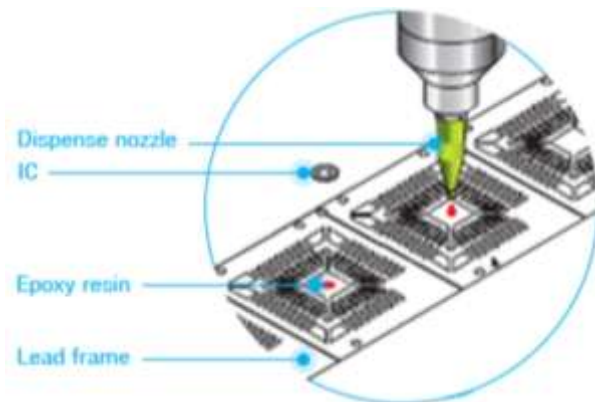


Fig. 1. Epoxy Dispense

In most cases, an adhesive dispense pattern is designed so that when the die (adhered) is placed over the adhesive, and pressure applied, the adhesive will squeeze out without trapping air. A standard pattern is automatically selected based on chip size X & Y.

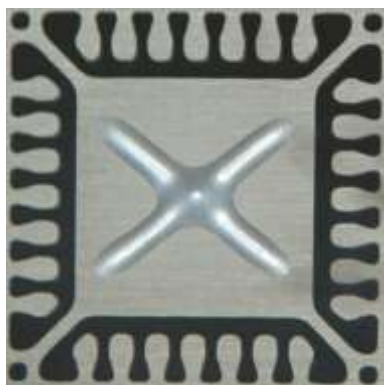


Fig. 2. Epoxy Dispense Pattern

II. PROBLEM IDENTIFICATION

There are various Paste Dispense Issues, the most commonly is Inconsistent Dispense Pattern as shown in Figure 3. Possible causes are Entrained air in adhesive, Temporary needle clog and Needle gage too small for adhesive type



Fig. 3. Inconsistent Dispense Pattern

III. EVALUATION ASSEMBLY PROCESS IMPROVEMENT

Epoxy Auto-purging on Pre-dispensing plate is an area where in dispenser is set down to create a series of dispense shots prior first dispense of epoxy on leadframe shown in Figure 4.



Fig. 4. Evaluation methodology

One of the solution is to assess the amount of Epoxy accumulation at dispensing tool tip when the machine is idle for 10 min or more. Figure 5 shown the Evaluation Method flow.

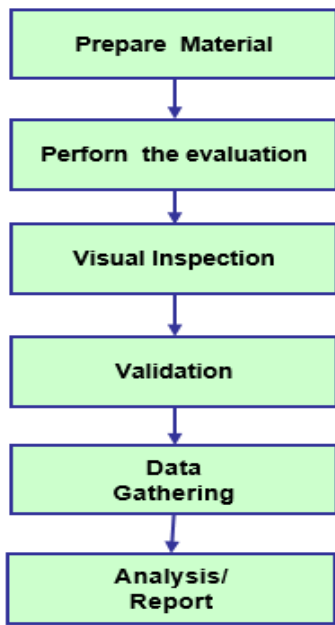












Fig. 5. Evaluation methodology

In Table number 1, Visual inspection result show Epoxy accumulation at dispensing tool tip, long epoxy tail is observed on the tip of the dispensing needle. This happens when the DA machine is idle mode for more than 10 mins. This may cause epoxy dripping / splatter during indexing and Inconsistent Dispense Pattern.

TABLE I. Visual Inspection Result

Machine Idle Time	Epoxy on Nozzle	Epoxy on Padie
3 mins		
5 mins		
8 mins		
10 mins		
> 10mins		

The next verification is using Die attach machine with capable for auto-purging/ Epoxy Pre-dispense, epoxy will be automatically purged on dispenser board in five (5) different

contact points. It is observed that more amount of epoxy was purged if machine idle time is set to more than 10 minutes.

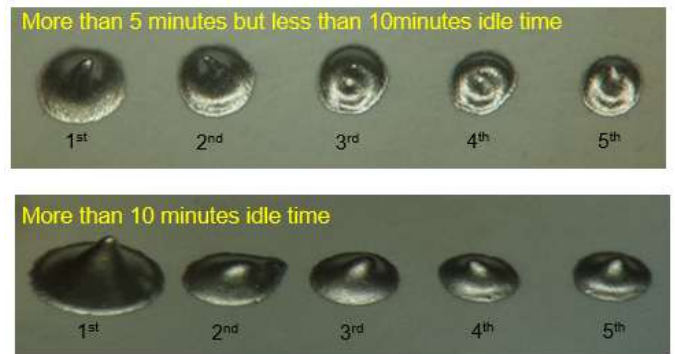


Fig. 6. Epoxy Pre-Dispense

Using Statistic tools ANOVA (Analysis of Variance) a Confirmation Run was done. Measuring the Dot Size of five (5) different contact points from Epoxy Pre-dispense. Data Analysis below show there is Significance different for measurement on that Dot Size for the machine with greater than 10 minutes idle.

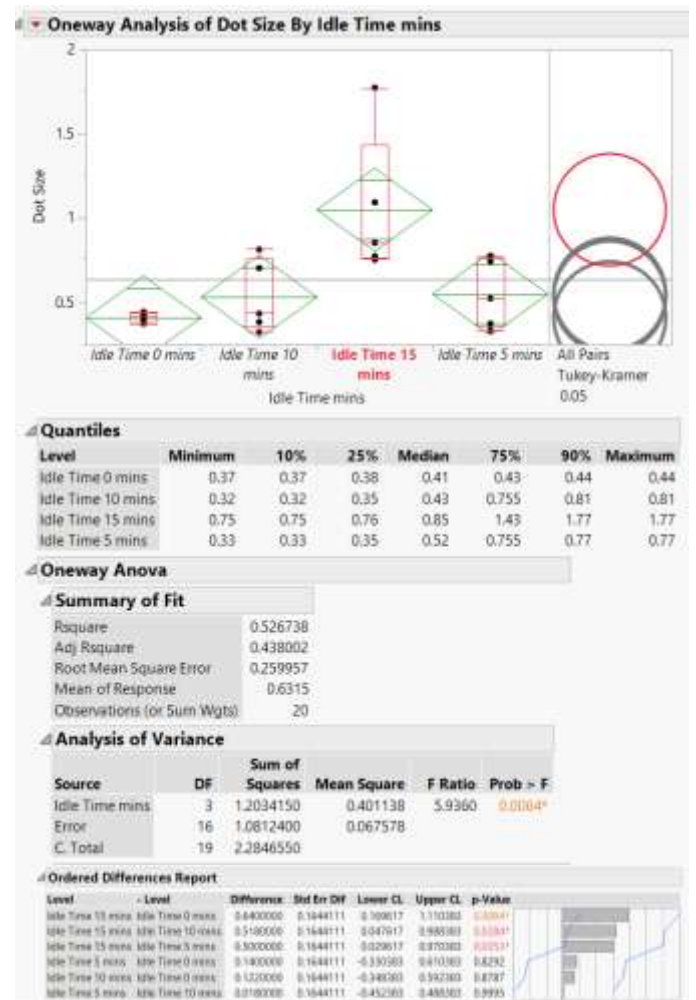


Fig. 7. ANOVA (Analysis of Variance)



IV. CONCLUSION & RECOMMENDATIONS

After being idle more than 10 minutes, long epoxy tail is observed on the tip of the dispensing needle and more amount of accumulated epoxy may potentially cause epoxy dripping / splatter during indexing and Inconsistent Dispense Pattern.

It is therefore recommended to perform auto epoxy purging for more than 10 minutes machine idle.

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