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A System Improvement to Control the Die Attach Materials

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I. OVERVIEW

With the fast moving technology that requires Automation, in order to achieve company goal of Industry 4.0, our manufacturing systems should be able to surpass Industry 3.0, where automation and computer aided techniques are essential.

This paper discusses the implementation of Die Attach Material Control which leads to the development of a new system that will provide computerized traceability and at the same time incorporate engineering process controls Error Proof system (poka-yoke) to become one of the most effective tools in the electronics manufacturing industry. This addresses the common system's lack of controls, incomplete data and manual retrieval of records linked to human intervention. That can prevent to misprocess due to Expired & Wrong Material for the manufacturing perishable material.

As highlighted, the focus is the assembly process step at Die attach operations, showed in figure1. During this process, singulated silicon dies are picked from incoming tested wafers and placed on a Leadframe carrier or strip with applied die attach material or epoxy.

Fig. 1. Assembly Process Flow

II. PROBLEM IDENTIFICATION

The Die Attach process has two important materials such as Leadframe and Epoxy, that has required floor life and shelf life base on manufacturer recommendation. And this information need to control to prevent to use expired material that can lead to potential Product reliability and quality problem.

And Material Traceability and is highly important within the supply chain of any manufacturer, as it provides the ability to quickly recall products, track production and match replacement material.

Historically Assembly Misprocess due to Wrong & Expired Material used. Increasing trend of Assembly misprocess due to poor material control and human dependents, as showed in figure 2.

Fig. 2. Assembly Misprocess due to Wrong & Expired Material

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The scope of the Die Attach process starts from receiving and preparation of materials up to assembly and processing at Die attached. The detailed process flow is shown in Figure 3.

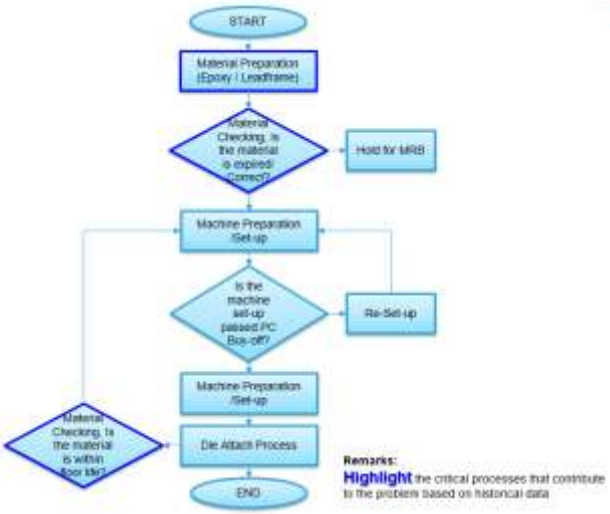

Fig. 3. Detailed Process Flow

Using Fish bone diagram in figure 4, several Potential Cause where identified that can cause of High occurrences of Wrong Material and Expired Material at Die Attach process, based on historical data.

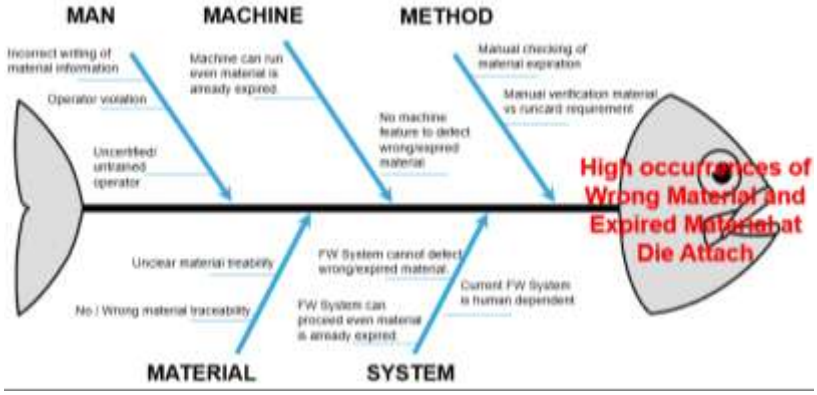

Fig. 4. Fish Bone Diagram

And each potential causes need to validate, and as a result Four Valid Cause where identify as True cause. And team need to generate Alternative solution to the problem as showed in figure 5. And one of them is to implement automatic Die Attach Material control system.

Valid Cause	Alternative Solutions	EP Level
Manual checking of material expiration.	Implement Die Attach Material Control	1
Manual verification material vs runcard requirement.		
Incorrect writing of material information.	Barcoded material information - Scanning of Barcoded Material Information	1
Operator violation	Integration of Die Attach Material Control and Manufacturing Factory System	1
Current Manufacturing System is human dependent		
CurrentManufacturing System cannot detect wrong/expired material.		
Current Manufacturing System can proceed even material is already expired.		

Fig. 5. Validation of Potential Causes

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III. Assembly Process Improvement

With the development and implementation of Die Attach Material Control is a web application which purpose is to control the usage of perishable materials as showed in figure 6. It ensures the materials used in production are within shelf life time and used for the correct products. The new system application is integrated to current factory manufacturing system and can detect and prevent some non-conformances issue.

Barcode Sticker where all the material information and expiration is included. During transaction in manufacturing factory system, it requires to load the material information. All material will upload in manufacturing factory system and Die Attach Material Control system. For manufacturing factory system, it has a smart compare system to validate if correct material in being loaded, to prevent wrong material used.

While in Die Attach Material Control system, the material expiration, floor life and shelf life is being monitor. If material is nearing to expired, it will prompt up a notice to the user. And once the material expiration is reach, the system automatically will stop the processing.

Fig. 6. Die Attach Material Control

As a result of implementation of new system, Die Attach Misprocess due to Wrong and Expired Material used reduce into Zero occurrence's consecutively, as showed in figure 7.

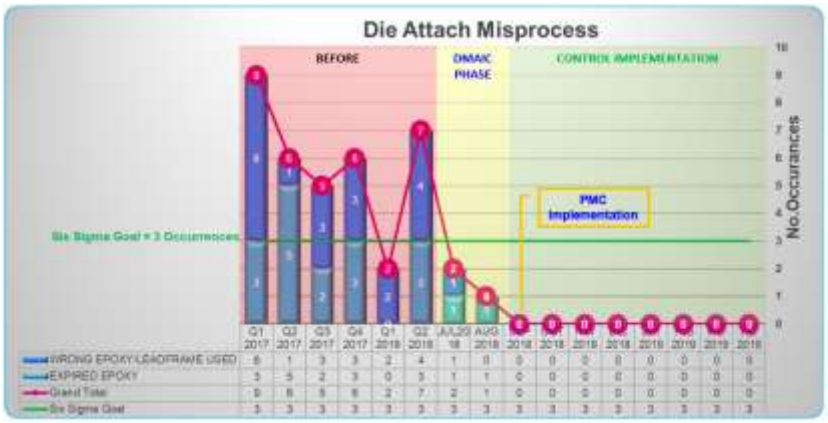

Fig.7. Improve Assembly Misprocess

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