

Adhesive Contamination Removal through Improvement at Package Sawing Process

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I. OVERVIEW

- Package sawing process in semiconductor assembly manufacturing is a process typically performed to separate integrated circuit packages such as IC chips from a substrate / leadframe in order to form the individual units.
- In the absence of Jig sawing process, Tape sawing is being used due to its process capability limitation. Molded package is being mount unto the UV tape for stiffness and stability during package singulation.
- Visual Mechanical Inspection must be free from any mechanical induce defect including any foreign materials and contaminants which will affect production cycle time due to its non-value added activity.

II. PROBLEM IDENTIFICATION

- Adhesive Contamination is one of the unwanted scenario at package sawing after full cut process and this trigger to have a big impact affecting production UPH (units per hour) capability resulting to long hour processing and product shipment delay.
- During Final Visual and Mechanical Inspection, Singulated units already separated on tape and was placed on tray. 100% visual inspection with each lot was applied wherein foreign mat or contaminants was captured as shown on Fig. 1.
- One whole lot was affected, resulting to have a longer visual inspection period due to manual removal of contaminants (adhesive residue from UV tape) per units. Almost 8 hours consumed to totally removed the contaminants and will perform 100% re screening afterwards.
- Figure 2.0 below shows the constructive analysis on why adhesive contaminants or tape whisker is being encountered and formed what associated factors to be investigated.

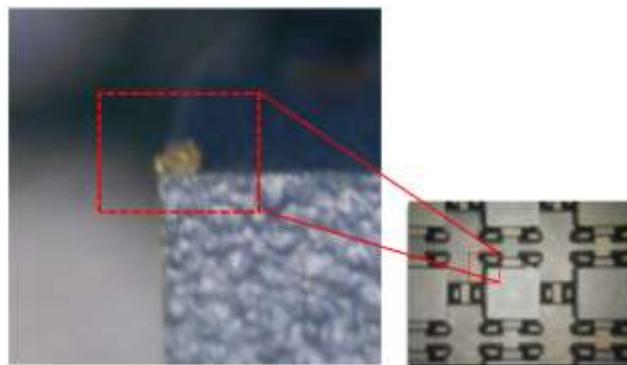


Fig. 1. Actual singulated units with adhesive contamination.

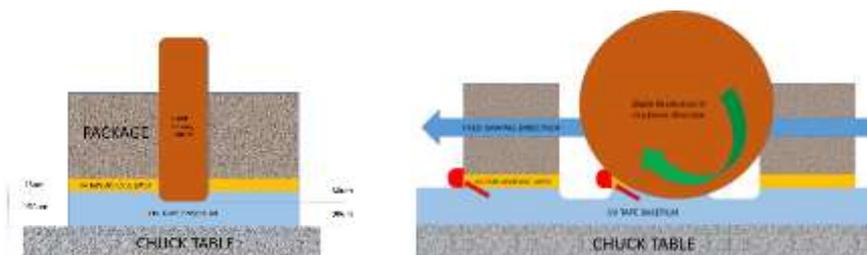


Fig. 2. Actual failure mechanism.

- The occurrence of adhesive contaminants should be tag as reworkable because it is just cosmetic and no internal mechanical stress failure may have encountered to affect product functionality.

III. DESIGN SOLUTION

- As illustrated on Figure 2, three (3) items of factors defined as contributor of adhesive contamination. One (1) is the Spindle revolution, two (2) is the Feed speed and three (3) is the Cut depth or blade height.
- Eliminating factors are need to consider to have a quick response on production needs, considering an engineering solving approach to have a better and constructive solutions. Figure 3 below shows eliminating method done to have quick but best solution to resolve encountered issue.

Items	Current Parameter	Target changes	Effect on product	Effect on production	Risk Level	Priority rank	Could we eliminate?
Spindle Revolution	30KRPM	+/- 10KRPM	chipping, burrs, delamination	low	Medium	1st	No
Feed Speed	30 mm/sec	-10mm/sec	chipping, burrs, delamination	High	Medium	2nd	Yes
Cut Depth	0.09mm	1.0 to 0.12mm	shallow cut, elephant feet	low	High	3rd	Yes

Fig. 3. Eliminating factors table for quick resolving issue.

- By adjusting the blade spindle revolution (reduced from 30KRPM to 20KRPM), the issue of adhesive contaminants has been resolve. No adhesive contamination on the succeeding lots after implementing the corrective action. Inspection per lot made much shorter time and leads to have production target shipment on time.
- Additionally, by adjusting only the Spindle revolution and maintaining the Feed Speed production UPH will be the same.