

Addressing Package Crack during Frame Mounting by Defining Appropriate Mounting Roller Kit

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I. OVERVIEW

- Package Tape sawing process requires mounting of molded strip package into Ultraviolet (UV) Tape by means of manual, semi-automatic and automatic mounting process.
- Manual and Semi-automatic mounting process have high risk of package crack means by intervention of human handling and machine mechanical failures.
- Risk level of Package crack is inversely proportional to the thickness of a strip package. The thicker the strip package, the lower the risk of package crack. On the other hand, the Thinnest the strip package, the highest the risk of package crack.

II. PROBLEM IDENTIFICATION

- Package strip to UV tape mounting is required on a tape Package sawing process to hold the strips on the chuck table in order to ensure the sawing stability during the process.
- On a semi-auto mounting process, Soft roller is used to initially applied proper down force pressure contact between UV tape and molded surface of the strip package.
- Figure 1.0 illustrate the mounting process of a typical QFN device with a 0.60mm total package thickness. Due to its thinnest package, the roller unable to apply the required pressure on the whole package area resulting to weak adhesion at the side perimeter of the strip molded package as per illustrated on figure 2.0.

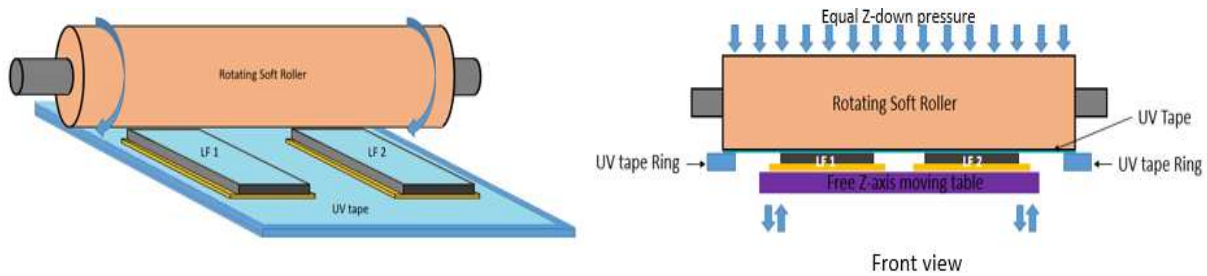


Fig. 1.0 Semi Auto-mounting concept.

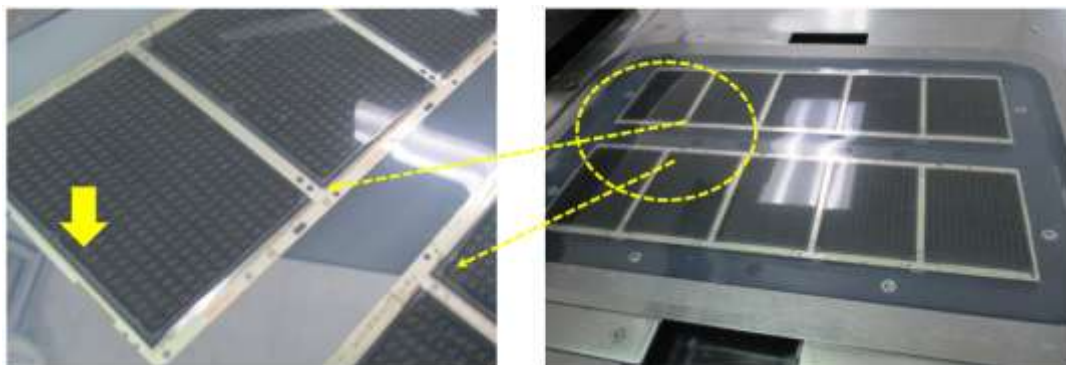


Fig. 2.0 Weak adhesion of Tape on Strip mold surface resulting to manual intervention of User.

- Mechanical Soft Roller on mounting machine press the UV tape on molded strip package however unable to press the edge of molded area resulting to weak adhesion, therefore, intervention by operator to manually press the affected area as immediate corrective action. On this scenario, the required pressure has been altered by Operator which is depends on his/her aimed force

released. On Figure 3.0 shows manual intervention of Operator performing manually press the weak area of mounted strips by using his/her thumb fingers with undefined pressure resulting to high risk of package crack.

- Soft roller pressure force not equally distributed on strip mold package mostly on the thinner package device due to Metal ring is too thick versus the strip package wherein the pressure applied by soft roller concentrated on the metal ring and less pressure applied on package.



Fig. 3.0 Operator applied pressure on area of strip package affected by weak adhesion.

- Units affected by package crack is automatically rejected aside from performing 100% inspection to guarantee that no more units are affected. Non value added activities by performing 100% inspection is additional cost that be shouldered by the units itself. Figure 4.0 shows the sample encountered units with package crack detected at 100% visual inspection after package simulation.

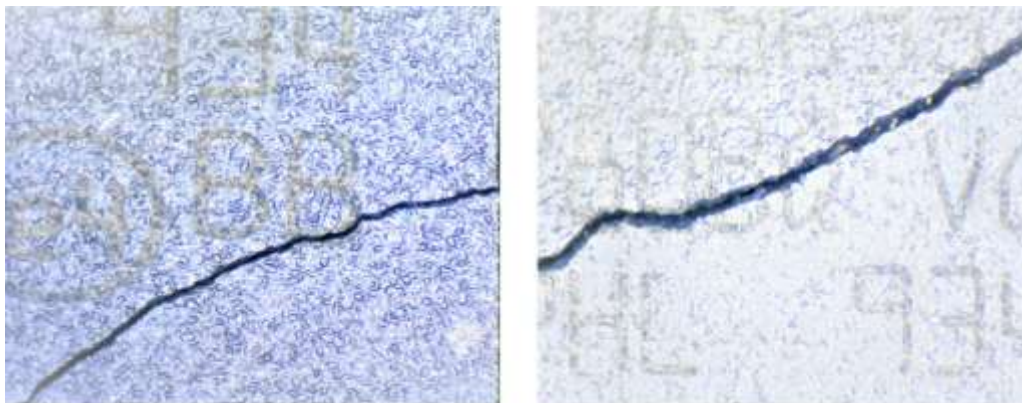


Fig. 4.0 Samples of package crack encountered at 100% VMI.

III. DESIGN SOLUTION

- In order to have constant Z-down pressure on both metal ring and on the target package, modification of soft roller has been considered.
 - Proposal 1 on Figure 5.0 below illustrated the new design for thinnest packages to have better contact between UV tape and Strip Package.

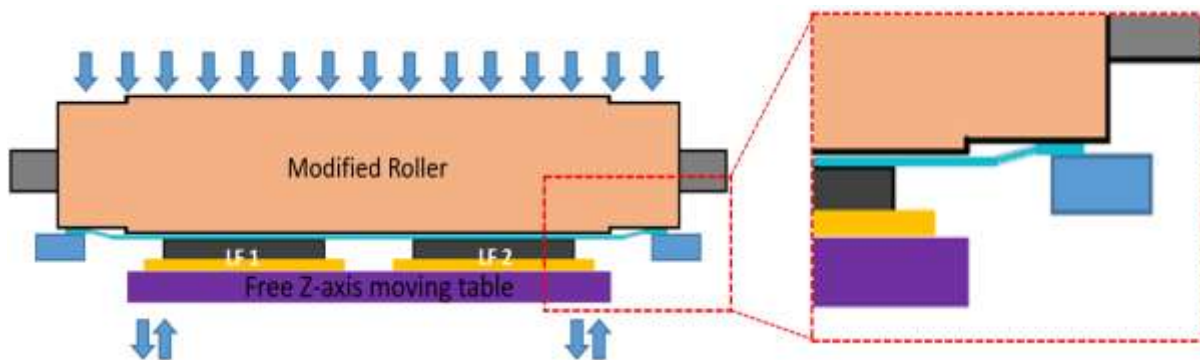


Fig. 5.0 New Modified Mounting Roller design to compensate constant pressure on thinner packages.

- Proposal 2 on Figure 6.0 below illustrated the inclusion of soft roller at both side for compensation of compression force during processing.

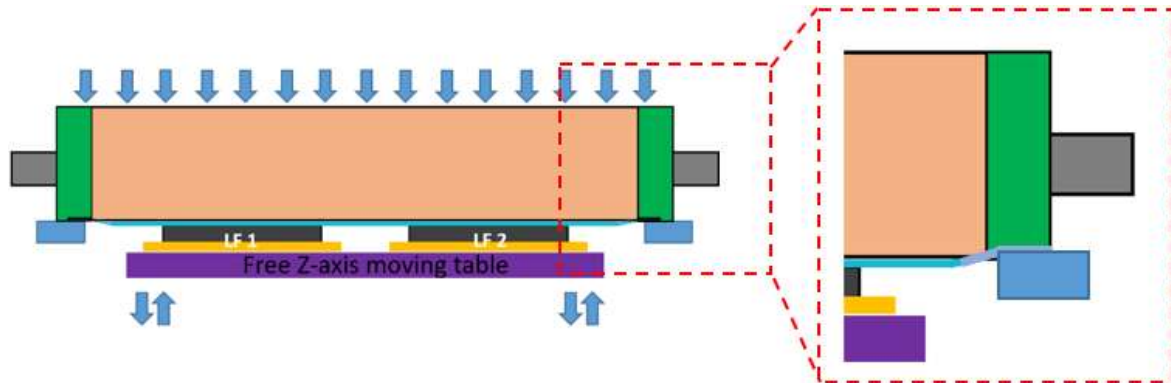


Fig. 6.0 Inclusion of soft roller at both side for compensation of compression force

- By modifying the soft roller, the thinnest package has constant contact on both metal ring and strip package. Manual intervention of Operator has been eliminated and package crack has been prevented.