Mold Tool Design Augmentation for Leadframe Package Singulation

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I. OVERVIEW

- Package singulation process is one of the known package sawing techniques on QFN (quad flat no-lead) leadframe semiconductor manufacturing to separate the molded or encapsulated leadframe into individual units

- Conventional package sawing or singulation process in Fig. 1 uses a mechanical blade to cut through the metal and mold material according to defined package size of the product
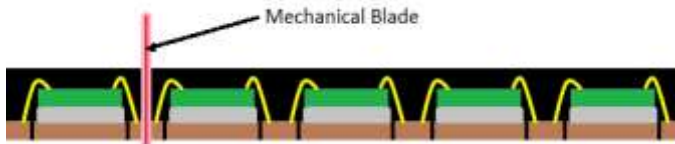

Fig. 1. Package singulation of individual unit from the molded leadframe strip.

II. PROBLEM IDENTIFICATION

- Conventional package singulation technique comes with some process/assembly related rejections namely metal burrs, un-cut unit, shallow cut, delamination and package chip-out illustrated in Fig. 2
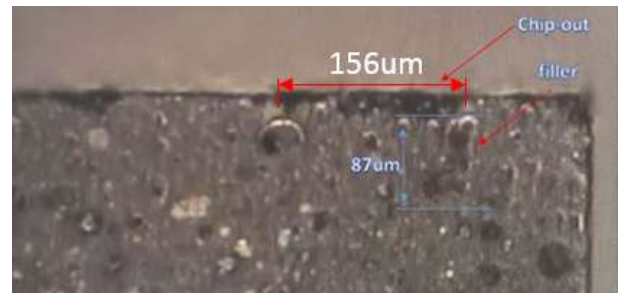

Fig. 2. Example of package chip-out during mold process.

- Parameter optimization, blade selection and evaluation, and ensuring planarity and calibration can help mitigate the package chip-out, but still cannot be totally eliminated due to the degradation of the mechanical blade

III. PROCESS DESIGN SOLUTION AND IMPROVEMENT

- An augmented and improved mold tool design showcased in Fig. 3 paved way for a specialized cutting technique for QFN leadframe assembly, this time without the use of mechanical blade to singulate or separate the unit individually
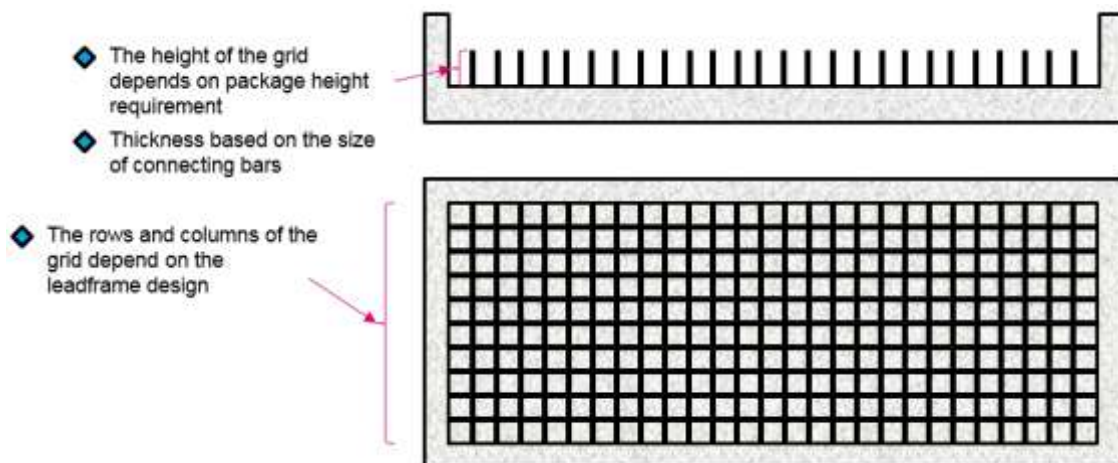

Fig. 3. Augmented mold tool design.

- The cutting technique with the augmented mold tool design offers an advancement in QFN technology, supporting assembly yield improvement and cost