

# Die Backside Augmentation for Die Crack Mitigation

Bryan Christian S. Bacquian, Frederick Ray I. Gomez

Central Engineering and Development Department, Back-End Manufacturing & Technology  
STMicroelectronics, Inc., Calamba City, Laguna, Philippines 4027

**Keywords**— Wafer preparation; backside surface subtractive method; die crack; thin die; die attach.

## I. OVERVIEW

- Challenges exist for wafer preparation and die attach process in processing thin dice with thickness ranging from 50  $\mu\text{m}$  to 120  $\mu\text{m}$ , or even up to 30  $\mu\text{m}$  thickness
- Typical assembly process flow in Fig. 1 shows the mentioned processes at the forefront



Fig. 1. Assembly manufacturing process flow.

## II. PROBLEM IDENTIFICATION

- Die crack issues on thin die applications (with 50  $\mu\text{m}$  to 120  $\mu\text{m}$  die thickness) propagated during pick-up process of diebonder machine, as illustrated in Fig. 2
- One reason behind this die crack defect or issue is the die adhesion to mounting tape

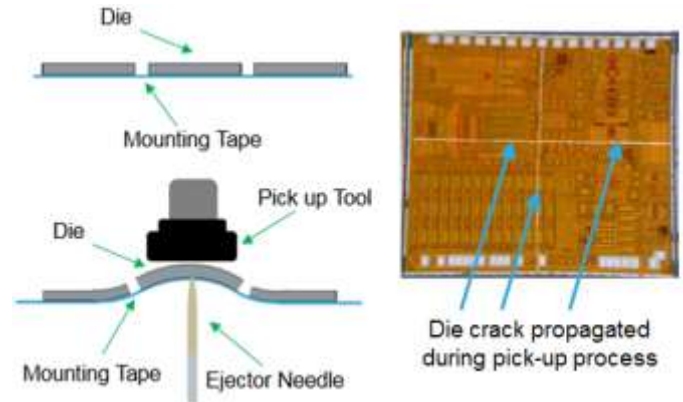


Fig. 2. Die crack encountered during pick-up process at die attach station.

- With the increasing demand on thin die applications, mitigation of die crack issues is one big challenge during pick-up process of diebonder machine

## III. PROCESS DESIGN SOLUTION

- Silicon die backside area is augmented by reducing the area by 50% or less with depth of 10  $\mu\text{m}$  as depicted in Fig. 3, through the application of backside surface subtractive method
- This critical process utilizes a grinding wheel type material (like a dicing saw) to grind 10  $\mu\text{m}$  from the backside surface

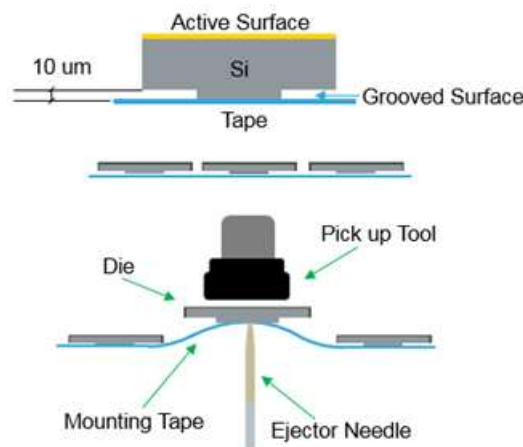


Fig. 3. Silicon die backside augmentation through subtractive method application.

- Infrared camera will guide the wafer sawing machine during the process since standard sawing machine is not capable of aligning an object without unique pattern
- With the area of die with direct contact on mounting tape reduced, adhesion strength of die to mounting tape is then reduced, thus eliminating the possibility of die crack issue
- Another advantage for the design is the anchoring effect of the grooved area for thin die with glue applications