International Research Journal of Advanced Engineering and Science
ISSN (Online): 2455-9024

A Breakthrough in Die Bonding Technique on Thin Semiconductor Die

Rennier S. Rodriguez, Frederick Ray I. Gomez
Central Engineering and Development NPI, Back-End Manufacturing & Technology, STMicroelectronics, Inc.
Calamba City, Laguna, Philippines 4027

Keywords— *Die bond; die attach; semicoductor; pick and place; process improvement.*

I. Overview

- Die attach or die bonding process is one of the key processes in integrated circuit (IC) assembly, responsible in the "picking and bonding" of semiconductor die from the wafer to a carrier
- A rubber pick-up and non-conductive needle material incorporated in a pneumatic-controlled assembly in Fig. 1 enables the separation of the semiconductor die from the wafer

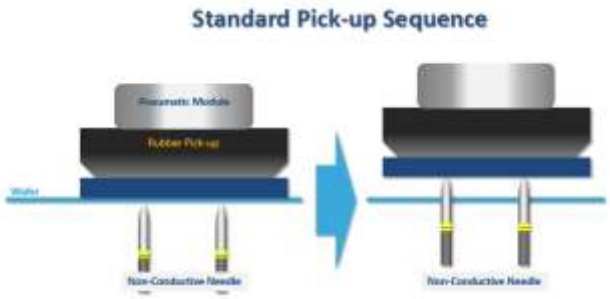

Fig. 1. Pick-up process for standard silicon die.

II. Problem Identification

- The continuous demand for densification and miniaturization of semiconductor product sets new standard in diebonding technology
- As the thickness of silicon die shifts to thinner requirement and applications, the pick and place process becomes a critical part of the IC assembly
- Thinner silicon die is more susceptible to the stress induced by the assembly process in Fig. 2 resulting to semiconductor die anomalies or defects

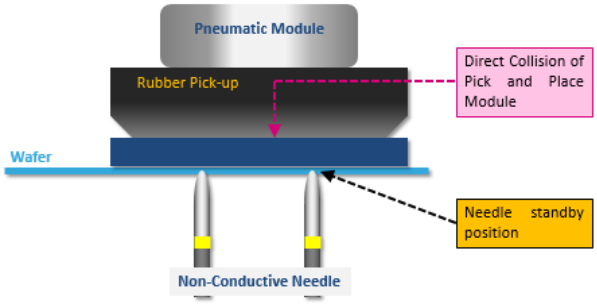

Fig. 2. Illustration of potential factors during pick-up sequence contributing to silicon die defects.

III. Process Design Solution and Improvement

- A modification and improvement in the standard pick and place process is presented in Fig. 3 through understanding and proper identification of factors that contribute to a certain defect

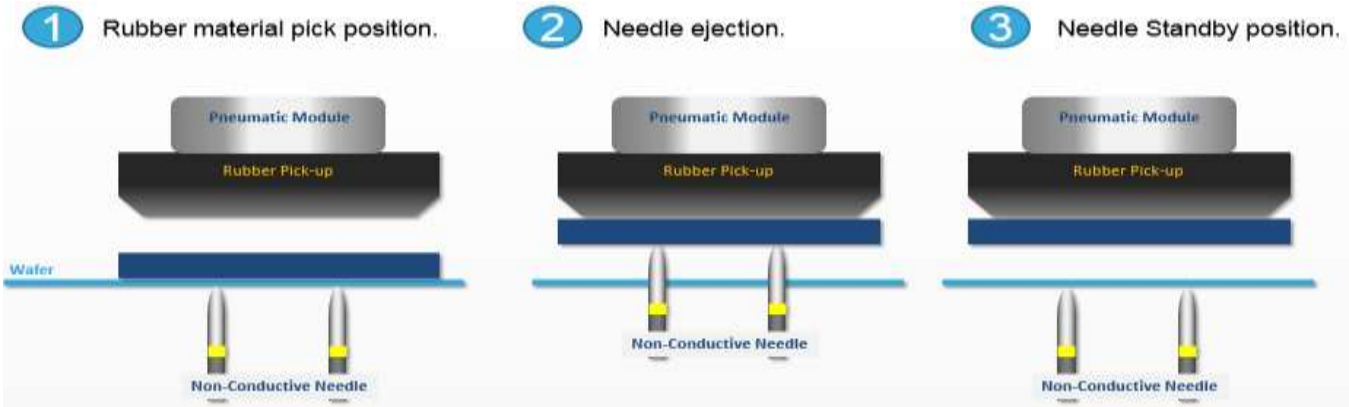

Fig. 3. Modified pick-up process.

- The augmented and improved machine pick and place sequence eliminates the direct collision of the assembly on the silicon die

Rennier S. Rodriguez and Frederick Ray I. Gomez, "A Breakthrough in Die Bonding Technique on Thin Semiconductor Die ," *International Research Journal of Advanced Engineering and Science*, Volume 4, Issue 2, pp. 503, 2019.