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

Critical Insights in the Design and Application of Die Attach Tooling per Carrier Construction

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Keywords— *Process plate; vacuum design; anvil block; die attach process; diebonding; leadframe; semiconductor carrier.*

I. Overview

- Die attach process or diebonding is the process of "picking and attaching" of silicon die to a carrier either by die attach film (DAF) or glue adhesives
- A process plate or anvil block is used to hold the semiconductor carrier wherein it is supplied with dedicated vacuum underneath the carrier

Fig. 1. Standard process plate for die attach process.

- Process plates are commonly placed at dispense and bond area of the machine since the leadframe should be stable or to avoid movement during this process

II. Problem Identification

- Underrated design of anvil block leads to gross rejection during die attach assembly or often cause common die attach and process errors
- A "bouncing effect" on the carrier as shown in Fig. 2a might happen when the placement of the vacuum hole is not aligned on the bondpad location

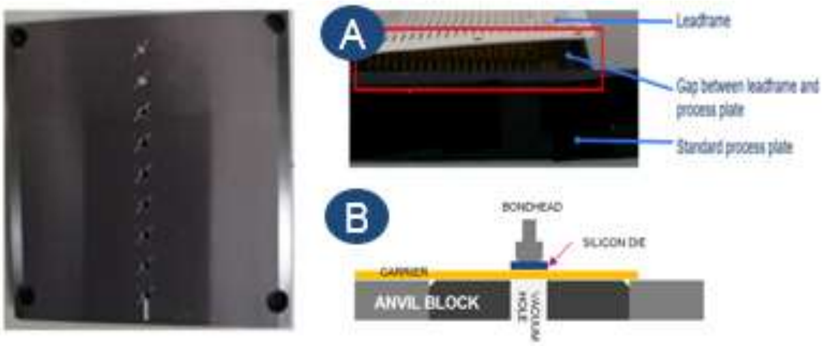

Fig. 2. (a) Gap between leadframe; (b) standard process plate single column.

- In addition, improper size of the vacuum hole might produce instability during bonding of silicon die

III. Mechanical Process Design Solution and Improvement

- The advanced multi-hole process plate design illustrated in Fig. 3 shows augmented and improved design wherein the number and location of vacuum hole is arranged to improve the stability of die attach process

Edwin M. Graycochea Jr., Frederick Ray I. Gomez, and Rennier S. Rodriguez, "Critical insights in the design and application of die attach tooling per carrier construction," *International Research Journal of Advanced Engineering and Science*, Volume 4, Issue 3, pp. 336-337, 2019.

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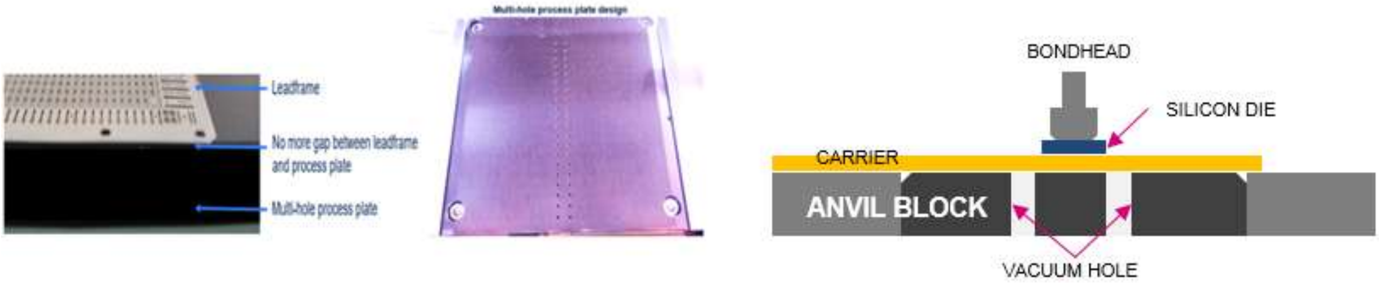

Fig. 3. Advanced multi-hole process plate design, showing the vacuumed semiconductor leadframe carrier.

- The relocation of vacuum pad from the middle of the carrier to sideways design improved the bonding stability of silicon die
- The improved process plate design would avoid potential damage to the backside of the carrier resulted from unbalanced bonding and vacuum hole diameter
- Furthermore, increasing the number of vacuum holes creates better and improved control for the carrier to avoid “bouncing effect” of the carrier, particularly the semiconductor leadframe carrier