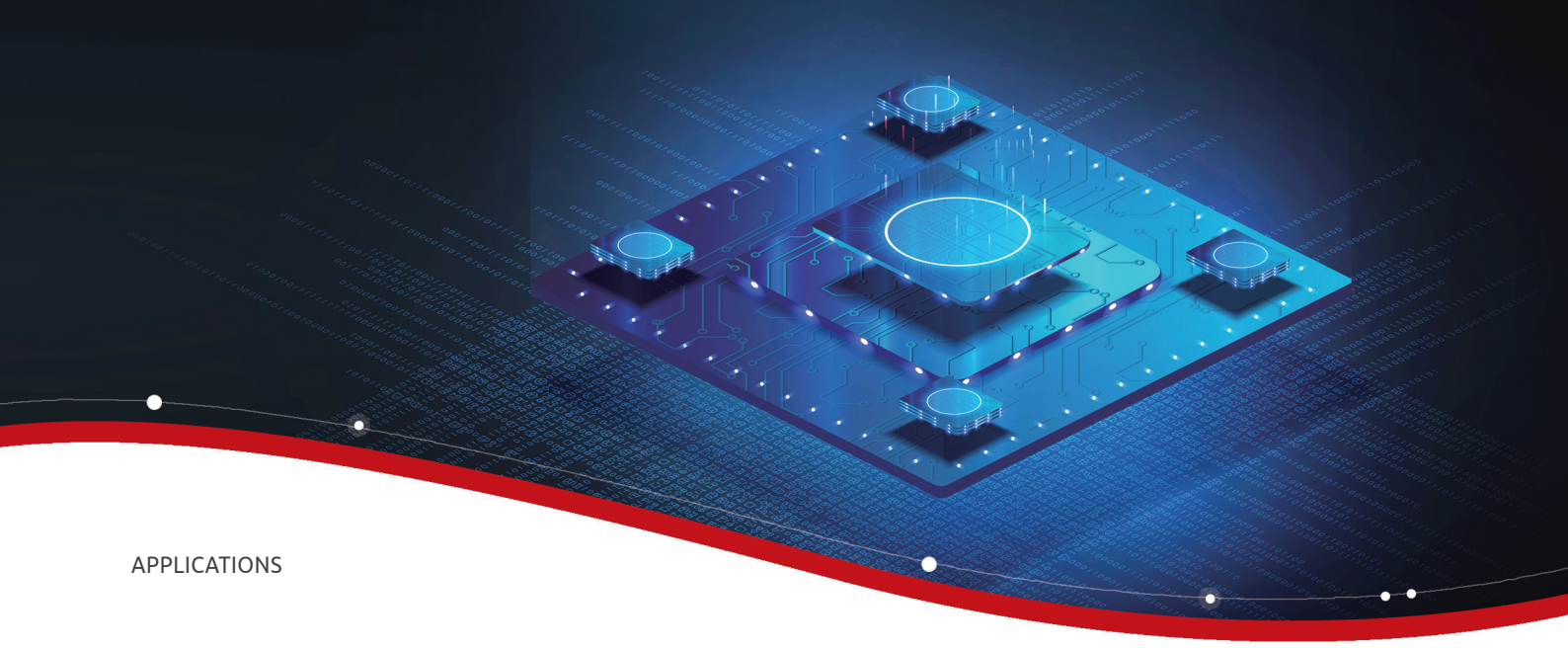


APPLICATIONS

With Its Powerful Die Bond Solution, ADLINK Helps Semiconductor Factories Accelerate Their Back-end Packaging Process

The semiconductor chip industry has been booming in recent years primarily due to the wide extent of applications in trending fields such as electric vehicles, 5G, military hardware, and low-orbit satellites, for example; essentially, everything is driven by chips.

How exactly do semiconductor factories cut huge silicon wafers into chips with different functions that are then used to support various application scenarios? The procedure involves an extremely important back-end packaging process known as “die bonding.” Die bonding is a process in which the die is removed from the silicon wafer and then attached to the integrated circuit (IC) substrate using a conductive medium such as gold wire, or epoxy (the most common).

As can be expected, an increasing number of dies can be cut from a single silicon wafer as the semiconductor miniaturization process continues to evolve and advance. The LED die, for example, has evolved from a die size of about one millimeter to micro LED dies of just one hundred micrometers or even thirty micrometers. In other words, ten to thirty times the number of dies can now be cut from a silicon wafer. This translates to the number of pick-and-place motions in the die bonding process also increasing ten to thirtyfold, posing severe challenges in terms of maintaining operating efficiency and positioning accuracy.

Continuing to Exhibit a Fast and Accurate Die Bonding Process Unaffected by the Miniaturization Process



ADLINK Technology has been developing die bond solutions for many years, witnessing the evolution of the semiconductor process as well as the operating pain points arising from the changes. In keeping pace with the times, ADLINK has introduced an advanced die bond solution that operates faster, achieves more accurate positioning,

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

and allows easier setting of the dispensing trajectory, helping customers in the semiconductor industry resolve the issues they encounter.

What problems have been solved? The first is adhesive dispensing. ADLINK's die bond solution ensures that the dispensing head can travel along the preset path, whether straight, round or curved. Once positioning is completed, it confirms whether the current position, temperature, weight and other data points actually meet the preset requirements. If so, adhesive is dispensed at the right time in the right amount to complete the attachment process for that point.

The second problem that has been solved is speed. ADLINK's die bond solution ensures that the dispenser completes the tuning process in the shortest time after positioning is completed without continuing to vibrate or shake. This means the dispenser does not need additional time to become motionless and can go directly into its operating status without interruption.

Apart from speed, accuracy is also critically important. With general sensors, positioning accuracy can reach only about two millimeters at best; however, two millimeters is tens or hundreds of times the size of a micro LED, which shows that positioning accuracy at this level is far from sufficient. Therefore, ADLINK has ingenuously adopted the use of cameras to assist in positioning, vastly improving positioning accuracy to just 0.1μm. With cameras, the position can be obtained immediately after taking the picture, ensuring the adhesive dispensing point is free of bias.

ADLINK's Advantages

ADLINK has long been a trusted provider of die bond solutions, and is well versed in the operational requirements of its customers. As such, ADLINK is able evaluate the factors that may affect die bond operations for each semiconductor process conversion, and then use some of the most suitable technologies to eliminate issues.

For example, ADLINK offers an extremely convenient and intuitive development interface, fully supporting linear, circular, spiral or mixed trajectories of various shapes, allowing customers to easily set the dispensing trajectory. ADLINK's die bond solution supports multiple I/O channels that allow customers to set trigger conditions with greater accuracy. With multiple I/O channels, the system will accurately perform condition comparison actions based on the information feedback from various sensors. The result being that and the valve will only be triggered after all conditions are met, enabling precise amounts of adhesive to be dispensed.

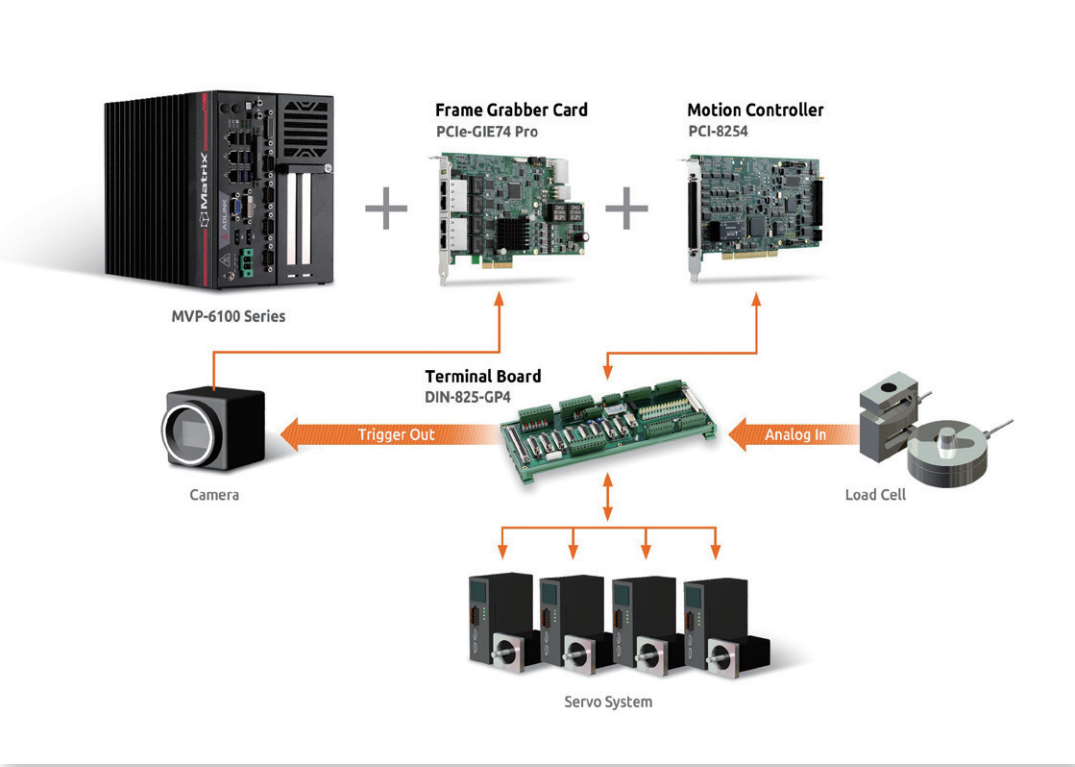
ADLINK's die bond solution also supports "high-speed P2P" and features PCI-8258 DSP-based 4-axis advanced motion controllers, effectively improving the response speed of specific motion axes. This allows extremely fast removal of the die from the silicon wafer followed by use of a unique closed-loop motion control technology to greatly increase positioning speed and suppress resonance or jitter in the shortest time possible, so as to ensure that the dispensing operation after pick-and-place runs at optimal speed without lags or interruptions.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

ADLINK has incorporated PCIe-GIE74 frame grabbers into the solution that can be used with the most commonly used camera brands to maximize positioning accuracy. Apart from excellent image capture quality that guarantees no frame drop, real-time power control capability also offers outstanding energy savings.

One particular challenge that users often encounter when performing die bonding is the inability to distinguish driving axles from driven axles, which can easily affect the control ability of the machine due to ineffective elimination of the mechanism's resonance. To resolve this issue, ADLINK offers master-slave synchronous control to effectively avoid interference between machines and mechanisms through frequency-domain response analysis technology. In this way, even if the customer wants to attach two different ICs into the same chip, there is no need to worry about the interference between heterogeneous components.

ADLINK's die bond solution continues to evolve and advance as the semiconductor packaging process becomes increasingly sophisticated and miniaturized, ensuring that the customer's dispenser can quickly achieve correct positioning and dispense the precise amount of adhesive, so that there is no longer any concern over inferior chip quality due to misaligned contraposition or adhesive dispensing.



ADLINK's Die Bond Solution

All products and company name listed are trademarks or trade names of their respective companies.
©2021 ADLINK Technology, Inc. All Rights Reserved.
All specifications are subject to change without further notice.