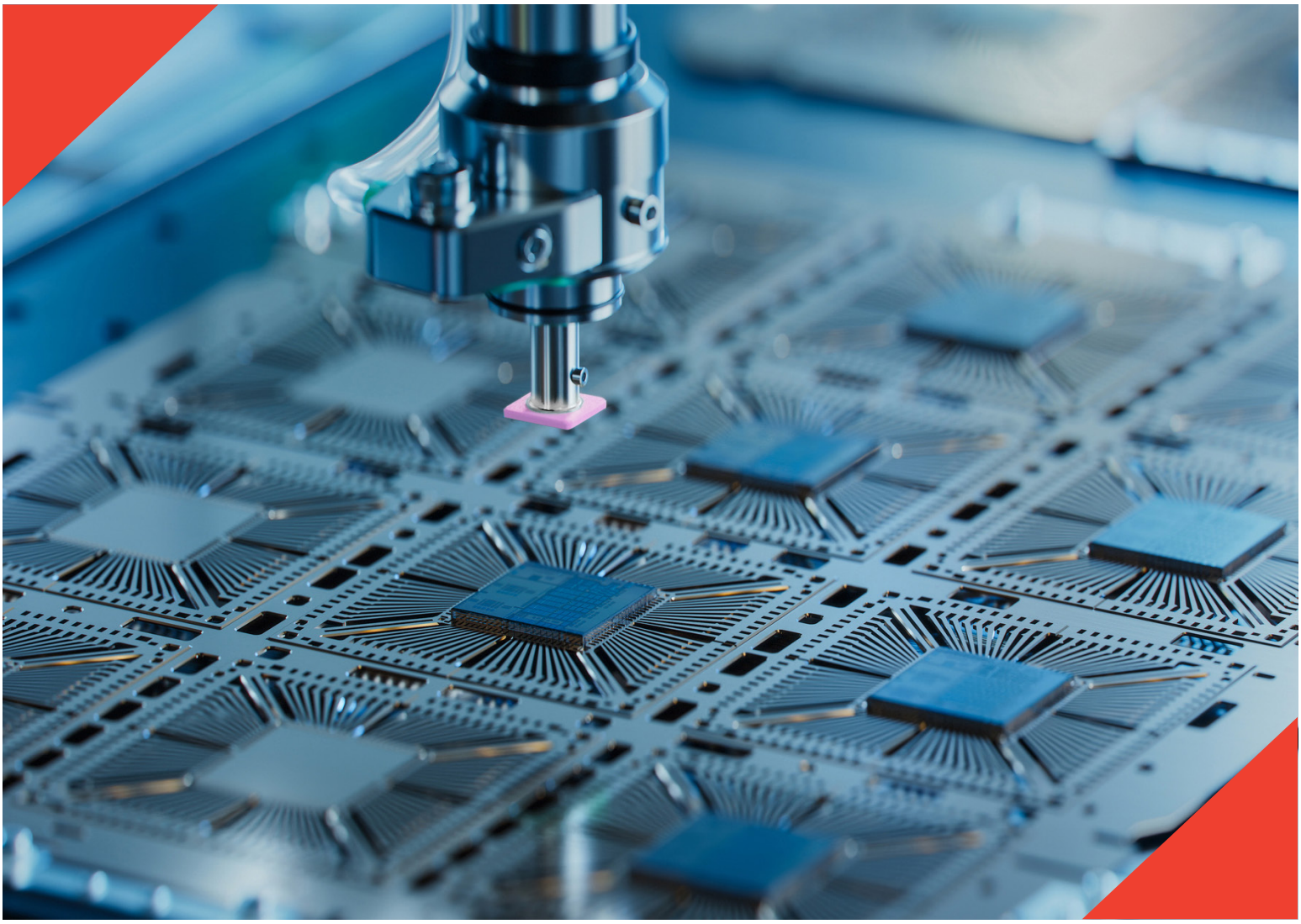
FUJIPOLY

High-performance Thermal Interface Materials, Elastomeric Connectors and Custom Silicone Extrusions

THE PROMISE OF STREAMLINED PRODUCTION:

IMPLEMENTING AUTOMATED PICK-AND-PLACE FOR THERMAL GAP FILLER PADS



INTRODUCTION

The ever-growing miniaturization of electronic components pushes the boundaries of automated assembly. While pick-and-place technology reigns supreme for most components, one area remains stubbornly manual: thermal gap filler pads. These pre-cut, non-viscous thermal interface materials, unlike dispensables, require precise handling akin to component placement. Despite their crucial role in heat dissipation, application often occurs manually, demanding meticulous peeling and placement. Enter automation. The promise of streamlined production and unlocked potential of thermal gap fillers beckons. Imagine robots, the tireless workhorses of the factory floor, seamlessly integrating these pads into the assembly process, replacing manual grace with automated precision.

AUTOMATION SYNCHRONIZES PAD PLACEMENT, ENSURING PREDICTABLE, CONSISTENT ASSEMBLY.

OPTIMIZING THERMAL GAP FILLER APPLICATIONS WITH AUTOMATION

Automation's core advantage lies in its consistency and speed. Cycle time, a critical metric, takes center stage. Manual operations introduce variability, impacting cycle times and potentially hindering production flow. Automation synchronizes pad placement, ensuring predictable, consistent assembly.

Beyond speed, automation guarantees accurate pad positioning. Manual handling poses risks of misalignment, jeopardizing thermal performance. Robots, however, place pads with unwavering precision, eliminating these concerns and maximizing thermal effectiveness. Furthermore, automation minimizes risks of contamination and deformation, preserving the critical thermal interface properties of the pads. This robotic precision ensures consistent quality, maximizing pad performance across the entire production run.

CHALLENGES OF THERMAL GAP FILLER PICK-AND-PLACE

Smooth automation, however, requires navigating unique challenges. Thermal gap filler pads, unlike rigid semiconductors, present their own complexities. Their gel-like softness and inherent stickiness can complicate handling. Peeling them from liners, a crucial step, necessitates a delicate balance, avoiding both pad damage and liner remnants.

Liners themselves become significant factors. PE liners offer ease of post-manufacturing peel-ability but lack the high-temperature tolerance of PET liners. PET, while heat-resistant, demands a more controlled peel due to its rigidity. Understanding these material properties is key to optimizing the automation process.

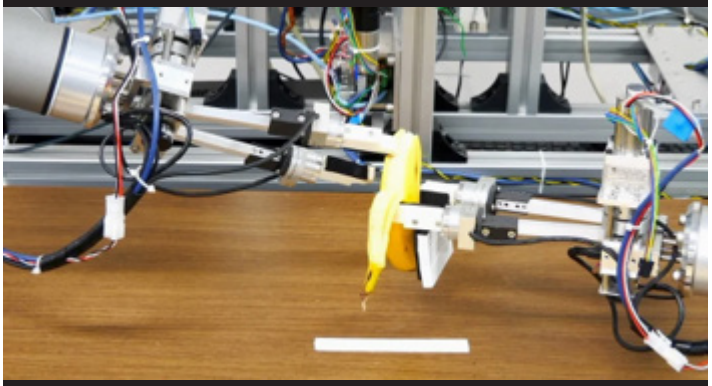
LINER SELECTION FOR EFFICIENT HANDLING

Choosing the right liner is critical for a flawless automation sequence.

Consider PE liners for their post-manufacturing ease of removal, but be mindful of their lower temperature tolerance. PET liners, while ideal for high-temperature processes, require a more nuanced approach for peeling due to their stiffness.

Color also plays a subtle role. Different liner colors, when paired with vision systems, can guide robots, ensuring they select the correct pad for each assembly stage. Choosing the optimal liner type unlocks the full potential of the automation process, ensuring smooth and efficient handling of thermal gap filler pads.

TRAINING ROBOTS FOR PRECISE PEELING AND PLACEMENT:



Teaching robots to peel thermal gap filler pads is a complex task. It demands precise control of pressure, angle, and timing, exceeding the capabilities of brute force. Initial attempts, like the University of Tokyo's banana-peeling robot, highlight the delicate nature of this operation.

Mastering the initial peel is key. A gentle separation at the pad's edge is crucial for breaking the adhesive bond without damaging the material. Vacuum tools, often employed, require careful handling to avoid lifting the entire sheet. Each material, with its unique properties, necessitates a customized approach for optimal removal.

OPTIMIZING PICK-AND-PLACE FOR GAP FILLERS

Integrating thermal gap filler pads into existing pick-and-place systems doesn't require a complete overhaul. The vacuum head becomes the star performer, responsible for holding, transferring, and releasing these delicate pads. Its design is paramount. Pads clinging stubbornly to the head disrupt the process, necessitating a release mechanism that balances suction with clean detachment.

The vacuum system's design features an air chamber for pad adherence, utilizing controlled evacuation and air direction changes for clean detachment. Various designs, including multi-chamber and two-chamber rocker designs, offer controlled adherence and release, minimizing material deformation. The strategic method involves sequential activation of vacuum chambers for secure gripping and controlled detachment during pick-and-place, emphasizing a

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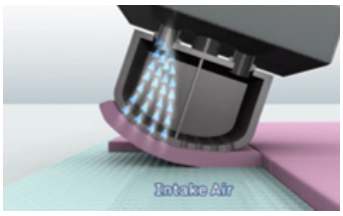

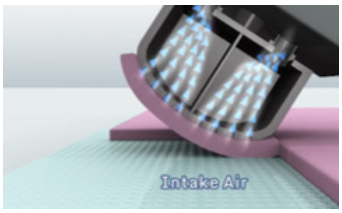

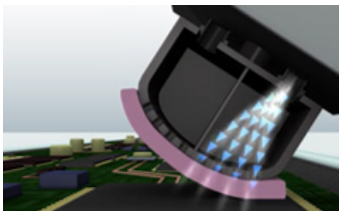
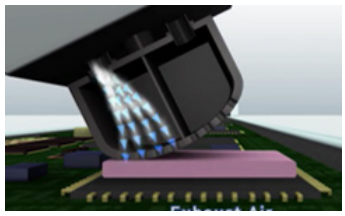

Optimizing Pick-and-Place for Gap Fillers continued

smooth transfer. Customization through 3D printing or metal machining offers flexibility. Metal heads, while more durable, are susceptible to wear and tear from abrasive pads. Customization options like hole size, shape, and design allow for optimization based on specific pad sizes and functions. Ultimately, while the general pick-and-place process remains familiar, the vacuum head design is key for seamless integration of thermal gap filler pads. Let's consider an alternative liner removal, the take-up assembly system. This involves rolling up the protective liner, creating a deformation in the liner rather than the pad. The vacuum head, no longer peeling, grabs onto the liner, emphasizing the importance of breaking the seal between the pad and the liner. While a flat vacuum design may suit dryer, higher modulus pads, simplicity remains valuable if the design proves effective. Consider material tackiness when exploring alternatives, like a convex-shaped head or a chamfer for a rocking motion, offering flexibility without unnecessary complexity.

MOVING FORWARD:

By addressing the challenges and leveraging the benefits of automation, we can unlock the full potential of thermal gap filler pads. This shift, from manual handling to automated precision, not only streamlines production but also opens doors for further advancements in thermal management solutions. The future of electronics manufacturing beckons, and automation, hand-in-hand with innovative thermal materials, is poised to lead the way.

CONCLUSION: EMBRACING AUTOMATED PICK-AND-PLACE WITH FUJIPOLY AMERICA

While the challenges of implementing automated pick-and-place for thermal gap filler pads are undeniable, the potential rewards - streamlined production, enhanced quality, and improved thermal management – are significant. To navigate this transition and unlock the full potential of your assembly lines, Fujipoly America stands as your trusted partner.

With decades of experience in developing and manufacturing high-performance thermal gap filler pads, Fujipoly America offers a comprehensive solution. We provide not only a diverse range of pad materials and liner options tailored for automation compatibility, but also expert guidance on selection, customization, and integration into your existing pick-and-place systems.

Our engineers are at the forefront of innovation, continuously developing materials and automation interfaces that push the boundaries of thermal management performance and efficiency. Through collaborative partnerships, we work alongside you to optimize your processes, ensuring seamless integration and maximized benefit from automated pad placement.

Embrace the future of thermal management with Fujipoly America. Let us guide you through the challenges, unlock the automation potential, and empower your electronics assembly with the unparalleled precision and performance of our thermal gap filler solutions.

Author:
Christian Miraglia is the applications engineering manager for Fujipoly America Corporation, based out of its Customer Engineering Resource Center in San Jose, CA. He is a graduate of the New Jersey Institute of Technology and has been with Fujipoly for over 15 years.