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NEW YORK, NEW YORK, UNITED STATES, September 17, 2025 /EINPresswire.com/ -- Amid a high-end clip bonding equipment sector long dominated by a handful of international giants, Chinese semiconductor equipment maker PrecisioNext has scored a major breakthrough. Its clip bonding solution—which includes high-precision die attach, clip bonder, and in-line vacuum reflow oven—has secured an order from an overseas factory of a global power semiconductor leader. This product line had already been successfully deployed in core mass production lines at several top Chinese power device manufacturers. This marks the first large-scale export of China-made high-end clip bonding equipment, validating PrecisioNext’s ability to meet the stringent packaging demands of high-current power devices and compete globally.

Copper Clip: The Essential Choice for the High-Current Era

Driven by booming demand in electric vehicles, industrial motors, data centers, and high-power fast charging, power semiconductors are rapidly evolving toward higher current density, power density, and reliability, plus lower thermal resistance. Traditional wire bonding, however, faces inherent limitations: high resistance, limited current capacity, thermal bottlenecks, and risks of wire breakage or de-soldering. These issues make it a major constraint for medium-to-high-power devices (like IGBT and SiC MOSFET modules).

Enter clip bonding (Copper Lead-frame Interconnect Package) technology. Its core innovation

replaces limiting metal wires with flat, thick copper strips ("clips") that directly connect the die top to the lead frame or substrate. This shift delivers game-changing advantages:

1. Higher Current Capacity: The clip's larger cross-section slashes resistance and boosts current capacity up to 5-10x vs. wire bonding, meeting high-power demands.
2. Lower Thermal Resistance: Clips create an efficient heat path, rapidly pulling heat from the die to the substrate/heatsink, boosting reliability and lifespan.
3. Reduced Inductance: The flat structure cuts parasitic inductance versus arched wires, improving high-frequency switching performance (critical for SiC/GaN).
4. Smaller Package Size: Compact clip designs enable smaller, denser power modules.

These unbeatable advantages have cemented clip bonding as the standard for high-current, high-density IGBT and SiC MOSFET modules.

Market Landscape & Equipment Hurdles: Efficiency, Precision, Cost

The high-end power module market is ruled by giants like Infineon, ON Semiconductor, Mitsubishi Electric, Fuji Electric, and DIODES. Their clip lines demand extreme equipment performance and stability. In China, players like StarPower, BYD Semiconductor, CRRC Times Electric, and China Resources Microelectronics are racing to adopt high-performance power chips, fueling urgent demand for advanced, mass-production-ready clip bonding tools. For large-scale manufacturing, the market's core demands are:

1. High Throughput: Meeting massive volume needs (especially automotive).
2. High Precision & Consistency: Ensuring precise clip placement and reliable bonding (critical for dispensing/solder paste control), directly impacting module current handling and long-term reliability.
3. Low Cost of Ownership (CoO): Cutting consumables (e.g., seals), gas usage (e.g., Nitrogen), and maintenance costs.
4. Stability & Yield: Solving process pain points (e.g., "solder splash") for continuous production.

Winning Global Clients: Solving Core Clip Production Challenges

I. Built for High-Power Mass Production: Compatibility + Efficiency
PrecisioNext's full line handles both 8-inch and 12-inch wafers, serving current and next-gen power chip needs. Its optimized architecture delivers industry-leading precision, efficiency, and compatibility—validated by customers—providing strong support for large-scale, cost-effective module manufacturing.

II. Precision Dispensing: Key to High-Current Reliability
The precision and consistency of underfill/adhesive dispensing (e.g., sintered silver paste, epoxy) between clip and die directly determine the interface's thermal/electrical resistance and long-term reliability. PrecisioNext's configurable multi-dispensing system (up to 6 heads) features independently controlled heads delivering ultra-precise glue volume. This ensures extreme dispensing accuracy—position, shape, volume—even at high speeds, eliminating risks of

hotspots or failures from glue defects (too little/too much), securing high-current stability.

III. Vacuum Oven Breakthrough: Boosted Reliability, Slashed Costs
Vacuum reflow soldering is critical for strong, void-free clip-die bonds but is traditionally a "cost and yield bottleneck." PrecisioNext's in-line vacuum oven delivers game-changing improvements:
1. Radically Longer Seal Life: Core seals last over 6 months vs. the industry standard 1-2 weeks, slashing downtime, maintenance, spare parts costs, and boosting OEE.
2. Eliminates Solder Splash: Innovative thermal/pressure control suppresses solder splashing ("solder splash"), significantly improving yield and module insulation reliability.
3. Dramatically Less Nitrogen: Optimized fluid dynamics and sealing slash Nitrogen use, cutting long-term operating costs.
4. Seamless In-Line Integration: Smooth connection to upstream/downstream equipment boosts line automation and efficiency.

Future Outlook: Clip Tech Meets Next-Gen Semiconductors

As 800V EV platforms proliferate and SiC/GaN adoption accelerates, demands on power modules—current density, switching frequency, temperature, reliability—will hit unprecedented levels. As the preferred packaging for these devices, clip bonding equipment must evolve toward higher precision, throughput, stability, and lower CoO.

PrecisioNext's smart clip line entering the supply chain of top-tier global clients is powerful proof of China's high-end semiconductor equipment capabilities. It also spotlights the company's foresight in meeting future high-current, high-reliability packaging needs. Its breakthroughs in large-wafer support, precision dispensing, and ultra-reliable, low-consumption vacuum soldering directly address core requirements of power semiconductor packaging upgrades. For manufacturers racing to build cost-performance advantages, domestically made high-end tools offering full-line capability and significant cost/efficiency benefits are becoming a strategic choice. PrecisioNext's breakthrough proves China's high-end equipment can now compete head-to-head with global leaders in the critical packaging processes defining power semiconductor performance, injecting fresh momentum into the global power electronics industry.

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