ADLINK
LEADING EDGE COMPUTING

Building Cutting-Edge SMT Machines with Leading CompactPCI Solutions



CompactPCI®

ADLINK stands out as the clear choice for CompactPCI with industry-leading COTS portfolio, customization capability, field-proven reliability, and committed innovation

Solution Brief

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Everything in the modern world from coffee makers to data centers runs on printed circuit boards (PCBs) with precisely positioned components, such as resistors, capacitors and integrated circuit (IC) chip packages. The accuracy, efficiency, and flexibility of PCB manufacturing depends on the surface mount technology (SMT) solution being used. Robotic SMT machines, also called pick-and-place machines, have evolved steadily over the last few decades. Modern SMT systems often utilize machine vision systems to ensure placement precision, multiple (or all-in-one integrated) heads and gantries, and component modularity. The more versatile the SMT solution, the better it can accommodate fast transitions for short, on-demand manufacturing runs.

One pioneer in the chip-mounting industry began advancing SMT solutions in the 1980s and has since become a leading global supplier of mounters, semiconductor equipment, insertion and assembly automation equipment, machine tooling, collaborative robotics, industrial automation equipment, and integrated software solutions. The East Asian manufacturer recently developed a cutting-edge, modular mounter. Extracting the maximum performance and adaptability from its design would depend greatly on the computing platform at the solution's heart. The manufacturer turned to ADLINK for help.

SMT Solution Challenges

Not surprisingly, one of the key challenges in SMT systems is maximizing performance without sacrificing reliability. To provide value in the market, each successive SMT machine generation must improve on balancing these factors. Manufacturers build their designs around goals including:

- Higher electromagnetic compatibility (from lower lead induction)
- Higher degree of assembly automation
- Higher circuit speeds
- Reduction of unwanted RF signals
- Lower setup time
- Higher shock and vibration tolerance (for both finished PCB assemblies and SMT machines themselves performing at optimal production speed)
- Higher component speed per PCB while staying within quality tolerances

Clearly, accuracy and performance are paramount. Customization also plays an increasing role in SMT solution success. SMT manufacturers often receive requests to modify their designs for customers' specific use cases or priorities. These requests can range from specialized I/O interfaces and/or configurations to customization of the system's BIOS. Vendors supplying the SMT manufacturer need to accommodate these requests.

Arguably, the greatest SMT manufacturer requirement is for broad, long-ranging support. Support can take the form of rapid responses to queries or servicing needs, as well as having that support come from a relatively close geo-location. Support will also encompass having a dependable technology and product roadmap, because every manufacturer needs product lines that are continuously updated to provide customers with migration paths rather than stranding them in dead ends. Extensive support will also include solution longevity. SMT manufacturers sink extensive capital resources into their systems, and maximizing the return on those investments can require support cycles well beyond tech industry norms.

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ADLINK: The Clear Choice for CompactPCI

The East Asian SMT manufacturer's modular mounter offered an impressive and demanding set of specifications:

- Placement of up to 80,000 surface-mounted components per hour
- 20 spindles x 2 rotary gantries
- Chip placement accuracy of ±25 µm @ Cpk ≥ 1.0
- Component range of 0201 to □ 6 mm
- Maximum component height of 2 mm
- A fixed camera able to ensure head and board placement alignment at full production speed

This last point is pivotal, as the machine vision component relies heavily on visual recognition algorithms powered by significant compute resources. The SMT system's underlying computer architecture needed to provide these processing resources while simultaneously withstanding manufacturing environment conditions and fulfilling all demands around serviceability, scalability, and cost-effectiveness.

The manufacturer had worked with ADLINK for many years on prior projects and and trusted their stellar track record in providing embedded compute solutions with field-proven performance and reliability. Moreover, ADLINK is one of the industry's foremost manufacturers of CompactPCI blade computing solutions. Across physically demanding sectors such as industrial automation, defense, aerospace, and railway, CompactPCI has been a stalwart computing standard for over 25 years. As a result, CompactPCI components remain globally available and under continuous advancement as they incorporate the industry's highest-performance technologies for mission-critical applications.

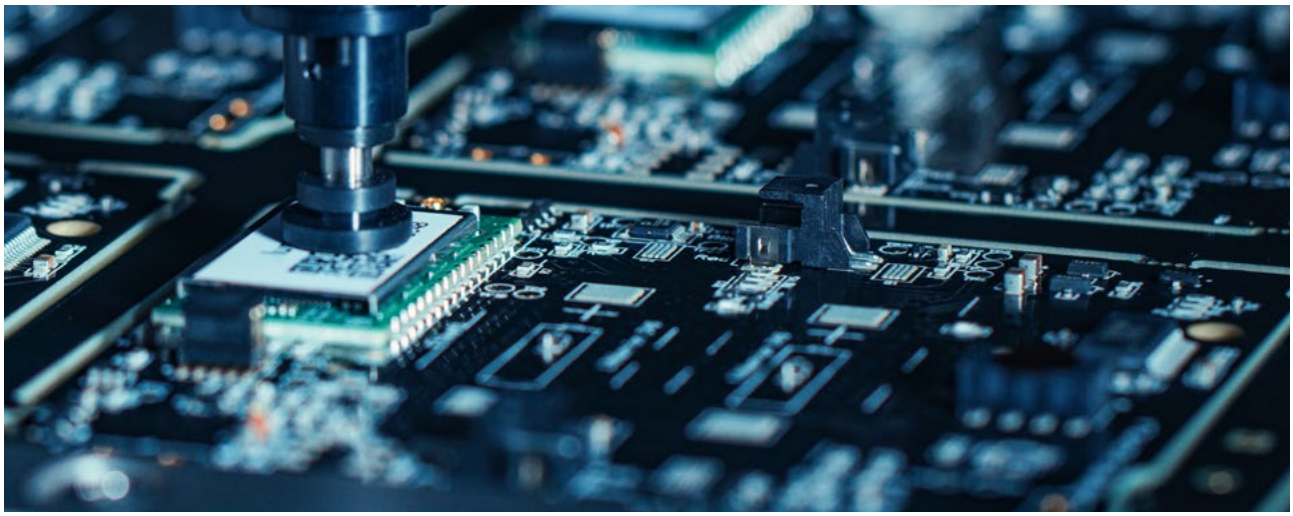
The manufacturer based its SMT solution around ADLINK's cPCI-6636 processor blade. With a 6U Eurocard form factor, the cPCI-6636 is based on the 6th generation Intel® Core i7-6820EQ, a four-core/eight-thread processor with integrated Intel® HD Graphics 530 and maximum 3.5 GHz turbo frequency. Thermal design power is only 45W, which helps keep the system cooler and more efficient in warm industrial settings. Additionally, the blade is equipped with both integrated and expandable dual-channel DDR4 system memory, CFast and 2.5" SATA storage, and front I/O ports including 2x VGA, 2x Gigabit Ethernet, and 8x USB 3.0. The cPCI-6636 accommodates up to six Baumer cameras, including two 1.3MP and two 5MP units, and the SMT manufacturer selected the cPCI-6636 version with XMC riser support, which allows for expansion via high-speed connections such as Serial RapidIO or PCI Express.

CompactPCI®



ADLINK cPCI-6636 Series Processor Blades

As an SMT leader, it made sense that this manufacturer would want certain optimizations made to its assembly solution for performance and efficiency. Most CompactPCI systems vendors offer commercial-off-the-shelf (COTS) solutions, but ADLINK stands above the field in its vertically integrated ability to customize products to meet client needs and manufacture validated, modified COTS (MCOTS) alternatives. This ODM/customization capability, combined with deep support capabilities at the local level, made ADLINK the obvious choice for this SMT application.



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Ready to Excel

There are many reasons for a manufacturer to base its solutions around CompactPCI. The standard's ruggedness provides critical ability to withstand vibration on production floors. Its blade architecture delivers modularity for easy feature selection and high serviceability. Not least of all, a committed CompactPCI supplier like ADLINK will continue to deliver product updates that incorporate new technologies and capabilities. For this manufacturer's present needs, the cPCI-6636 was an ideal fit, especially after customization. Going forward, the door remains open for the manufacturer to quickly upgrade its SMT solution with even more powerful blade options if conditions merit.

ADLINK's SMT manufacturing client realized its critical goals for this project, beginning with achieving a top-quality assembly and production solution for its customers. Results proved that real productivity from the new solution was among the highest of all machines in its class. Thanks to the system's exceptional performance and reliability, the new solution could run completely without human assistance around the clock while achieving zero-defect results, putting the company that much closer to realizing its goal of becoming a true "Industry 4.0" smart factory solutions provider. Not least of all, ADLINK's widespread support presence in locations around the world will allow the SMT manufacturer's solutions to maintain extended lifespans with rapid support responsiveness.

ADLINK is committed to developing and innovating embedded computing solutions and continues in its long-ranging role as an executive member of the PCI Industrial Computer Manufacturers Group (PICMG) consortium, which governs and advances the CompactPCI standard. By providing leadership at the standard's governance level, while also partnering with core industry pioneers like Intel and NVIDIA, ADLINK is uniquely positioned in today's market. No other MCOTS ODM delivers ADLINK's high caliber of solution ruggedness, performance, time to market, support, and total solution value.

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