

This article was published by [elektroniknet.de](https://elektroniknet.de) on March 18, 2024:

**Super-precise and fast:**

**Placement mix in advanced packaging applications**

## **Backend and SMT technologies are merging**

**The key technology for innovations like 5G, e-mobility, IoT, optoelectronics, sensors, virtual reality and AI in the coming years will be advanced packaging, which requires new manufacturing concepts. The previously separate areas of die bonding and SMT placement can now be efficiently combined on a single machine, which generates significant cost savings. Placement platforms like the SIPLACE TX micron from ASMPT set new standards in this field.**

The demand for flexibly deployable SiPs (system in package components) or modules is growing rapidly. The sensor market, for instance, is expected to grow from US\$116.72 billion in 2023 to US\$165.47 billion in 2028, which corresponds to a compound annual growth rate of 7.23 percent.<sup>1</sup>

SiP (system in package) and other modules combine active and passive electronic components into compact functional groups that can in turn be used as modular additions in larger electronic and SMT modules. Examples include communication and camera modules in smartphones. The advanced packaging technology required for producing such modules places dies and flip-chips as well as classic SMT components.

### **Technological integration overcomes performance limitations**

The required packaging densities and the resulting need for positioning precision were traditionally achieved with two separate technologies: placement machines for SMT components and conventional die bonders for dies and flip-chips, a technology from the backend and semiconductor field. Since they involve two different procedures, often carried out by different departments, the logistical effort and the thermal load on the components and modules are quite high. In addition, the rapidly growing demand requires significantly higher volumes than die bonders can deliver without investing in more machines.

What is needed is therefore a new generation of placement machines that can reliably process not just SMT components but also highly sensitive bare dies and chip-scale

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<sup>1</sup> Source: [Mordor Intelligence](https://www.mordorintelligence.com)

packages and do so at speeds that are comparable with those of SMT-only lines. Not an easy task, because SiPs and modules include components that are extremely small and sensitive. In particular, super-thin dies with heights of only 50 to 70 microns and latest-generation 0201m components must be picked up, moved and placed with exceptional gentleness. Since advanced packaging combines technologies and processes from the backend and SMT segments, suppliers that have traditionally addressed both areas with their product portfolio have a leg up on the competition, with ASMPT being at the forefront.

## **SIPLACE TX micron: The best of both worlds**

The SIPLACE TX micron from market and technology leader ASMPT is an outstanding example of the merger of these previously separate manufacturing worlds. With a maximum benchmark speed of 96,000 cph and a standard accuracy rating of 20 microns, it serves three accuracy classes in a single machine. With options like vacuum tooling, the machine's accuracy of the SIPLACE TX micron can be raised further to 15 or even 10 microns. It also handles high-density placements with component gaps of only 50 microns at very high speeds. The digital blue-lighting vision system ensures the optimized detection of low-contrast and particularly small fine-pitch components and component parts, such as copper pillars with small diameters. And the new high-resolution PCB camera contributes to the high precision of the SIPLACE TX micron by ensuring the improved detection and reading of small properties and reference points.

To achieve the placement speed of 93,000 cph in the dual-gantry SIPLACE TX micron, the SIPLACE CP20 head plays a key role. In combination with 4-mm, 8-mm and 2 × 8-mm variants of the SIPLACE SmartFeeder Xi, it can process even 0201m components and bare dies with the smallest connectors and a minimal diameter of 25 microns gently, quickly, and accurately.

With a footprint of 2.23 m × 1.00 m, the new SIPLACE TX micron sets new standards in floorspace performance – a factor that is even more important in cleanroom environments than in classic SMT manufacturing. The machine is certified for cleanroom ISO class 7 as well as CE and Semi-S2/S8.

## **Innovative component management**

Particularly important for the processing of sensitive dies is the fact that with the SIPLACE TX micron all central placement parameters such as pickup positions, lighting settings, dip forces, travel speeds and placement forces can be accurately defined for each component. This extends to touchless pickup and placement, the latter even with a placement force of zero. Especially convenient: the various placement forces and process variants can be executed with the same placement head, requiring no setup changes.

The SIPLACE TX micron's cracked-die inspection detects even the smallest cracks in dies while the die chipping detection recognizes chips in the dies' edges with great reliability. They prevent damaged dies from being placed and diminishing the line's yield.

Also new on the SIPLACE TX micron is the Multi-Purpose Dual Conveyor TX, which handles PCBs weighing up to 8 kilograms and up to 14 millimeters thick, including any warping, with no compromise in speed or precision. Even board supports weighing up to 35 kilograms are possible with this conveyor option. Low and tall JEDEC trays are used as substrate carriers, and the clamping and unclamping speeds are flexibly programmable.

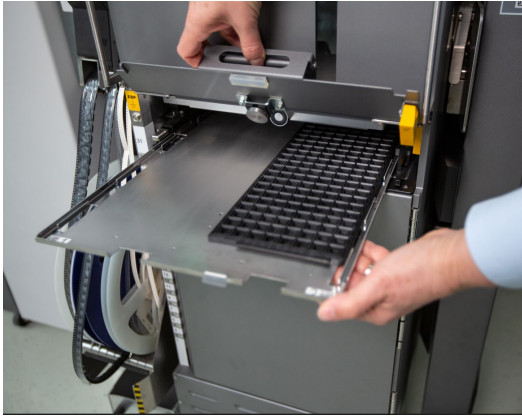
## **Best fit for the Intelligent Factory**

Like all modern ASMPT solutions, the SIPLACE TX micron features a broad range of M2M communication and networking capabilities. Proprietary and standardized interfaces such as the WORKS Operations Information Broker, IPC-HERMES-9852, IPC-2591 CFX and IPC-SMEMA-9851 integrate it fully into workflows, higher-level MES/ERP systems, traceability solutions, and ASMPT's Intelligent Factory concept, which delivers more efficient processes, better yields, improved quality, and more effective staff deployments through big data.

With the SIPLACE TX micron, ASMPT demonstrates once again in which direction electronics production is moving, especially where advanced packaging and high-density applications are concerned. The machine combines for the first time high precision and reliability in mixed SMT and die placements, making it the ideal platform for manufacturing much more compact SiPs and modules in significantly greater volumes than before reliably and cost-effectively.



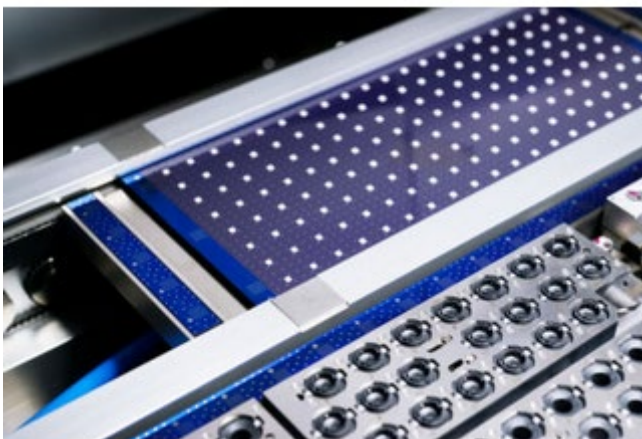
**The SIPLACE TX micron from ASMPT shines with speed and precision for standard SMT components as well as highly sensitive dies. (Image credit: ASMPT)**



**With the SIPLACE Tray Unit, trays can be refilled without having to interrupt the production process.** (Image credit: ASMPT)



**The CP20 placement head of the SIPLACE TX micron places even the smallest and most sensitive components with exceptional speed (48,000 cph) and precision (up to  $\pm 10$  microns @  $3\sigma$ ) with touchless pick-up and a placement force of zero.** (Image credit: ASMPT)



**With innovative vacuum tooling, the SIPLACE TX micron delivers high-precision placements without compromising its maximum speed.** (Image credit: ASMPT)