

Handling printed circuit boards



ISD System GmbH uses fully automatic handling machines

Fast, flexible, capable of handling heavy loads - SCARA robots are the compact high performers of modern automation. They show their strengths especially when handling different product formats. This is demonstrated by ISD System GmbH where Epson robotics solutions have supported the company as it entered a new field of activity.

Variant diversity fully under control

Printed circuit boards: almost everyone holds them in their hands every day without being aware of it. They are installed in computers as well as in smartphones, televisions and cars. Printed circuit boards come in a wide variety of sizes and configurations, they are an inconspicuous yet indispensable component of electronic devices.

But what is a relief for some is a new challenge for others. With the growing number of variants, the production of printed circuit boards demands more and more from machine builders. The processes should be fully automatic with short cycle times and require as few tool changes as possible with maximum flexibility for changing over to different formats – all without a worker having to change anything in the machine configuration.

This is a tough ask but ISD System GmbH from Bempflingen in Swabia has mastered the process with its new fully automatic handling machines for printed circuit boards. This is despite the fact that the automation experts have only been building their own machines for one and a half years. The step into a new business field was made much easier thanks to Epson's SCARA robots (type LS20-B). Precise, fast and equipped with a long reach, they can effortlessly adapt to a wide range of changing Printed Circuit Board (PCB) formats.

From programming to mechanical engineering

Anyone looking for the secret of the success of ISD's new robotic cell will find it in the past. The company's two technical masterminds, Torsten Schmid and Michael Dircks, are long-time experts in programming sophisticated automation solutions. For more than 20 years, the two have programmed systems for a wide variety of machine builders. "It was often us who closed gaps in the design for use by the end customer through our programming," explains Torsten Schmid. "That's how we learned to think about a design process from the end in a very detailed and customer-oriented way." Following the motto "We can do that ourselves!", Schmid and Dircks then took the step in 2019 of building their own robot cells for loading, unloading, aligning, checking and moving PCBs - always with them: SCARA robots from Epson.

Demand is rising

Michael Dircks has observed the development of printed circuit boards and the accompanying "upgrading" of handling machines over the years: "Printed circuit

Epson SCARA robots make our design work much easier

Torsten Schmid

Managing Director ISD System GmbH

Key Facts

SCARA robot with excellent price/performance ratio and high power density

Compact: Designed for use in confined work areas

High payload and long arm reach: 20 kg at 1,000 mm

User-friendly: Easy installation, use and maintenance

Versatile and flexible: placement, assembly, palletising, inspection and polishing

boards have become more complex, the density of the tracks has increased significantly, products are much more sensitive today. Our thinnest products measure just 25 µm. This calls for solutions that are highly flexible and can work very sensitively." For this purpose, in ISD's modular robot cell, PCBs with undefined position, size and distance from a previous process are fed into the machine via transport rollers at a speed of 0.1 m/min to 3.0 m/min. After measuring the position, size and infeed angle, a suction arm on the Epson SCARA robot flexibly adjusts to the size of the PCB. This allows it to grip the PCB precisely at the edges and lift it off the conveyor belt at the same speed during transport. Depending on the process requirements, the PCB is unloaded or turned by 180° and placed on an outfeed conveyor belt at different speeds. If there is a malfunction in the downstream machine, the sucked-in PCB can be unloaded and stacked in the robot cell for intermediate storage. If there is an upstream malfunction, dummy termination boards that are stocked in the robotic cell are inserted into the process so that the production PCBs have a defined termination and thus damage to PCBs can be avoided.

Robots as a multi-tool

The Epson SCARA LS20 is the linchpin of powerful and flexible handling. With its space-saving arm length of 1,000 mm and a payload of up to 20 kg, it can take on a variety of tasks even in confined work areas. Another decisive factor for ISD was the easy installation and maintenance as well as a high power density at a very profitable investment. "Of course, price plays a role for us as a compact technology forge," emphasises Schmid, "with the Epson SCARA LS20, we have a powerful multi-tool with which we can fully concentrate on programming. This makes our design work much easier." A big advantage for ISD is also the international support and service. "If our systems go to the Far East, for example, we can't send a service technician with spare parts to the site in the event of a machine breakdown; it's simply too expensive," says Dircks. In this case, the automation experts can rely on Epson's worldwide supply network. For ISD, this is a real added value that pays off in the long run.

Simple commissioning, reliable operation

Last but not least, from the point of view of the programming experts Schmid and Dircks, the Epson RC+ development interface has also proven to be particularly user-friendly. "Thanks to the Epson development environment, we were already able to install our first Epson robots completely without training," says Schmid. Equipped with an intuitive Windows user interface and an open structure, the Epson RC+ software is ideal for easy programming of a wide variety of applications. By means of a 3D environment, robot programmes and movements can be almost completely simulated and visualised. This is another advantage for the compact technology forge, which ensures that machines can be commissioned and maintained worldwide even by non-specialist workers