No need to fear artificial intelligence in electronics production

We are living in a world increasingly marked by digitalisation and networking. This development is also filtering through into production areas previously shaped by the implicit expertise and experience of individual employees. The demand for reduced reliance on these leads to the deployment of new technologies. Assistance systems play a major role here, supporting production staff in their decision-making.

In the production of electronic assemblies, the quality of the final product is dependent not only on the processes in the production line itself but also, to a major extent, on the quality of printed circuit boards, components and process materials. These factors are subject to manifold reciprocal effects. As a rule, an understanding of the interrelated processes is the implicit knowledge of the employees who have acquired it by experience in the course of their working lives. Only a very small proportion of this knowledge is explicitly recorded in the form of working instructions or technical reports.
Conversely, this fact means that quality in electronics manufacturing relies on individual employees. In the worst case, valuable knowledge is lost when they leave the company. Because this form of dependency is simply not acceptable, industry has long been calling for further validation and process support measures to assist staff, in parallel with the existing process monitoring in the individual systems.

Stencil printing and 3D SPI

The VERSAPRINT 2 series is the new generation of stencil printers from Ersa, based on the proven concept of the VERSAPRINTseries. Modern drive technology with encoders enhances control and verification of positioning processes on all process relevant axes. The VERSAPRINT 2 models are equipped with modern camera technologies for fast setup and integrated 100% inspection of the print area.

The VERSAPRINT 2 ULTRA³ model uses the very latest measuring technology provided by the 3D-LIST camera. The shape of the smallest solder paste depots plays a major role in the printed volume and ultimately for the shape of the solder connection. Is the height of the paste depot consistent or does it drop towards the edges? The ULTRA³ can answer this question for you. It is both a stencil printer and 3D-SPI in one. It can also be upgraded or retrofitted with all the options of the VERSAPRINT 2 series.

A production line for the manufacture of SMT components is always structured according to the same scheme. The first step is the solder paste printing, followed by the component placement and then the reflow soldering process. The individual process steps can be easily monitored. Solder paste volumes, placement offset and the thermal processes in the reflow systems are physical factors which can be measured relatively easily. On the other hand, there are non-measurable factors, such as the wettability of PCB surfaces and components. If a supposed "soldering defect" occurs in the form of an open soldering joint, it cannot be directly assigned to one process in the line. This is where the networking comes in. The error's location is linked with the component type, the layout and the product. Now, when the AOI data is compared with the component type, the layout and the error frequency for other products, interesting details can be analysed. The statistical inference permits conclusions on how the layout, the component and the product influence the error. With this data at hand, determining the cause of the error is easier as the observation period extends beyond the faulty product and the line. The same process also applies for wave and selective soldering. Here it is the approach to the solder bead issue which makes networking and analysis of product-specific errors particularly interesting.

It makes sense to turn around the "learning from your mistakes" approach. Today, the error rates in electronics manufacturing lie in the low double-figure ppm area. With an error rate as low as this, software-based AI systems cannot extrapolate data for a learning process. For this reason, the quality of the processed material is documented and then, using the diverse data and a process of elimination, conclusions can be drawn on possible causes when faults occur.

Many employees take a critical view of this development: they fear that their jobs will be taken by systems based on artificial intelligence. These fears are unfounded, as intelligent assistance systems are primarily a tool for staff. The analysis of large volumes of data is a piece of cake for today's computer systems. They allow analyses to be generated wich provide a high level of transparency regarding the entire manufacturing process, and the materials processed. This transparency is very important, contributing greatly to the acceptance of the

VERSAFLOW 4 selective soldering platform in modular design with unique flexibility and assistance systems

decisions made by or suggestions provided by the assistance systems.

A further advantage of AI systems is that, unlike humans, they always take the same decision. For humans, decisions are often subject to influencing factors – form on the day, stress levels, personal wellbeing, too little sleep, and so on. These influencing factors do not apply for AI systems.

Intelligent assistance systems in harmony with experienced staff are an optimum symbiosis when it comes to enhancing quality.

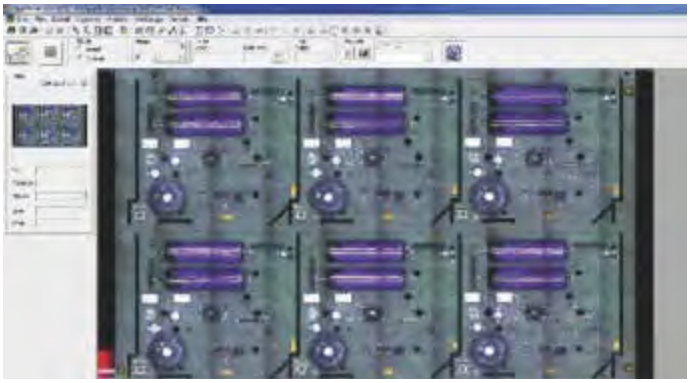
A look is taken at the influence of new technologies in the area of process optimisation as well as the associated benefits. Exciting scenarios describe future developments and provide food for thought on cross-sectoral implementation. Assistance systems make a major contribution; they are to be seen as an opportunity for staff, not as a threat.

Developments in Europe's industrial landscape are fundamentally dependent on the competitive capacity of the companies. Regardless of whether they operate locally or globally, under today's boundary conditions as dictated by the world market, far-sighted orientation and a high degree of innovative power and willingness are indispensible. Only with constant innovations will it be possibly to safeguard medium-term and long-term company success.

As an SME in the machine engineering sector with a tradition going back many years, it is our duty to support our customers in their production processes, to optimise their quality, costs and delivery service through our technological lead and our innovative power.

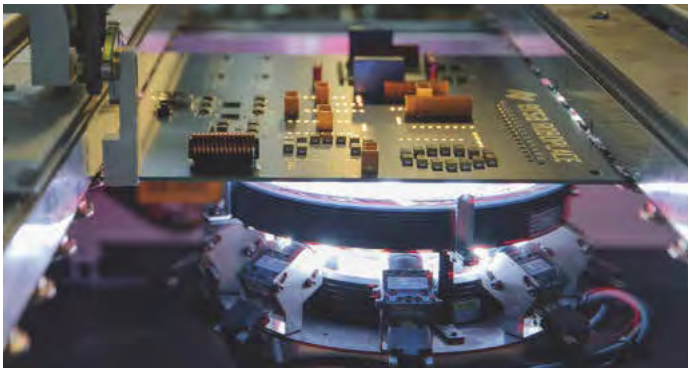
Intelligent assistance systems are an important detail; on the basis of extensive datasets, they support our customers in their decision-making processes.

We look forward to interesting discussions and a spirited exchange of information at SMT Hybrid Packaging in Nuremberg, and wish visitors constructive contact with our experts to successfully advance the projects which will secure their future.



Integrity check prior to the soldering process with VERSASCAN

CAD Assistent 4 – Modern 3D printed circuit board formats for simple programming



Documentation and generation of QA data with VERSAEYE

Profile

kurtz ersa

Ersa – Electronics Production Equipment – As the largest manufacturer of soldering systems, we look after connections in the electronics industry around the world.
Ersa is one of the worldwide largest suppliers in the area of soft soldering and possesses the most comprehensive range of services under one corporate umbrella. The engineers at Ersa have set themselves the task of adapting their products, production processes and complete solutions to the constantly-changing demands in joining technology.
In the area of soldering machinery, Ersa offers solder paste printers and reflow ovens as well as wave and selective soldering systems. The range on offer in the hand-soldering sector extends from the proven soldering irons to intelligent soldering stations and fully-automatic repair stations for soldering and desoldering a diverse range of components.

More about Ersa