

## Soldering robot integrated in THT production

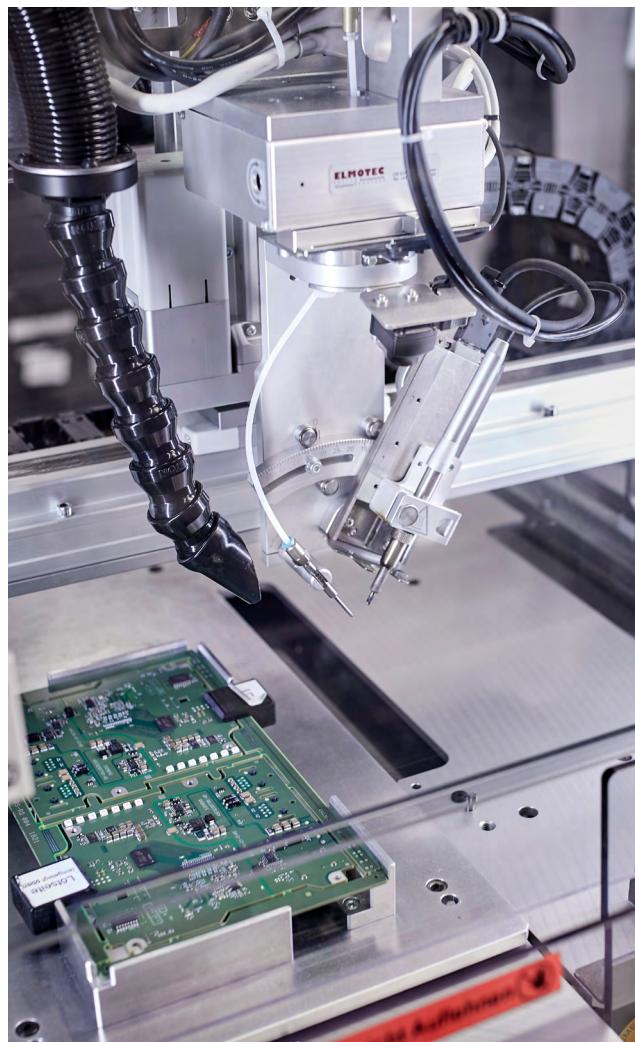
### SolderSmart® - soldering automation Plug&Play

**Soldering automation should be economical, reproducible and traceable. High flexibility due to rapidly changing products and production processes is a decisive factor in increasing the efficiency of soldering processes. With the integration of SolderSmart® soldering robots into the THT production, Siemens was able to achieve these goals.**

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As a leading international technology company, Siemens has set itself clear goals and developed a strategy to transform production in a more flexible, economical and climate-friendly way. Sustainability and economic efficiency already begin with the saving of materials, energy and resources. To achieve these goals, Siemens relies on the SolderSmart® soldering robots from ELMOTEC AG. The soldering robot has been integrated into the production processes at the Hagenau and Karlsruhe sites - other sites are currently being implemented.

The Siemens manufacturing and development site in Karlsruhe is one of the largest Siemens sites in the world. It is the international centre of the process industry and process automation. The manufacturing plant, headed by Manfred Kirchberger, manufactures products for industrial communication and identifica-



tion, as well as automation systems, process control systems and industrial PCs. The plant is one of the most modern in the world and the employees are supported by a whole fleet of autonomous delivery robots.

#### Efficient Integration and Reproducible Soldering

The soldering processes in the factory are divided into THT and SMD production. An internal analysis in the factory showed that there is still a high demand for soldering automation, especially in the area of THT soldering or in the area of flat modules. The goal of this project, headed by Josef Kühn, Technology Planner at Siemens Karlsruhe, was to integrate soldering systems that would allow flat modules to be integrated into the assembly modules. Important criteria were the small space requirement and simple installation to ensure the best possible process flow. Still existing manual soldering processes within the production islands were to be converted to automated soldering processes with reproducible soldering quality.

“SolderSmart® tabletop soldering robot is the first project in which the employees were completely satisfied with from the very beginning,” states Josef Kühn. The analysis and comparison of different soldering robot manufacturers showed that the SolderSmart® soldering robot from the leading soldering and automation technology manufacturer ELMOTEC

in Switzerland meets and even exceeds Siemens’ wishes and requirements. SolderSmart® convinced with its modern, lightweight and at the same time high-quality design. The efficient drawer system and the intuitive software, as well as helpful features such as automatic zero point calibration and peak measurement, impressed the client. SolderSmart® runs on a plug-and-play basis - no compressed air or nitrogen at all - and requires only a 230V supply line. These are differences that immediately caught the eye of the experienced Siemens team.

#### Solder Penetration Confirmed by X-rays

To put SolderSmart® soldering robots through their paces, Siemens had selected assemblies with THT ground connections. Increased attention was paid to the through-platings of the ground pins. A solder penetration of 100% was the prerequisite for integrating the soldering robots into the production. ELMOTEC and IVD GmbH (distributor of SolderSmart®, Germany) each analysed the most efficient soldering parameters according to IPC standards, in a comprehensive sample soldering and determined the optimum cycle times. Advice and development of workpiece carriers are also part of the service offer. An optimal interaction of the expertise of the soldering machine manufacturer ELMOTEC, together with the soldering technology partner IVD, ensured that the potential of the SolderSmart® was fully exploited.



The soldering and solder penetration were confirmed by X-ray tests according to IPC standards and Siemens gave the green light for integration. Mr Kühn mentions: “The efficient and close cooperation between the local sales department in Germany (IVD) and the manufacturer in Switzerland (ELMOTEC) was impressive”.

**Series Production & 40,000 Solderings with One Tip**  
The SolderSmart® tabletop soldering robots could be seamlessly integrated into series production. Traceability, full process monitoring and various security mechanisms such as password-protected user levels are standard in the SolderSmart® software. Mr Kühn explains: “The drag soldering function has reduced our cycle times by almost half and additionally increased the economic efficiency.” The software is also equipped with icons and info buttons to make it easier for inexperienced users to get started. The Siemens team is very happy to work with the SolderSmart® as “new colleagues”. Experience at Siemens has shown that on average the tips should be changed after 40,000 solder joints. “The frequency for changing soldering tips can be adjusted individually and depending on the process parameters” adds Manfred Schnabel. SolderSmart® is equipped with a counter as standard to monitor soldering tip wear.

After a soldering tip change, the soldering robot then automatically measures itself via automatic zero point calibration and simultaneously checks whether the correct tip width was used. “Highest soldering quality, process reliability and complete traceability of the relevant process parameters - these are our ELMOTEC values which we pay great attention to when developing soldering systems,” explains Raphael Luchs, Managing Director of ELMOTEC. ELMOTEC also develops customised fully automatic soldering systems, which, for example, ensure safety-relevant components for automotive suppliers. “We always have our finger on the pulse of the latest technological developments and our team of engineers and software developers are used to challenges.”

Maintenance and servicing are hardly necessary with SolderSmart® soldering robots. Regular maintenance for servicing can be carried out by the user himself. The wear parts inventory at Siemens only includes soldering tips, solder wire, heating elements and a few brushes for the cleaning unit. Compared to other soldering processes, the maintenance effort for the SolderSmart® soldering robot is negligible. Regular nozzle cleaning, checking the solder bath, adding antioxidant pellets, recycling the old solder, nitrogen supply, compressed air, etc. none of this exists with the SolderSmart®.

**Global SolderSmart® Experience Exchange at Siemens**  
Word of the use of the soldering robots has spread quickly in the global Siemens network. At the plant in Hagenau, SolderSmart® support the production of pressure sensors. To compensate for tolerances of the soldering points, for example, a vision software system is also integrated there. The soldering points are detected by the system using a camera and existing tolerances are automatically corrected. This ensures reproducible soldering quality at all times. Within the framework of Siemens internal communication (e.g. internal Facebook such as Yammer), experiences and videos of the soldering processes with the SolderSmart® are exchanged.



**Soldering the Future**  
By using the SolderSmart®, Siemens continues to focus on the set goals of climate neutrality and resource conservation, without compromising on quality and efficiency. In order to consolidate the needs for future SolderSmart® for Siemens AG, the company ELMOTEC has defined a Siemens version with the integrated Industrial Siemens PC. This allows the SolderSmart® to be identified according to Siemens specifications and the same high standard is available to all plants globally.

The demand for automated soldering and the flexible use of soldering robots has experienced a real boost in recent years and will continue to grow in leaps and bounds. Whether semi-automatic soldering robots or fully automated and completely monitored systems – ELMOTEC’s systems cover all the needs of customers in the field of automated soldering worldwide.