



Employees at the new pick-to-light workplaces work more ergonomically and with greater concentration

Everything at Hand

Turck has optimized THT assembly at its Halver production site with two pick-to-light systems

For PCB assembly, manufacturers often rely on SMD technology (surface-mounting technology) as this process is fully automated. However, as soon as wired electronic components have to be fitted, alternatives such as the THT process (through hole technology) are used. Components here are inserted through contact holes in the board, which even today still requires manual assembly work. To accomplish this, employees place the individual electronic components on boards and use a soldering wave unit to form a permanent connection with the PCB track.

Depending on the size of a board and the number of components to be fitted, this assembly process can be very complex. Roynic assembly tables are therefore frequently used in the THT assembly of PCBs to ensure process safety and quality. This is also the case in the THT assembly at Werner Turck GmbH in Halver.

The Roynic assembly table shows the employee where to fit particular components by means of light indicators. Normally 8 to 15 similar boards are positioned in a transport frame. Each time a component is inserted, the employee presses an acknowledgement button on the table.

Cost and process optimization

Production processes undergo regular examinations at Turck as part of its practiced CIP process. The process specialists in Halver calculated that employees spend a total of 240 hours a year just pressing the acknowledgement button. The fact that the frames with the boards had to be lifted manually by the employees to a conveyor belt for the soldering wave unit was also not efficient. There was a lot of overall potential for increasing the efficiency of the THT assembly process.

QUICK READ

Greater ergonomics, faster processes and lower costs – this is the result of a process optimization that Turck has implemented for its Halver site for the manual assembly of electronic boards. Instead of using the previous Royonic assembly tables, employees assemble the boards on two pick-to-light workplaces. The new solution was planned and implemented by Turck subsidiary Mechatec in close cooperation with the Halver production planners.



For Alexander Kohlhaas, expert in manufacturing technology in Halver, it was clear that the Royonic assembly tables were not the optimum solution for the boards with up to 15 components. The decision to implement a pick-to-light solution with system components from Turck was one of the initial ideas. The transport of the frame also had to be automated, which eliminated the need for employees to carry the frames and also optimized manufacturing. As such, it was no longer necessary for logistics processes such as the restocking of components to interrupt assembly, as these could be carried out by the logistics employees.

System solution from Turck Mechatec

Together with Natalie Krumme, at that time a micro-technologist trainee, Kohlhaas developed the idea of a THT workplace based on a pick-to-light system. After

The assembly process optimized with pick-to-light results in a considerable increase in production at the workplaces at full capacity.



Turck's BL67 I/O system processes and controls the signals of the plant and communicates with the IPC via Modbus TCP



The employees confirm the removal and fitting of the components by touching the capacitive sensor light

the Halver production planners had defined the functional and ergonomic requirements of the application, Turck subsidiary Mechatec got on board. Turck Mechatec offers complete electrical system solutions to meet customers' specifications, from the planning stage to handing over a turnkey solution. From the requirements profile, the Mechatec specialists worked out and implemented a system solution that was both ergonomic and cost-optimized.

With its pick-to-light solutions, Turck has already provided several customers with workplaces for

manual mounting and order picking. Mechatec could therefore draw on the automation specialist's extensive wealth of experience for the system planning and combine the optimal individual components with software specially developed for the THT application in Halver. The software not only controls the process but also measures the productivity of the THT assembly and visualizes it via a separate monitor. The data is logged so that any further optimizations can be identified during later analysis. The hardware used on the new assembly stations includes two HMI/PLC systems, a BL67 I/O station, as well as various sensors and light buttons together with the connection cables. Today, the employees stand in front of two ergonomically designed pick-to-light shelving systems which are provided with up to 48 compartments for holding the components to be assembled.

Efficient assembly process

An assembly process starts with the insertion of the empty boards into the frame carrier. The large HMI/PLC screens visually indicate the individual work steps and the next component to be fitted, with the location and the assembly position on the board. The display on the monitor also serves as a work instruction at the same time. This eliminates the need for any training time and enables production employees to be deployed more flexibly. Besides the display on the monitor, an activated light indicates the shelf location from which the employee has to take the current component to be fitted.

After the employee has fitted the component on the board, she confirms this operating step by touching the capacitive pick-to-light sensor and the visual-



Initial training unnecessary:
The image on the display gives precise instructions for inserting the next component, and the sensor light indicates its storage location



Both shelving systems can be filled with new components from the back without interrupting the production process

Productivity and other production parameters are visualized on an additional monitor

ization on the monitor indicates the next assembly location. The pick-to-light sensor indicates on the shelf locations the next component to be taken. Once the boards are complete, the employee pushes the frame to the conveyor belt. The frames with the assembled boards are automatically moved via the conveyor belt to the soldering wave unit and then back to the workplaces. Here the employee takes out the fully assembled and soldered boards and refills the frame with empty boards for the next operation.

Concentration on essentials

The shelves are designed so that they can be refilled from the back with new components without interrupting the assembly operation. This relieves production workers from logistics tasks so that they can concentrate on the actual assembly operation. The two shelving systems are also an advancement in terms of ergonomic design. Instead of having to lift the component frame weighing approximately eight kilos from the belt for assembly, a conveyor belt now moves the

frames with the boards to the employees. They just have to push the frame a short distance until it is picked up by the conveyor belt and transported to the soldering wave unit. All necessary preliminary work for assembling new products can now be carried out externally by the work scheduling unit. The entire process is described and defined in a CSV file. The production planners can also define whether the workplace is to be used by one or two employees in order to shorten the throughput time for the products. As soon as the new product is started, it is only necessary to load the CSV file together with the images into the IPC and the BL67 station. In the future, solutions can also be linked to the new inventory management system without any major effort.

Conclusion

The initial experience has shown that the assembly process optimized with pick-to-light results in a considerable increase in production at workplaces at full capacity. The soldering wave unit is now continuously and evenly utilized. Any process interruptions, as was previously necessary for refilling components, have largely been eliminated. The error rate could also be reduced as the interruptions are generally error sources in the assembly process. The investment in the optimized equipment will pay for itself very quickly.

TURCK MECHATEC

Turck Mechatec offers complete electrical system solutions to customer specifications for all areas of industrial automation. As a service provider, the Turck subsidiary places great importance on customer service. At the same time, the company is so flexible that it can complete its individual tasks promptly and efficiently. The essential factor for success is the close analysis of customer requirements and operating conditions. Any existing components are integrated upon request; new components are selected carefully.

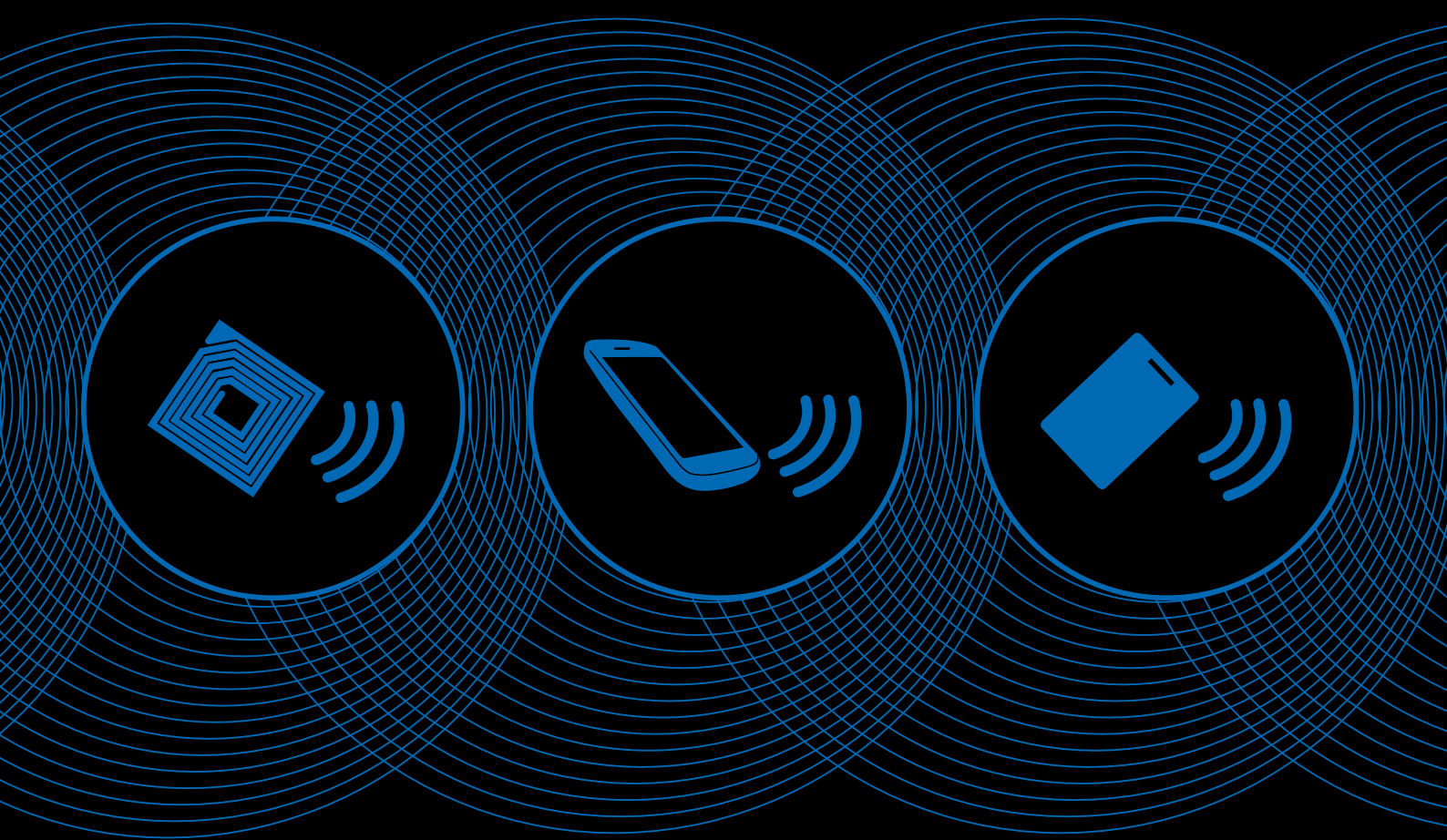
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