

User report



Leuze electronic assembly banks on Erska convection technology

Leuze electronic assembly in Unterstadion

Change of Technology

The calculated risk of changing from one technology over to another is rather large for many manufacturers. Even for changes taking place in the same branch of technology, for example from vapor phase over to convection soldering, the fears and

concerns against such a change are great. That may be the reason why often, may be too often, the older and already known is being retained rather than taking the step towards a new experience.

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Ersa Hotflow 3/20 at Leuze electronic assembly

An example that older and known technologies do not always have the best advantage, and that a well-planned change in technology can be extremely advantageous, has been demonstrated by Leuze electronic GmbH, headquartered in the Swabian town of Owen.

The Leuze electronic GmbH is a worldwide active corporation specialized in the development and sale of optoelectronic and inductive sensors, identification-, data transfer- and image processing systems. Its sensors and light barriers are not only used in the automotive industry and by manufacturers of industrial equipment, but also in the medical and analysis technology. Producing the electronic assemblies required for their own products is being done by its daughter company, Leuze electronic assembly GmbH, located in the Swabian town of Unterstadion.

This daughter company, founded in 1977, was initially intended to manufacture thick-film hybrid circuits for their own textile machines, but it developed rather quickly into being the main supplier for electronic assemblies for all products and all locations of the Leuze GmbH. Any excess capacity was used to supply, as a contract manufacturer (EMS), products primarily to discriminating and demanding customers from the military and the medical industry.

FOCUS ON QUALITY AND TRANSPARENCY

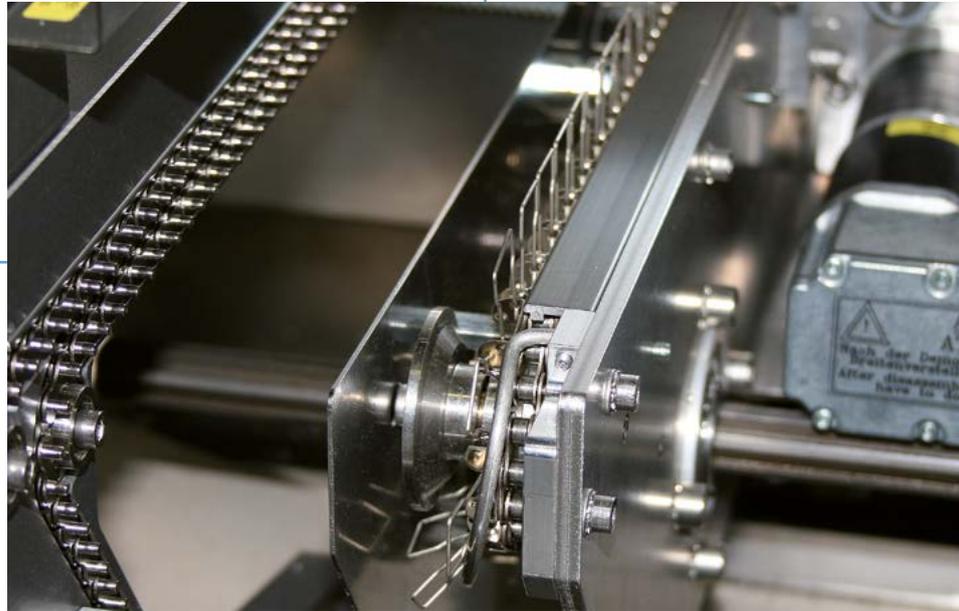
In order to operate in the latter, security-relevant area as an international corporation, the quality of the board assemblies and the transparency of the

production processes is of prime importance. The company is not only certified as per DIN 13485, but is also approved for production as per the UL/CSA standard, which calls not only for the traceability of each board assembly, but also for each component that has been used - and that all times and in full detail.

When the company was planning to invest in a new reflow system, the demands on this new system were very high. Amongst other demands, it had to fit into the high level manufacturing environment of Leuze electronic assembly. After intensive discussions with Ersa and some other suppliers, a decision was made. The new reflow system was to be the HOTFLOW 3/20, supplied by Ersa.

Aside from criteria which were derived directly from the process parameters and the demands of the customer, the communication with the in-house MES was a central and crucial issue for Georg Denkinger, the production manager. On this subject, Leuze requests standardization as much as possible. Even prototype assemblies are manufactured in the same standardized process. This allows customers to be aware, early on, how the product will behave in future serial production. This is a very important aspect of the proto-type phase, particularly for products requiring FDA approval.

The starting point of the investigation were the experiences the company had made with the presently used vapor phase system. The new reflow unit should be able to be integrated into the existing production line, which is made up of a solder paste printer and four pick-and-place units.



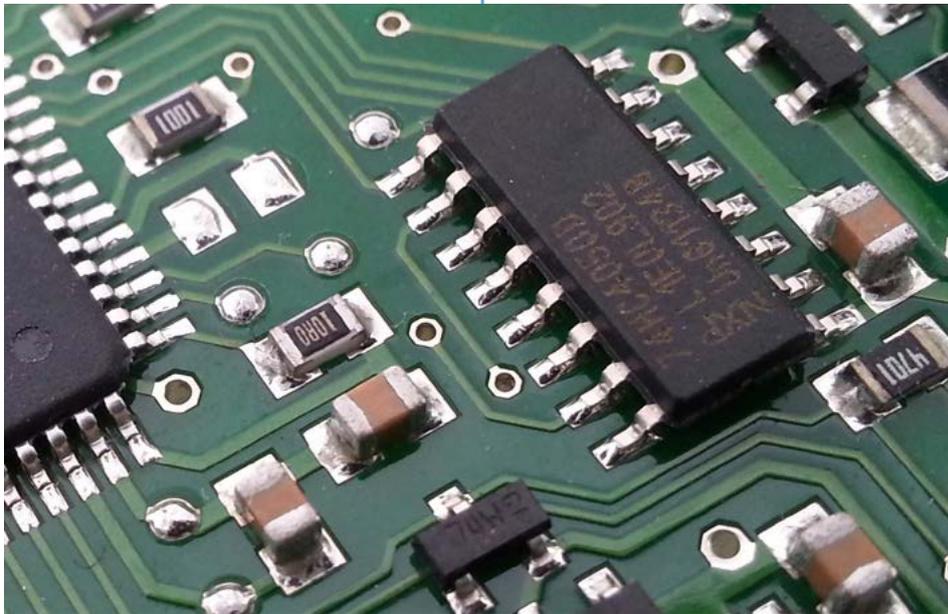
A primary goal was to further improve the cycle time of the production line, so that, in the near future, customers with higher quantities of boards could also be optimally served. This latter demand could already be met by the new single-track reflow system on account of the shorter cycle times in the convection reflow process when compared to the vapor phase process. Leuze electronic assembly also decided to specify the integrated center support. With this feature flex boards or other thin printed circuit boards, which have a tendency to warp due to their own weight or under the thermal influence, can be optimally transported and soldered with the shortest possible cycle time.

In addition, the currently installed vapor phase system has proven to be relatively susceptible to disturbances, and it became apparent already during the amortization period that a large maintenance effort was required to maintain production. Since the company produces in 3-shift operation, the demands on the production equipment as a whole and the components installed therein are very high. On this aspect, Leuze is convinced and assured that they have made the correct decision when selecting the HOTFLOW 3/20. Not only could the maintenance effort required from the vapor phase system be drastically reduced, but it also became apparent that the maintenance-free components installed in the reflow system caused less downtime during production. Therefore, the throughput of the full production line could once more be increased and optimized.

Another challenging aspect was also the demand put forth by the customer, that when soldering in a nitrogen atmosphere, the rest-oxygen value may not exceed 200 ppm, even when operating under maximum load. Actually, it is normally assumed that a rest-oxygen value during the soldering process of below 500 ppm is adequate to sufficiently reduce the formation of oxides. But a higher standard is frequently demanded by customers from the military- and medical industry, which manufacture products whose solder joints need to meet the IPC class 3 standards. This demand also was fully met - during the solder trials already by the HOTFLOW 3/20.

ERROR RATE IMPROVED

It was surprising for Georg Denking that, after a couple of month of operation, it became apparent that their already low defect rate due to soldering could be even further reduced. In vapor phase soldering, a phenomenon labelled tombstoning (the snapping up on one of its metalized ends of small chip components such as 0805, 0603 and 0404) is a common occurrence. This is generally attributed to a slightly delayed melting of the solder paste on one of the pads, caused by the large temperature gradient during the condensation of the vapor on the board. Current analysis of the QS data shows clearly, that in the convection reflow process of the HOTFLOW 3/20 tombstoning is no longer a statistically relevant factor.



Perfectly soldered components with Ersa Hotflow convection technology

Another criterion during the evaluation, for Georg Denking, was the level of standardization. Following the current trend of the market, the Leuze group did not want to resort to a customized solution for the new system. This was important, as Leuze had made some bad experiences with non-standard equipment. In the past, when it was planned to invest in another "non-standard" system with the identical specification as the one installed, it was found that the supplier could deliver this only at a very high additional cost. With its modular approach and the highly standardized systems, however, Ersa could score an important point. Ersa's customer fully benefit from the extensive features already included in the basic system, which can be reordered in the identical configuration without any problem. When defining the basic configuration, particular attention was placed on supplying the customer a production system with high-valued features and conforming to the actual industrial standard.

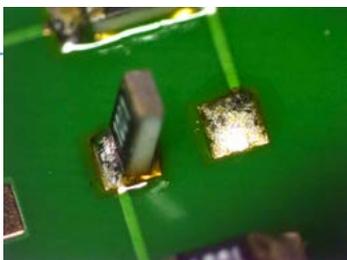
The HOTFLOW series reflow systems is expandable at all times with a number of additional options which a customer may require, always depending on his particular needs.

This also shows up positively by the integration of the system into the existing infrastructure. The system is intended for autarkical reaction to a product change in the production. First the infeed for boards is blocked, the system loads and activates autonomously the new soldering program, reports this back to the OIC and frees up again the infeed for the new product when the operating conditions of the program have been reached within the system. With the assistance of an Ersa application engineer, and without too much effort, it was possible to integrate the system into the existing software structure.

After evaluation of the system in production, it could be shown that the conversion from vapor phase over to convection reflow was a full and complete success for Leuze electronic assembly. Aside from the easy integration of the system into the existing infrastructure, it was also possible to achieve the requested improvement in cycle time. The maintenance effort could be drastically reduced, and the already high quality standard could substantially be raised by the integration of the HOTFLOW 3/20.

It is planned to install a further line with similar specifications, an interesting new project that will be realized by Leuze electronic assemblies and Ersa. ■

Tombstone effect of a 0603 component from the vapor phase process



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