

## Hot operations – cool calculations

**BHTC puts its faith in state-of-the-art reflow soldering systems for the production of PCBs for air conditioning systems in cars**

Hot or cold. These were the criteria for car drivers in the 60s and 70s when it came to choosing the interior climate. What progress when you could later choose specifically which parts of the body you would like to blow with cold or pre-warmed air. This was made possible by new blowers and manually operated nozzles. Nowadays it is not only drivers of classy wheels that can get into their cars and choose the best temperature individually for each seat position. State-of-the-art air conditioning systems do this with precision down to half a degree.

**Behr-Hella Thermocontrol GmbH** in Westphalian Lippstadt is one of the leading manufacturers of air conditioning systems and a supplier of well-known car makes. **BHTC** was founded in 1999 as a joint venture between Behr GmbH & Co. KG and Hella KG aA Hueck & Co.

An ideal combination as both companies could bring their many years of experience in their core competences car air conditioning and engine cooling systems as well as vehicle electronics and light technology into the venture. The decision to locate in Germany at a time when the tendency was moving towards relocating somewhere in the east was the result of inventiveness, cleverly devised production processes as well as the commitment and flexibility of all the suppliers involved. So BHTC started production with 44 employees in new greenfield premises. Today approx. 800 employees ensure that car passengers of well-known car makes can travel in a cosy environment.



## Planning with wheels running hot

Hans-Werner Lückehe, Head of Technical Support, was part of the team right from the word go (seen on the right of the picture with Jochen Krisch, SMT Sales Manager for Germany). He was one of those on the production side responsible for planning and calculating the project "Yes to a German Location". "The complete planning went ahead so fast that our wheels ran hot. We had to exploit production benefits to the limits in order to survive against competition from the east and to meet the numerous specifications laid down by the car industry". "Whereby it was important", according to Mr. Lückehe, "that our partners and suppliers bit the bullet in order to provide an unbeatable competitive edge in production with state-of-the-art technology and innovative products."

An ideal case of exemplary cooperation with a supplier was the integration of the reflow soldering system into the production process. Mr. Lückehe contacted the manufacturer SMT from Wertheim because he already knew their products. The medium-sized specialist for reflow technology is renowned for the fact that it covers the whole range from small batch production right through to high-speed lines. SMT was in a position to make its abundance of know-how available for the development of the BHTC production. "Requirement specifications were compiled that demanded great innovation potential from us", said Jochen Krisch, the person responsible at SMT for sales in Germany.

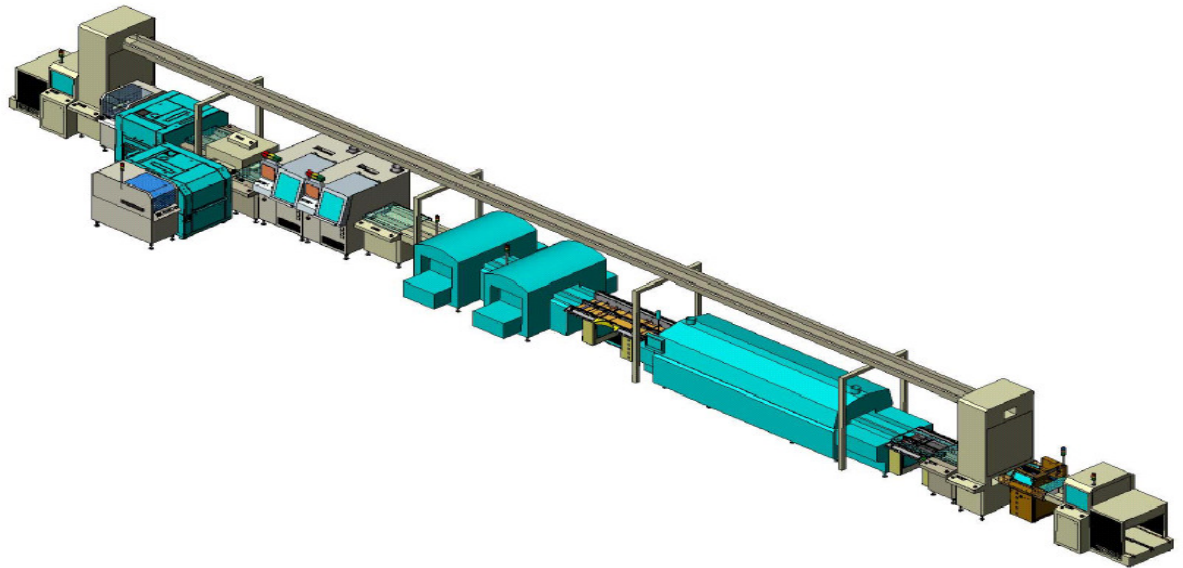
**“Our dual track solution resulted in cost savings of 15%”**

## **Hans-Werner Lückehe**

The first challenge: dual flow tracks operating at different speeds for irregular formats. “We wanted to manufacture two different products independently of each other on one line. This meant a cost saving of approx. 15%”. Other requirements were a high-precision temperature control for optimum product quality, lower maintenance time and costs, lower consumption of nitrogen and energy and, of course, high process reliability for the 18 shifts planned per week. The outcome was a product called “SMT Quattro Peak® L”; developed in Wertheim in Baden-Württemberg, it was equipped with numerous innovations and tailor-made to meet BHTC requirements. The “SMT Quattro Peak® L” was not designed to be integrated into one specific line. It had to be flexible and able to accommodate at least 80% of the PCB formats processed in the plant. It was also necessary to clarify in advance the number of pieces that had to be run, what the position was as far as the energy balance was concerned and whether all thermal requirements were fulfilled. Greatest attention was given to process reliability. In this case the people at SMT were convinced that, as in all existing systems, high reliability is the result of high-quality production which in turn was confirmed by extensive machine capability studies.

## **1100 double-sided PCBs per shift**

After the planning phase it took another 18 months until the first “SMT Quattro Peak® L” was integrated into a complete production line in the year 2005. The complete line is a special construction and designed in such a way that it optimises both the quality requirements of the car industry and the economic aspects. The PCB blanks are fed through an automatic PCB feed system and then printed with soldering paste by the stencil printer. A specific dual-track dispenser provides for the SMD adhesive application. Two mounting devices position the required electronic components and the PCBs are fed into the soldering system. Both tracks in the soldering system can firstly accommodate different formats and secondly be run at separate speeds. This ensures that each track has the optimum processing time depending on the process latitude. In this way two products can be handled independently from each other in one process step. After cooling, the flow continues via a segmented intermediate belt and from there to the double-sided feed via an overhead return conveyor system or to a magazinging system with automatic magazine changer. 1100 doubled-sided PCBs are produced per shift on the optimised production line.



## We set high standards of quality

Hans-Werner Lückehe is extremely satisfied with the production. "An increase in performance of approximately 25% with comparable investment costs was achieved for a standard production line. All systems are working smoothly." He is, of course, also highly satisfied with the SMT cooperation. "It was a commitment to what we all wanted, not only a financial transaction". Mr. Lückehe is particularly impressed with the high reliability of the system. "We set high standards of quality and have developed our own testing system that, for example, measures the stability of the temperature in short intervals on each track of the soldering oven. Any deviation in temperature would lead to a standstill in production. Thank goodness we are spared any such thing". Of course, time saving is also a requirement demanded of technical systems. In this case the "SMT Quattro Peak® L" stands out with its fully automatic track-width changer, which ensures that all formats can be conveyed without any great loss of time. The operational costs of a system are naturally also a point of attention. But here, too, there are no grounds for complaint. According to Mr. Lückehe, "There are several sophisticated technical innovations on the system that reduce consumption in all areas. The intelligent nitrogen control, for example. Nitrogen consumption is reduced enormously thanks to the automatic adjustment of the pass-through apertures and the nitrogen feed in the case of different PCBs and a flow tunnel at the inlet and outlet with adjustable aperture height. The same goes for the constructive features in the separation of peak and cooling zones. The heat stays in the peak zone so that active water cooling is redundant as is energy consumption. I am glad to say that the time and costs

required for maintenance are also low. Despite the 18 shifts a week, the intervals are set at approx. 4 to 6 weeks". The reason for this," according to Jochen Krisch, "is the new process gas filtering that keeps the inside of the soldering system deposit-free. This fact together with the enclosed conveyor system reduces cleaning time and costs considerably."

The fact that the 5<sup>th</sup> SMT reflow soldering system has meanwhile gone into operation in Lippstadt in the period between 2000 and 2005 is sufficient proof that the "SMT Quattro Peak® L" has more than met the demands placed on it. And that is not the end of the story. Mr. Lückehe will fall back on German quality "made by **SMT**" for future purchases.

#### Technical Data „SMT Quattro Peak® L

Length:	6404 mm
Width:	1571 mm
Length of process area:	4815 mm
Pre-heating zones:	4
Cooling zones:	3
Peak Zone:	2 Peak zones with 4 heating modules
Temperature measurement:	NiCr-Ni sensors in the hot gas flow
Conveyor speed:	0.2 to 2.0 m/min