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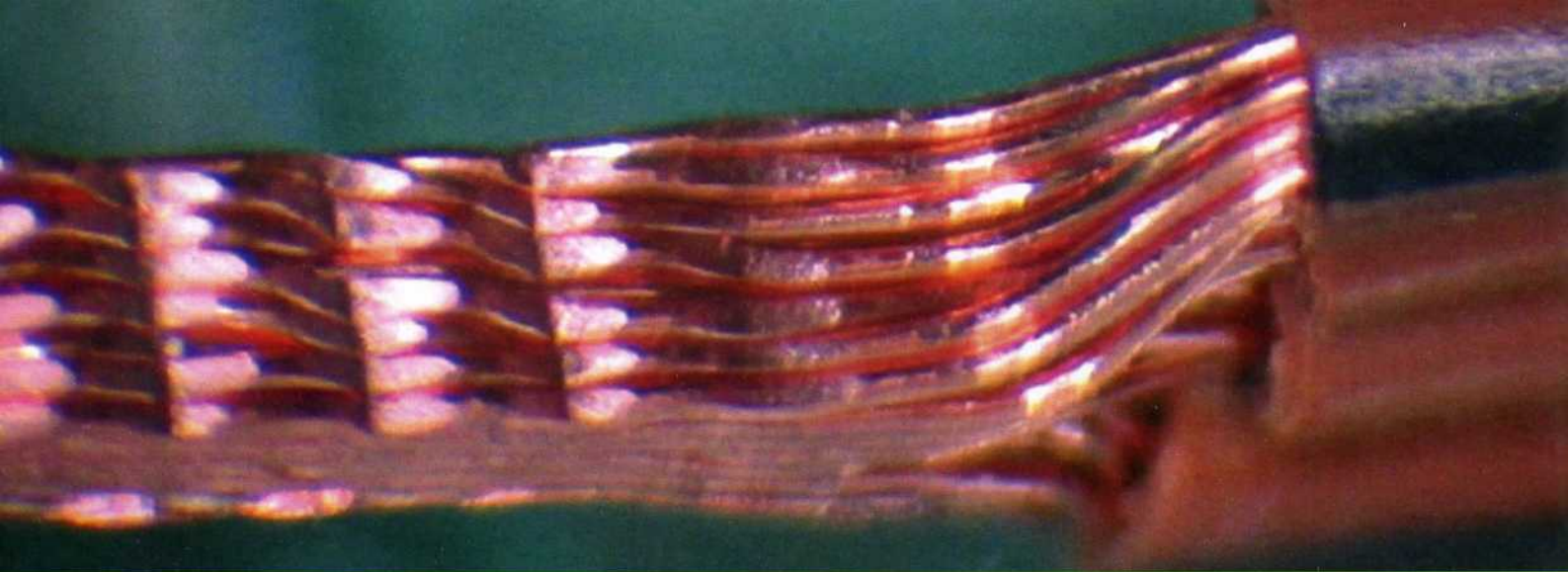
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Reliable ultrasonic weld joints for all multi-strand cables
Photos: Telsonic GmbH

Ultrasound for accurate welding of motor vehicle cables

Ultrasound welding replaces crimping technology in cable connections – improved quality control and set-up times

K.T.C Kabeltechnik in Crailsheim develops, designs and manufactures cable systems for a broad range of applications in Germany and Eastern Europe. The spectrum covers samples, specimen products, series production as well as the replacement supply of individual wires and cable sets. Production is mainly focussed on providing customised cable sets for the motor industry. The crucial factor here is the reliable connection of several cable strands together. The high quality standards of the motor industry require constant cost optimisation and the highest degree of process reliability from suppliers. K.T.C have used ultrasound technology from the Swiss company Telsonic AG for manufacturing cable connections since 2006. Ultrasound

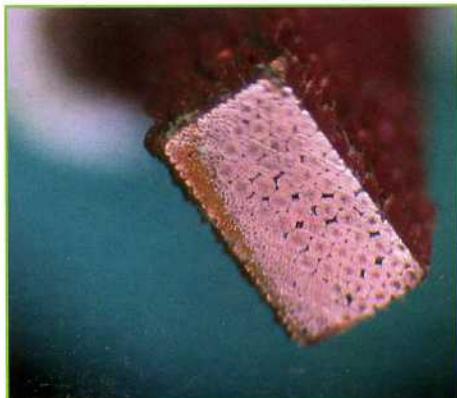
welding reduces set-up times for new batches to a minimum and enables extremely accurate quality control. The crimping method is increasingly being replaced.

“The quality requirements and ppm guidelines for OEMs in the motor industry and the enormous pressure of rising costs demand constant rethinking of manufacturing processes,” emphasises Sieghard Lang, managing director of Crailsheimer K.T.C Kabeltechnik GmbH & Co. KG. The production of customised cable sets for electrical vehicle components, both for cars and trucks, must be completed quickly, reliably, and on a just-in-time basis. Here, the connection of individual strands to the said connectors can be only partly auto-

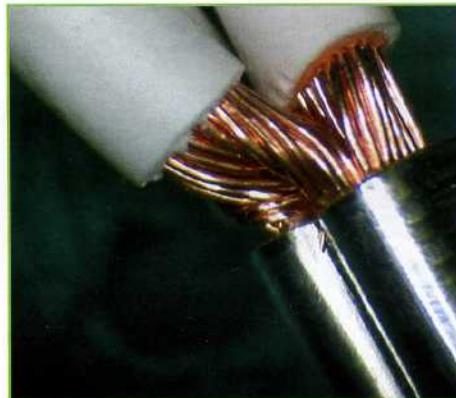
mated and always requires human involvement at the crucial point in the process. “Process reliability in the manufacture, and the reliable functioning, of electric circuits including all connectors for the global vehicle market which needs millions of cable sets per year is absolutely essential. You can’t afford to make mistakes,” adds the experienced engineer.

Customised cable sets for Miele and Maybach

This medium-sized family company, founded in 1979, with its current workforce of 240 based in Germany, Rumania and Slovakia, has concentrated on the development, design and manufacture of customised cable sets since 2001 and is a secondary supplier to the motor industry. The customers are primary suppliers such as Behr, Bosch, Hella or Siemens. The cables control lighting and air-conditioning systems or supply power to electric windows and other electrical vehicle components. Crailsheim cable sets are to be found in a wide range of vehicles including Audi, BMW, Mercedes, MAN and Volvo. “Our cables ensure the reliable function of air-conditioning technology for Maybach,” declares Lang. We also produce cables for the medical technology and engineering sectors, building services (lifts etc.) or white goods. K.T.C started off in domestic electrical goods but since 2000 this has



Monitoring a cut-open ultrasonic weld joint cross-section and grinding pattern



Telsonic ultrasonic welding technology replaces the crimp connections commonly used up to 2006

gradually been replaced by the motor vehicle sector which has produced a doubling of turnover in the last three years alone.

Cable sets in motor vehicles can be several metres long and weigh up to 50kg. Therefore, alternative materials and solutions are being sought, both in respect of cost and weight reduction. Flexible cables, ribbon cables, fibre optic or BUS solutions are considered just as much as cheaper aluminium. "But ribbon cables make up the greater part. And that will still hold true in ten years time," explains K.T.C project manager Heinz Kiutra. And these cables need contacts and have to be connected. K.T.C process cables from 0.22mm² to 16mm². State-of-the-art machines and equipment ensure the reliable manufacture of contacts," 99 percent of which are crimped, explains Kiutra. The situation with the production of connectors is different. "We have used ultrasonic welding technology since 2006 and produce over half of the connectors with it," declares the manager responsible for new projects from planning to series production. "Welding helps us achieve significantly better quality control than crimping."

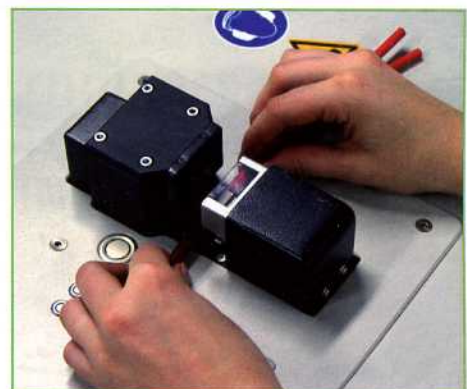
Technology changes in aid of time and quality

Since 2006, items that used to be crimped are now increasingly welded using ultrasound technology. "An ever greater number of connectors have been changed to the metal welding process and by 2008 it will account for more than 90% of products," explains Kiutra. Crailsheim has opted for the ultrasonic sound specialists Telsonic AG from Bronschhofen in Switzerland. They are looked after by the German subsidiary in Erlangen. Three ultrasonic metal welding devices TelsoSplice TST50205 desktop cable welding devices are currently used. "In designing these devices we have paid particular attention to the ergonomic aspects and the welding gun is installed at a slight angle. This makes it easier to insert the strands," emphasises Axel Schneider, an engineer at Telsonic in Erlangen, Germany. That benefits the many women at K.T.C who work family-friendly four, six and eight hour shifts.

TelsoSplice is the latest generation of Telsonic cable welding devices. A very stable structure and a working area of 10 x 19mm enables welding of large cross-section strand joints up to 45mm². The power for this is delivered by ultrasound generators with a capacity of 3000 to 5000 Watts and a working frequency of 20kHz. Menu-driven, self-explanatory control software with touch-screen operation and clear organi-



Telso-Splice TST 50205 ultrasonic desktop strand welding device from the specialists Telsonic AG, Bronschhofen



A working area of 10 x 19mm enables welding of large cross-section strand joints up to 45mm²

sation ensures efficient work. An easy to use joint editor makes it possible to set up new joint configurations with the relevant colour coding in the shortest possible timescale. "Where we once had to manufacture new crimping tools for new products, we can now achieve the same results just by reprogramming via the screen and possibly changing to another standard tool – it can't be done any quicker and any better," enthuses Heinz Kiutra.

Quality inspection down to the individual wires

K.T.C are also impressed by the quality control for Telsonic systems. Quality tolerance windows for all relevant welding parameters are established in the setting mode. Upper and lower threshold values can be set for node thickness final dimension, welding energy, power and time as well as maximum output. An alarm is triggered if these values are exceeded or under run. "The welding procedure now allows us to more accurately check that all contacts are connected correctly with each other," reports Kiutra. With crimping, the power path measurement used in testing error tolerance may not go below 10%. With ultrasound welding, the absence of a few wires in one of maybe twelve strands to be connected can be detected. And before the welding process starts. If an operator forgets to insert a strand, or if the strands are not inserted correctly, this is recognised by the software and the welding process does not start. Statistical analysis, automatic calibration, maintenance menu for service work, reference mode and an ultrasonic test mode extend its functions.

K.T.C came across Telsonic at a trade fair. The Swiss company was no stranger to managing director Sieghard Lang as the mechanical engineer knew of their expertise in plastics welding. "But we were pleasantly surprised by their welcoming approach and the speed with which they

processed the samples on our first visit." And the fact that Telsonic immediately provided a machine was well received in Crailsheim. "In addition to the very good offers regarding test and inspections, we were very impressed by the expertise of the Swiss," remembers Lang who is thinking about extending the machinery range. Finally, it is intended to rapidly extend the workforce at the site in Rumania, that was founded in 2007, from the current 25 employees to over a 100. Reliable machines could come at just the right time here.

Reliable ultrasonic technology from a pioneer

Ultrasound welding is a tried and tested method for combining plastics and metals. This technology is used in many sectors. The Swiss company Telsonic AG is a pioneer in the field of ultrasonic technology. The company was founded in 1966 and has subsidiaries in Germany, England, South East Europe and the USA as well as a joint venture in India. It holds numerous patents and uses its ultrasonic technology for welding, cut'n'seal, cleaning and screening. Its headquarters is in Bronschhofen, Switzerland. Ultrasound technology has been developed for, and used in, the automotive, packaging and pharmaceutical industries, as well as the medical, aviation and entertainment industries. ◀

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