

Wire splicing with ultrasonics – fit for Industry 4.0

Networking optimizes both the process and quality assurance

PLASTIC WELDING

METAL WELDING

CUTTING

CLEANING

SCREENING



Bronschhofen (CH), 09/2019

The use of ultrasonics for wire splicing has become a popular technique in many sectors of industry, from the automotive and commercial vehicles industry to aeronautical engineering and even including the production of domestic appliances. Typical applications are found primarily in prefabrication, in the production of cable harnesses on the mounting board, and in the compression of individual wire strands. It has even become possible to link modern wire splicing systems directly to users' manufacturing execution systems (MES), thereby increasing process reliability and making quality assurance easier.

Wire splicing with ultrasonics is the solution of choice whenever reliable electrical connections are required (to meet the high quality standards that are the norm in the automotive industry, for example). The countless cables must have fault-free connections in order to function reliably throughout the service life of a car. In cases like this, ultrasonic connections offer both technical and financial benefits, including low electrical resistance, cost-effectiveness, and excellent corrosion protection. Welding systems have also become very flexible over time. Copper-to-copper and copper-to-aluminum combinations in a variety of cross-sections can be welded with the same machine, for example, and there are now appropriate tools for twisted cables or cables stripped to a few millimeters. Wire splicing with ultrasonics has also proved to be highly reliable and safe in practice, because the relevant parameters



- 01 Welding high-voltage multi-core cables
- 02 Intuitive touchscreen user interface

can be adjusted and monitored as appropriate for the application in question. This is now also possible in Industry 4.0 environments.

End-to-end networking: Direct connection to the production management system

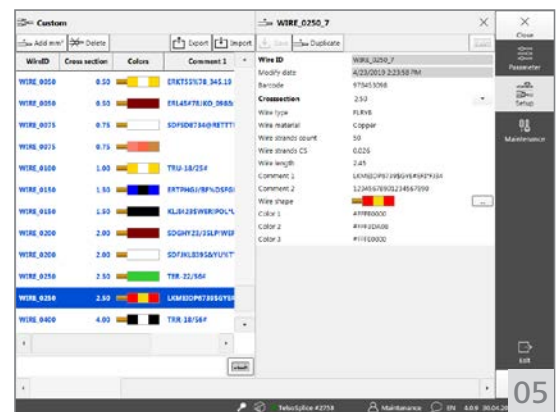
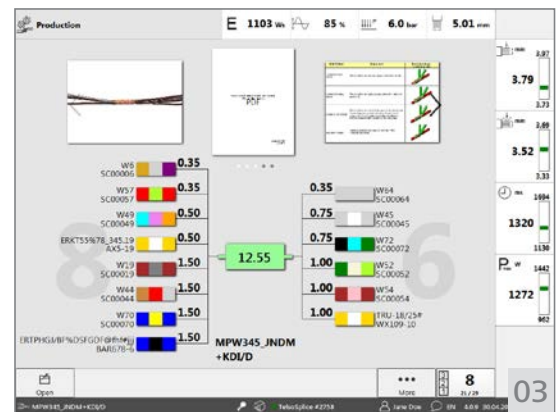
The ultrasonics specialist Telsonic has developed the new control and operating software TelsoSplice® V4 for its TelsoSplice® wire splicing systems. The software offers integration and networking options that are fit for the future, along with numerous functions for effective quality assurance. It is operated intuitively via a user-friendly touchscreen. Despite the modern design language, users who choose to upgrade will not require any training, because the look and feel of the graphical user interface is based on the previous version. The wire splicing systems can be connected directly to production management systems, offering users significant added value. This is relevant primarily for the most popular MES in the sector, 4Wire CAO by Di.IT / Schleuniger. Flexible integration into other MES systems is also possible via the Telso®CON interface. A large number of parameters can be transmitted via the OPC UA interface to facilitate the integration of intelligent benchtop variants into processes with up to 100% automation. Once the ultrasonic wire splicing systems have been integrated into the higher-level network, jobs can be transmitted automatically complete with all technical parameters, including splice type and quantity. Production data remains transparent at all times. All parameters and results can be shared via the network and used to optimize production control. Users can access real-time production data and welding results at any time and save data to network drives or other storage media – to ensure traceability, for example – once it has been processed for the specific purpose it is to serve. As the software supports a wide range of industrial label printers, labels containing the required information can be generated and printed at all relevant stages of production: after each splicing operation, on the finished wiring harness, or for each specific batch, for instance.

Load management and process optimization

The TelsoProduction Server offers additional options. It communicates with the MES and the splicing units. As an intelligent intermediate link, it simplifies customer-specific cable harness assembly and takes over both load management and process optimization. This enables complex splicing jobs to be distributed across multiple units and facilitates balanced load distribution between machines, for example. Should a fault occur on a unit, the task that was assigned to it can be picked up by another unit, for instance, thereby avoiding production downtimes. The associated parameters are transferred automatically.

Everything under control: Quality management and quality assurance

For effective quality management, the new software also supports seamless integration of the ultrasonic splicing systems into the Telsonic Quality Control Center (TQCC). This safeguards quality control. Splices can be tested and checked quickly and uniformly (with the ability to customize test sequences). Splices that fail quality checks are taken out of production. This approach ensures that potential faults are detected long before final checks, to avoid unnecessary costs. For maximum transparency, all test results are saved and can be called up at any time. Quality assurance starts much further upstream than wire splicing: Before production gets



- 03 Clear screen design shows all relevant production data at a glance
- 04 Checking wire material and age
- 05 Article number, barcode, material, type of conductor, etc., are added to the wire database

underway, the material is checked not only for type but also for age. Ultimately, the age of the wire affects the quality of the weld connection and material that has been in storage for too long should not be used.

All of the detailed information about the wires (including article number, barcode, wire structure, material, and type of conductor) can be captured in the new wire database and even imported into it automatically from both the MES and the cutting area. This avoids redundant data entry and makes it easier to create new splices.

Welding parameters only have to be entered once for each splice geometry. Welding parameters can be defined either separately for each splice or once for all splices – based on the cross-section of the splice, for instance.

Stable production and data integrity

There are also other features that increase production reliability for wire splicing. For example, the panel PC is fitted with an uninterruptible power supply (UPS) as standard. This provides protection against voltage drops. The data for the last splice completed is saved reliably even in the event of a power failure and the PC is shut down in an orderly fashion. This safeguards the data integrity of both the installed Microsoft Windows operating system and the TelsoSplice® software. The splicing unit pneumatics are also monitored. The automatic underpressure detection function warns the operator if the pressure is too low and stops production until the fault has been rectified, thereby avoiding the expense of rejects.

Moreover, the wire splicing systems support numerous options to help increase production reliability and operator convenience still further. The multi-conductor splice kit, for example, provides a straightforward and reliable means of welding high-voltage multi-core cables and twisted data cables using ultrasonics. There is a bad part cutter to destroy incorrect splices. An anti-side splice kit prevents wires from being inserted side by side to ensure reliable welding. The optional interface to the shrinkage oven is a practical addition for transmitting shrinkage parameters or preventing the sealing of splices that have been welded incorrectly. This also makes production more reliable, because faults of this nature would otherwise not be detected until the final check stage. Networking therefore makes wire splicing with ultrasonics more efficient.

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- 06 TelsoSplice® TS3 stand table version
- 07 TelsoSplice® TS3 desktop version
- 08 TelsoSplice® TS3 board version