

## Telsonic's PowerWheel® technology delivers weight saving benefits in automotive cable assemblies

PLASTIC WELDING

METAL WELDING

CUTTING

CLEANING

SIEVING



01

Bronschhofen (CH), 11/2020

Aluminium cables are now becoming commonplace in automotive on-board power supply systems. The typical assembly process for these cables often involves securely welding and crimping large cross section aluminium cables within a thick walled tubular copper cable lug.

The shortcomings which are characteristic of conventional crimping processes, when joining dissimilar metals, can be reliably overcome using Telsonic's PowerWheel® technology. Originally developed for copper to copper joints, this revolutionary ultrasonic welding process is now able to join aluminium cables to copper contacts through the application of high levels of energy over a short cycle time. In addition, the tubular cable lug can be protected by means of heat shrinkable tubing to protect the joint.

Axel Schneider, Sales Manager of Swiss based TELSONIC AG explains: "Applying large amounts of energy to the joint zone in a highly focused way, and over a short period using our PowerWheel® technology, we are able to achieve a welded joint between the two different materials through adhesion."

The revolutionary PowerWheel® process, with its unusual movement pattern,



02

01 MT8000 metal welding press with PowerWheel® technology

02 Aluminium cable with a cross-section of 85 mm<sup>2</sup>

produces an adhesive joint, where only a positive clamp fit is achieved using other more conventional processes. Manufacturers of automotive on-board power supply systems can therefore produce connection cables in weight-saving aluminium, safe in the knowledge that there are no compromises on the security of the contacts.

### Securely joining weight-saving aluminium

In the case of one cable manufacturer, an aluminium cable with a cross-section of  $85 \text{ mm}^2$  was securely welded and crimped within a tubular cable lug with a wall thickness of  $2.0 \text{ mm}$ , as a single process and within the same system. A representative of this manufacturer commented: "Until now, this has not been possible with other established processes". Although aluminium can also be crimped, its physical properties are an obstacle to the process. The challenge is to tear open the oxide layer and achieve a secure joint. For small cross-sections ( $< 6 \text{ mm}^2$ ), this is possible whilst still obtaining the high quality required for the components. However, using the ultrasonic process, this can be achieved much more easily and with the added benefit of greater reliability. For large cross section applications however, only the ultrasonic process can deliver the results required.

The ultrasonic technology breaks open the oxide layer and even in the case of large aluminium cross-sections, achieves a welded joint through adhesion. The process also significantly reduces the crimping forces required and produces a reliable low-resistance joint. The success of this process has seen the automotive sector in particular embrace the technology, with applications currently ranging from  $10 \text{ mm}^2$  to  $160 \text{ mm}^2$ , however there is still scope for widening the range of applications further. The PowerWheel® process creates strong, secure contacts by combining an ultrasonic welding process with a crimping process. Due to the sonotrode design and the rolling welding movement, a welding pressure of up to  $10 \text{ kN}$  and an energy output of up to  $13 \text{ kW}$  are applied to two positions in the joint zone through the thick walls of the tubular cable lug within a very short time.

The thickness of the tubular cable lug walls make clear how great the challenge is. However, using Telsonic's PowerWheel® technology, the aluminium does not flow away, but connects with the copper-to-nickel joint through adhesion. This results in a secure and very strong weld which allows the required current flow. This makes it possible for users of this technology to realise the benefits of weight saving in the manufacture of automotive on-board power supply systems, whilst obtaining a competitive advantage.

by Axel Schneider, Head of Sales Metal Welding, TELSONIC AG, Switzerland



03 Axel Schneider, Head of Sales Metal Welding, TELSONIC AG, Switzerland