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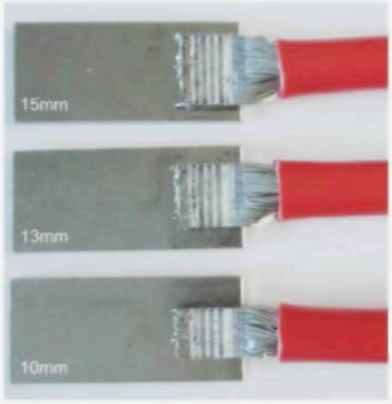
TELSONIC ULTRASONICS

TECHNISCHE UNIVERSITÄT ILMENAU

# Ultrasonic welding of aluminium conductors to copper terminals with longitudinal and torsional sonotrode movement



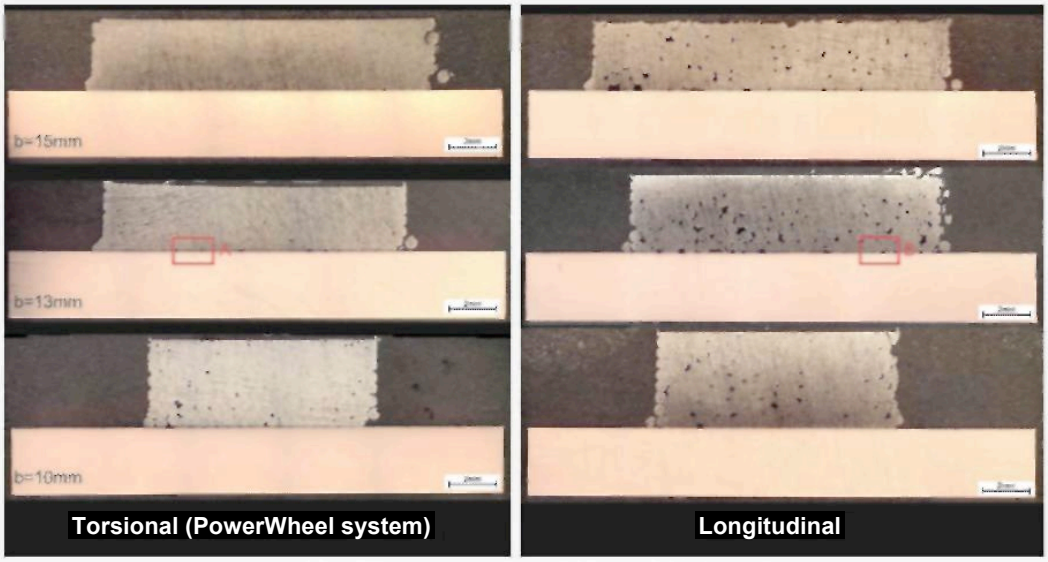

Torsional welds (PowerWheel system)

## Motivation

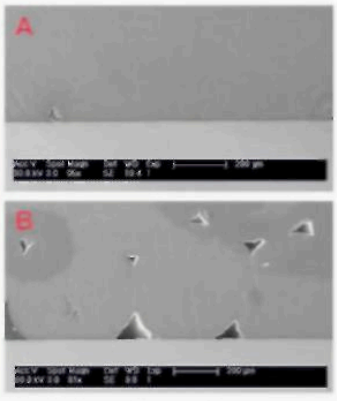
The ultrasonic welding of metal uses welding procedures in which an adhesive bond is formed by moving the parts longitudinally or torsionally relative to one another in a frequency range of 20 kHz. The PowerWheel procedure is a new variation of this process. In the PowerWheel procedure, rather than just moving torsionally, the sonotrode describes the shape of an arc segment. The resulting **amplitude maximisation** in the centre of the sonotrode improves the penetration in the joining zone, which makes it possible to produce **narrower welds, thus saving space**. The investigations described here were carried out on a PowerWheel system produced by TELSONIC.

## Experimental procedure:

» 100 welding attempts per sonotrode geometry with parameter sets adjusted for specific tools and systems




Comparison of compacting of stranded wire in the centre of the joining zone



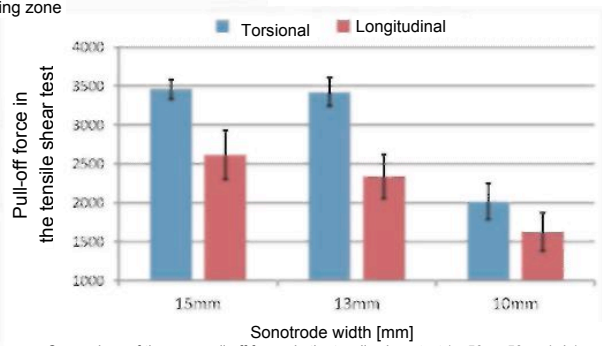

SEM images of the transition between terminal and stranded wire
(A) Torsional. (B) Longitudinal

## Results:

The following tendencies can be deduced from the experiment for torsional ultrasonic welding using the PowerWheel procedure:

» **The values achieved in the tensile shear test improve by approx. 30-40% with the same amount of force in the tensile peel test.**

» **There is a significant improvement in the compacting of the stranded wire in the node.**




Comparison of the max. pull-off forces in the tensile shear test (n=50; v=50mm/min)

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