

Possibilities of analyzing the mechanical properties of welded and soldered joints

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The quality criterion of a welded and soldered or brazed joint is its integrity, shape and mechanical properties [1]. Quantitative expression of mechanical properties are mechanical characteristics, determined by testing. Hardness, strength and toughness are the most frequently tested for welded joints. During the microhardness test [STN EN ISO 9015-2], the hardness can be measured in all parts of the weld joint, which consists of the base material, the heat-affected zone and the weld metal. During the toughness test [STN EN ISO 9016], the toughness can also be measured in all parts of the weld joint by a suitable sample selection and a suitable notch situation. For test strength [STN EN ISO 4136] it is more complicated. The sample breaks at the point of least strength or at the point of the defect. If there is a violation in the basic materials, the joint is evaluated as satisfactory, but we do not get an overview of the strength of the individual parts of the welded joint and also of the soldered or brazed joint. Often in this case, notches are applied to different parts of the weld joint, but the failure often proceeds from the notch to other parts of the joint that have lower strength. Thus, it is not possible to measure the strength in a predetermined part of the weld joint and also the strength of the soldered or brazed joint. An option to measure this property is to measure the shear strength in the active predetermined part of the weld joint. It is thus possible to measure shear strength in butt weld joints in basic materials, in various zones of the heat-affected zone, in weld metal and also in lap welded joints and soldered joints [2]. From the force-displacement dependence, it is possible to determine the toughness for a given area. The possibilities of analyzing the mechanical properties in the mentioned way were verified on butt and lap joints and on the basis of this, technological parameters were optimized.

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