Working Variables Optimization of Resistance Spot Welding

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Resistance welding ranks among progressive and in practice often used manufacturing techniques of rigid joints. It is applied in single-part production, short-run production as well as in mass production. The basis of this method is in the utilization of the Joulean heat, which arises at the passage of current through connected sheets at collective influence of compressive force. The aim of the carried out tests was the optimization of the resistance spot welding working variables, concretely the determination of the dependence between the rupture force of spot welds made using sheets of different thickness and different welding conditions. For carrying out of this aim 650 assemblies were prepared. The test specimens of dimensions 100 x 25 mm and thickness of 0.5 mm, 1.0 mm, 1.5 mm, 2.0 mm, 2.5 mm and 3.0 mm were made from low carbon steel. In the place determined for welding the test specimens were corundum blasted and then degreased. The welding of two specimens always of the same thickness was carried out using the welding machine type BV 2,5.21. At this type the welding current value is constant (I_{max} = 6.4 kA). The welding time (the time of the passage of the current) was changed in the whole entirety, namely 0.10 s, 0.15 s, 0.20 s, 0.25 s, 0.3 s, 0.4 s, 0.6 s, 0.8 s, 1.0 s, 1.3 s, 1.6 s and 2.0 s. The compressive force was chosen according to the thickness of the connected sheets in the range from 0.5 to 2.4 kN. From the results of carried out tests it follows that using the working variables recommended by the producer we obtain the quality welds. But it we use the longer welding times, we can obtain stronger welds, namely of 5 to 35 % compared to welds made using working variables recommended by the producer.

Keywords: Resistance welding; steel sheet; laboratory test; shear testing resistance spot welds

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