World Academy of Science, Engineering and Technology
International Journal of Mechanical and Industrial Engineering
Vol:11, No:05, 2017

Resistance Spot Welding of Boron Steel 22MnB5 with Complex Welding Programs

Authors : Szymon Kowieski, Zygmunt Mikno

Abstract : The study involved the optimization of process parameters during resistance spot welding of Al-coated martensitic boron steel 22MnB5, applied in hot stamping, performed using a programme with a multiple current impulse mode and a programme with variable pressure force. The aim of this research work was to determine the possibilities of a growth in welded joint strength and to identify the expansion of a welding lobe. The process parameters were adjusted on the basis of welding process simulation and confronted with experimental data. 22MnB5 steel is known for its tendency to obtain high hardness values in weld nuggets, often leading to interfacial failures (observed in the study-related tests). In addition, during resistance spot welding, many production-related factors can affect process stability, e.g. welding lobe narrowing, and lead to the deterioration of quality. Resistance spot welding performed using the above-named welding programme featuring 3 levels of force made it possible to achieve 82% of welding lobe extension. Joints made using the multiple current impulse program, where the total welding time was below 1.4s, revealed a change in a peeling mode (to full plug) and an increase in weld tensile shear strength of 10%.

Keywords : 22MnB5, hot stamping, interfacial fracture, resistance spot welding, simulation, single lap joint, welding lobe
Conference Title : ICRWSMC 2017 : International Conference on Robotic Welding Systems, Modeling and Control
Conference Location : London, United Kingdom
Conference Dates : May 25-26, 2017