

1.10.20. STUDY AND IMPLEMENTATION OF TECHNOLOGY OF ULTRASONIC NON-DESTRUCTIVE TESTING OF SPOT WELDING QUALITY OF LADA CAR BODIES OF SHEET STEEL IN OJSC “AVTOVAZ”

Novikov A.V., Khakimyanov R.R., Grigorovich V.V.,
OJSC “AVTOVAZ”, Tolyatti, Russia;
Semerenko A.V., “Panatest NK”, Moscow

Paper is devoted to research, development and introduction into existed production within the OJSC “AVTOVAZ” of the technology of ultrasonic non-destructive testing of the spot welding quality instead of expensive destructive method by means of chisel and hammer in order to improve the quality of welding of body in white made of sheet metal 08U, as well as reliability, durability and safety of LADA cars.

Until 2007, under technology transferred in 1970 to the OJSC “AVTOVAZ” by FIAT, two types of testing were applied directly in the welding workshops for control of spot welding (SW) quality. First is visual method. Second is destructive method by means of chisel and hammer.

At the initial stage of introduction of spot welding and application of the destructive method by means of chisel and hammer, bodies and body parts were subjected to repair and then, were launched into production. In the light of new requirements of GOST R ISO 9001 and car users' demands, application of parts subjected to destructive testing of spot welding became inadmissible even following repair. In this connection, problem of development of the method of non-destructive testing of spot welding of car bodies and body parts directly in the welding workshops became to be topical and economically necessary.

In order to examine opportunities of the SW non-destructive testing, authors have studied all possible NDT methods. Selection was made in favor of ultrasonic method. Spot welding process and metallographic modifications occurred in the heat-affected zone and fusion zone were studied.

Results of studying of dependence of the echo-signal amplitude on shaping and structure of fusion zone in specimens of body steel 08U were obtained.

It is established that in the process of spot welding of specimens in various welding modes, welding spots are formed with various macro- and micro-structure, which depend on welding current, electrodes compression force, electrodes surface state, conditions of electrodes cooling.

Comparative analysis of UST results and structure of the fusion zone of spot welding of specimens confirms the dependence of high-frequency ultrasonic oscillations attenuation on formation of coarse-grain dendrite structure of metal in the heat-affected zone.

Thus, testing of SW quality of specimen by US method can be evaluated by shape and amplitude of echo-signals on the instrument's screen, as well as by thickness measured in the place of sensor installation in the welding point.

Basing on the obtained results of studies, UST technology using instruments EP-OCH 4 PIUS is developed, laboratory and production tests are performed with positive conclusions. In the result of performed work, UST technology is introduced in production. In the process of introduction, the series of organizational and technical measures directed toward replacement of destructive testing of car bodies and body parts by non-destructive UST was carried out.

Considerable economic effect is obtained from introduction of UST technology.