STRESS-STRAIN STATE OF 12CR18NI10TI+(TI, V, MO)+ALMG6 COMPOSITES AFTER EXPLOSIVE WELDING*

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Explosive welding (EW) is a method that uses the released energy of explosive to join two or more plates through high velocity collision. When the plates are collided, both high pressure and stress are generated in the collision point, causing deformation and stress-strain state in the metal after EW. The deformation of a weld interface is a substantial condition for a strength joint [1, 2].

The aim of this study was to establish the relationship between EW parameters, intermediate layers (Ti, V, Mo), microhardness and residual deformation of the materials. Coordinate grids, the control points on the plate surface, mechanical tests and calculation of elongation were used to determine the stress-strain state of composites.

Figure 1 shows the results of measurements of the relative elongation of the plates by the control points. It is shown that the relative elongation of 12Cr18Ni10Ti plate starts from 210-240 mm, which corresponds to 70-80% beginning of the plate and is in good agreement with the calculated values (74-85%). Figure 1b shows that the relative elongation of AlMg6 plate starts from 215-235 mm, which corresponds to 71-78% from the beginning of the plate and is in good agreement with the calculated values (73-84%). The 12Cr18Ni10Ti plates in the final part are elongated by 5% and thinned by 6%, and the AlMg6 plates by 14% and 20%, respectively. The measurement of microhardness along the length of the 12Cr18Ni10Ti, AlMg6 and Ti plates showed that the increase in microhardness begins at a distance of 75% of their length by 45, 15 and 20% higher than the initial ones. The microhardness of the V and Mo plates remains at the initial level.

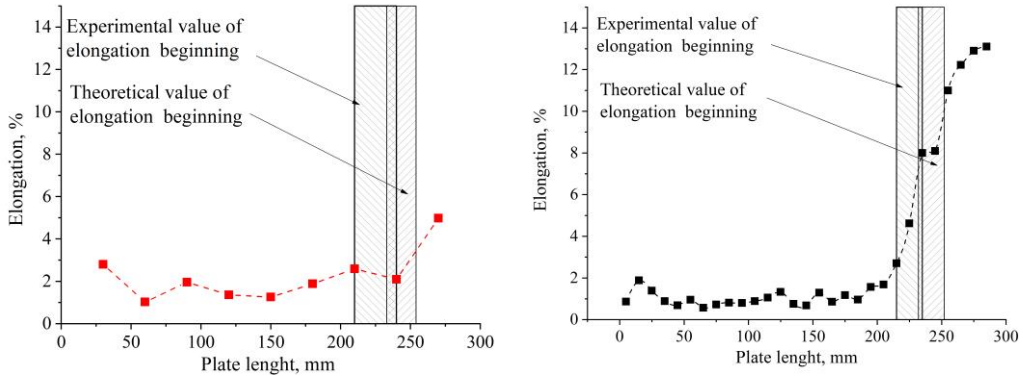

Fig.1. Elongation of plates: a) 12Cr18Ni10Ti, b) AlMg6.

The results of measuring the elongation of multilayer composites after EW showed that longitudinal deformation begins at about 75% of the distance from the beginning of the plates, which is in good agreement with the calculated values. The beginning of plate elongation corresponds to an increase in microhardness. Thus, in order to ensure a constant thickness of the finished plates, it is necessary to increase the size of the initial plates by a given value obtained as a result of experiments.

REFERENCES

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