

INFLUENCE OF FRICTION STIR WELDING ON THE PROPERTIES OF COPPER AND COPPER-BASED ALLOYS

Volkov O., Subbotina V., Xiaole Ge, Kraievska Zh.

National Technical University «Kharkiv Polytechnic Institute», Kharkiv

The properties of ductile materials such as copper and copper-based alloys can change during friction stir welding (FSW). This is the result of structural changes that occur due to the complex impact of this method of obtaining non-separable joints [1]. At the same time, depending on the modes of friction welding, a certain increase in impact toughness can be observed in the welding zone, which characterizes the strengthening of the welded material and structure. This effect is the result of complex structural transformations under the influence of heating, deformation and related processes. The simultaneous influence of such processes can contribute even to the formation of nanostructural states in materials [2]. And this is usually a way to increase the strength characteristics of materials. However, there are certain limitations to the thickness of sheets or parts that can be assembled in this way. These limitations are related to the need to obtain strong and reliable welds (welds).

This study involved the optimization of the parameters of the friction stir welding mode aimed at obtaining the required properties in the welded joint. The formation of an inseparable connection of copper sheets of different thicknesses was studied. At the same time, the mechanical properties of the obtained compounds were studied during impact and tearing tests. The obtained results made it possible to evaluate the dependence of the strength of the joints on the thickness of the connecting parts and to conduct a comparative analysis with the formation of technological recommendations.

References:

1. Вплив теплофізичних характеристик матеріалів на ефективність процесів з фрикційною складовою / О. Волков та ін. Інформаційні технології: наука, техніка, технологія, освіта, здоров'я : тези доп. XXXI міжнар. науково-практ. конф. MicroCAD-2023, м. Харків, 17–20 трав. 2023 р. за ред. проф. Сокола Є.І. Харків: НТУ «ХПІ» 2023. С. 283.
2. Volkov O. Study of heat deformation influence in surface strain hardening of steel by thermofriction processing. Eastern-European journal of enterprise technologies. 2016. Vol. 2, no. 5(80). P. 38–44.