STUDY OF THE CONDITIONS FOR THE FORMATION OF A TRANSITIONAL SUB-SURFACE LAYER UNDER THERMAL DEFORMATION OF STEEL

Volkov O., Kraievska Zh., Babanina N., Khronin S.
National Technical University "Kharkiv Polytechnic Institute", Kharkiv, Ukraine

For modern industry today, it is important to introduce new alternative processing methods that allow materials to develop enhanced performance properties. Such advanced methods of surface hardening, where thermal deformation effects are realized, involve exposure of the surface to highly concentrated energy sources. In this case, relatively small volumes of metal are exposed to concentrated high-intensity energy flows with high heating rates, followed by rapid cooling of the material During processing, high contact temperatures and stresses occur. It should be noted that the intensity of the heat flux depends on the characteristics of the tool - the hardening disk. Specifically, its shape, working surface dimensions, physical and mechanical properties, etc. affect it [1. 2]. Friction, as a source of energy, allows for rapid heating of the treated surfaces. Combined with deformation, this allows materials to develop higher-level properties. Part of the heat generated during surface treatment also affects the subsurface layer. This effect differs from the surface effect on the material being processed. Structural transformations occur in the subsurface layer, which are characterized by processes of partial weakening of the material while the surface is strengthened. In this regard, it is relevant to study the conditions for the formation of a transitional subsurface layer under thermal deformation effects on steel. It is emphasized that with an increase in the friction force, the amount of heat released in the contact zone increases. It should be borne in mind that there are certain differences for different materials, both in processing and in structure formation. This study involved taking into account a number of factors that, when interacting with each other, can significantly affect the result of structure formation. Such studies are relevant and have applied value based on the requirements of modern industry.

Reference:

1. Volkov O.O., Pogribnyi M.A., Sizyi Y.A., Kulyk G.G. Investigation of the role of thermal phenomena in the formation of structures and properties of steels of different grades during hardening by the TFE method. Bulletin of the National Technical University "Kharkiv Polytechnic Institute". Kharkiv: NTU "KHPI", 2010. Vol. 40. C. 17-24

2. Volkov O.A., Study of heat deformation influence in surface strain hardening of steel by thermofriction processing, Eastern-European journal of enterprise technologies. 25 (80) (2016) 38–44.