**Abstract**

**to article Maksimov B.A., Shevchenko I.P., Erokhina I.S. "Sheet metal with variable mechanical properties in thickness»**

The influence of one-sided accelerated cooling of thick-sheet shipbuilding steel A32 with a thickness of 10$∙10^{-3}$ m on the structure and mechanical properties is investigated. As a result of such cooling, a continuous spectrum of microstructures from ferrite-bainite on the rapidly cooled surface to ferrite-perlite on the opposite surface is formed by the thickness of the workpiece. Therefore, the thickness of the workpiece strength properties are reduced from the rapidly cooled surface to the opposite. Thus, the gradient of strength characteristics (hardness, yield strength and time tear resistance) in the thickness of the workpiece is directed to the rapidly cooled surface. For comparative analysis, other batches of workpieces were subjected to normalization and hardening with high release. The analysis of mechanical properties showed that the strength and plastic properties of the samples at unilateral accelerated cooling are at the level of the heat-strengthened state. When testing the impact strength of samples with variable distribution of mechanical properties across the thickness shows that the work of the impact depends on the correlation of directions of the gradient of the strength properties and load application. It is shown that in the impact bending test at a temperature of -40 ° C, if the direction of the load application is opposite to the gradient of the strength properties, the impact work was more than 300 j (the sample did not collapse). At coincidence of directions of the gradient deformation resistance and load operation of the blow was 262 George. Thus, if the direction of the deformation resistance gradient coincides with the direction of the external applied load, then this leads to an increase in the plasticity of the steel. It is shown that, knowing the distribution of strength characteristics by the thickness of the sample (yield strength, time tear resistance), it is possible to calculate the integral values of yield strength and time tear resistance of the sample. The value of the relative lengthening in thickness increases from the rapidly cooled surface to the opposite. The integral elongation of the specimen is not greater than the smallest relative elongation in thickness. With the changing thickness strength of the workpiece during bending, the displacement of the neutral deformation line relative to the geometrically average line in the direction of the strength properties gradient is inevitable. The position of the neutral line of deformation during bending is proposed to be determined by the value of the experimental integral yield strength (time resistance to rupture).

**Keywords**: one-way accelerated cooling, thermal reinforcement, neutral line of bending deformation, impact bending, gradient of mechanical properties, low-alloy steel.