

Laser-acoustic method of processing for non-ferrous and ferrous metals

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The use of the laser-acoustic processing method is also performed by the ultrasonic treatment of instrumental alloy steel PR-X12MF. This steel is used for manufacturing and repair of cold-pressing stamps in production. It was processed with the help of ultrasonic unit IL100-6 «Technological complex» Shmel», intended for hardening of welding seams of metal structures, pipelines for stabilization of welded joints. In the first case, elongated crystallization is obtained, the grain size exceeds 1000 nm, which gives a stronger metal structure in combination with relatively high elasticity values as a result of the treatment. In the second case a fine-dispersed homogeneous structure is observed, the grain size does not exceed 10 nm. Three samples were obtained for different regimes. The first sample treated with a laser, produces pores in the lower part of the melt bath. The crystallization time of the melt bath formed by the laser is so high that due to the rapid heat removal into the internal masses of the metal, the pores are fixed. However, the laser-acoustic method of processing in the second sample, allows to reduce the porosity in the lower part of the melt bath. At the same time, by varying the rate of crystallization of the metal, it is possible to obtain a purposefully defined pore size and position in aluminum. It can be concluded that the laser-acoustic method of processing of non-ferrous and ferrous metals makes it possible to obtain various structures and shape of the molten bath, depending on the method of application of the waveguide, which is a kind of control over the crystallization of melts.

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