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DETERMINING IMPACT OF PULSED PNEUMATIC VIBDRODYNAMIC PROCESSING ON CAST IRON FLAT SURFACE

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The purpose of this work is the metallographic analysis of the structural features of gray cast iron samples after carrying out pulse-impact magnetic-dynamic processing.

Effective technology consists in reducing the processing time, improving wear resistance of flat surfaces of metal-cutting machines by increasing the surface microhardness and creating a special surface microrelief.

X-ray structural analysis of the surface layers of the samples was performed on a DRON 2.0 diffractometer.

Metallographic studies were carried out on prototypes with dimensions of 10×10×10 mm made of cast iron obtained by the method of continuous casting under pressure in accordance with the conditions of production at JSC GOMEL CENTROLIT.

Six groups of samples were examined: after pneumovibrodynamic treatment with Ra ≤ 1.15 μm; after pneumovibrodynamic treatment with Ra ≤ 0,8 μm; after pneumovibrodynamic treatment with Ra ≤ 1,15 μm; after grinding with coolant with Ra ≤ 1,15 μm; after pneumovibrodynamic treatment with Ra ≤ 1,5 μm; after pneumovibrodynamic treatment with Ra ≤ 1,0 μm.

Microhardness was measured on a PMT 3 device using a standard tetrahedral pyramid with a square base with a load on the indenter of 0.490 N. For each researched processing mode, no less than 10 measurements were performed. Vickers hardness was measured with a load of 294 N.

The stages of materialographic sample preparation are cutting samples, grinding, polishing, study of the surface microsection before etching, etching.

To establish the depth of the hardened surface layer, studies were carried out using the method of oblique cuts. It has been established that in the structure of cast iron, in addition to graphite inclusions in the shape of plates, there is cementite, which gives the cutter specific light shine. The presence of cementite in the structure indicates the presence of a bleached layer.

It was determined that pulse-impact pneumovibrodynamic treatment of the surface of a cast iron sample leads to crushing cementite particles to a depth of about 200 μm and driving them into graphite inclusions. With an increase of up to 5000 times, for samples after pneumovibrodynamic processing, a hardened riveted surface layer with altered durometric characteristics is clearly visible compared with the original samples.