

STUDIES OF MAGNETIC-PULSE PRESS FOR CERAMIC POWDERS

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A mathematical model of a magnetic-pulse cyclic-action press has been developed, which at each working cycle calculates a complex of interrelated electromagnetic, mechanical and thermal processes.

It has been established that during cyclic operation, the temperature of the armature is higher than that of the inductor winding. At a significant pulse repetition rate ($q_{imp}=200$) during a pause, the temperature rise of the inductor increases slightly, and the anchors temperature rise noticeably decrease. The temperature rise of the inductor in a magnetic-pulsed press with an aperiodic excitation pulse and a full discharge of the capacitive energy storage is higher than when using a half-wave inductor excitation pulse and saving part of the energy of the ESE throughout the cyclic process. Temperatures of the armature are almost the same. During experimental studies on a laboratory press sample, at each working cycle, a force impulse of pressure was applied to a ceramic powder with an amplitude of 85 MPa and a duration of 1 ms (Fig. 1).

It is shown that during the molding of chamotte-clay powders, an increase in the number of power impulses compacts the powder, reducing the water absorption and porosity of ceramic materials. The achieved level of the properties of the samples obtained at the firing temperature of 1200°C corresponds to the level characteristic of chamotte refractories obtained at much higher temperatures (1350° ... 1400°C). It has been established that pulse pressing of technical powders allows obtaining compacts, the density of which is 12% higher than the density of samples obtained by static pressing. Pulse pressing contributes to an increase in the density of ceramic samples by 3 ... 8.5%, depending on the firing temperature.

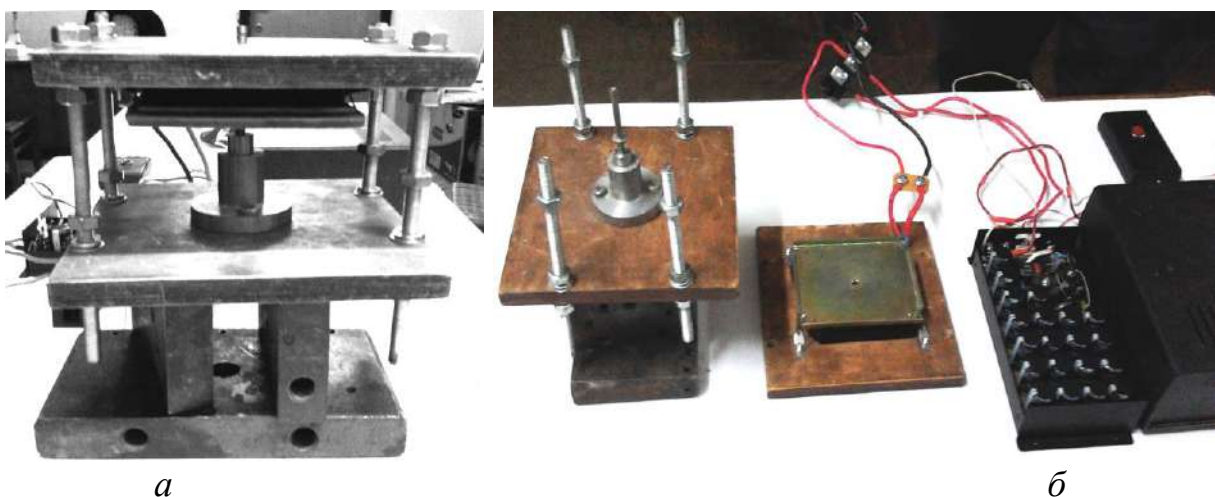


Fig. 1. General view of the laboratory sample of a magnetic pulsed press for ceramic powders in assembled (a) and disassembled (b) form