Vacuum-thermal magnetic-pulse compaction (VTMPC) belongs to the methods of hot compaction of powdered composites with the aid of pulsed loads [1]. The process (Fig. 1) is based on the use of accumulated electric energy of a magnetic field for inducing a pressure pulse on the treated semiproduct under conditions of vacuum. The semiproducts are preliminarily heated to a certain temperature by any of the known methods, in our case by high-frequency current. Compaction of the powder composite is effected with the aid of an electrically conducting shell as a result of its deformation under the action of the ponderomotoric forces which originate when a discharge current flows through the inductor [2, 3].

The powder is poured between the shell and the rod. The loading arrangement makes it possible to induce radial pressure that is uniformly distributed throughout the working space. The pressure depends on the level of the charging voltage and the frequency of the current in the discharge circuit of the insulation. Preliminary thermal activation of the surfaces of the powder and base in vacuum ensures adequate conditions for their solid-phase interaction (sintering and welding) at the instant of magnetic-pulse treatment, and it reduces the compaction pressure. The method of VTMPC makes it possible to combine the processes of compaction, sintering, and welding in one technological cycle.

**Fig. 1.** Diagram of the process of vacuum-thermal magnetic-pulse compaction: 1) base; 2) powder composite; 3) vacuum chamber \( (P = 1.33 \times 10^{-3} \text{ Pa}, T = 1473 \text{ K}) \); 4) vacuumizing device; 5) inductor for magnetic-pulse treatment; HFG) high-frequency generator \( (U = 26 \text{ kW}) \); PCG) pulsed-current generator \( (W = 20 \text{ kJ}; f_p = 7-8 \text{ kHz}) \).
Fig. 2. Block diagram of the installation "Impul's BM."

Fig. 3. Technological cyclogram of the process of obtaining coatings by the method of VT MPC on the installation "Impul's BM." Duration of the cycle 360 min, technological transitions: I) loading; II) producing and maintaining a vacuum (change of pressure vs. time); III) heating and cooling of the unit (change of temperature vs. time); IV) transfer of the unit to the zone of magnetic-pulse treatment; V) charge of the pulsed-current generator; VI) magnetic-pulse effect; VII) transfer of the unit to the turn-table seat, turn; VIII) opening of the unloading chamber of the unit.

Fig. 4. Microstructure of coatings Ni-Re (a) and Cu + LiO + BaO (b): 1) coating; 2) base.