

- System, adjusting the asymmetry of the HF transformer work, can also be built on the basis of an analog elemental base, but in this case its reliability will be drastically decreased.

**Key words:** undisturbed power supply (UPS), high frequency transformer, adjusting asymmetry of high frequency transformer operation

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## EVOLUTION OF THE WC-Co STRUCTURE, AS THE RESULT OF PRELIMINARY COLD ISOSTATIC PRESSING UP TO 0.3 GPa AND SINTERING

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**Purpose.** Investigation of the effect of cold isostatic pressing of WC-Co samples on the density, coercive force, grain size WC, thickness of the Co interlayer and microhardness value.

**Methodology.** The mixture of WC and 8 mas. % Co was mixed in 5% solution of synthetic rubber in gasoline. Samples in the form of parallelepiped were uniaxially pressed in a steel mold under pressure of 70 MPa. After that, the samples were placed in latex shells and exposed to cold isostatic pressing (CIP) under pressure of 0.2 and 0.3 GPa. Sintering of the uniaxially and isostatic pressed samples was carried out in a vacuum furnace ВП1300 at a temperature 1440°C. After sintering, the samples were grinded and polished. Vickers microhardness (from 2 to 10 N), density and coercive force were measured. The structure was examined on the surface of the samples using a scanning microscope (PEM 106 I). The WC grain size and thickness of Co layers were processed using a computer

software "ImageLab". The phase analysis and residual stresses measurements were performed on a Rigaku Ultima IV X-ray diffractometer.

**Findings.** The density of the samples after CIP is slightly higher than the density of the uniaxially pressed samples. The coercive force raised from 6,7 to 6,9 kA/m and average microhardness increased by 9.5% after the CIP at the 0.3 GPa. The distribution of grain size WC showed that the increased pressure of the preliminary CIP leads to a shift of the maximum toward smaller dimensions. The thickness distribution of Co interlayers has shown that the increased pressure of the preliminary CIP leads to a decreasing in the thickness of the interlayer. Analysis of the x-ray data showed the presence of WC (PDF Card 01-078-7532) and Co (PDF Card 01-071-4238) phases. According to the XRD measurements after sintering the surface of all samples is in a stress-strain state and the observed microhardness growth is obviously caused by this phenomenon. Thus, an experimental study showed that the preliminary CIP (under the 0.2 and 0.3 GPa) of WC-Co samples leads to an increasing of the coercive force, a decreasing (possibly due to crushing) of WC grain sizes and thinning of Co interlayers between these grains, which fully corresponds to the well-known regularity.

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**Key words:** CIP, WC-Co, coercive force, grain size, layers thickness, microhardness

## **IMPACT OF STRAY CURRENTS IN ELECTRICAL SYSTEMS OF UNDERGROUND TRANSPORT: AN OVERVIEW AND METHODS FOR SOLVING PROBLEMS**

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The metro system in the modern world is widely used in the urban transport system. Nevertheless, many negative consequences, such as electrochemical corrosion on the metro route caused by a wandering current, endanger the metal structures and personal safety of both passengers and service personnel.

In article factors of wandering currents on the "Metro" system, their effect on the construction of reinforced concrete, metal structures, as well as on the rails and electrical equipment of the train are examined and analyzed.

In general, there are various methods for analyzing the distribution and impact of a stray current in the subway structure: a network model, a ground return model, a concentrated parameter model, an equivalent layer model, and a resistive type model.