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Application Of Composite Materials and Metal Powders in the Technology of Restoration of Worn Parts

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Abstract: We can now say with confidence that we have begun to move from the “iron” age to the age of composite materials.

Keywords: metallokeramik, keramiklar, metall-polimer, polimer-metall, shisha-keramik, polimer-keramik

We can now say with confidence that we have begun to move from the “iron” age to the age of composite materials.

Composite materials are mechanical mixtures of two or more materials that differ radically in shape and properties, with a clear boundary between the components, as well as each of their advantages.

In the following years, composite materials began to be used in the manufacture of coatings, which were very important in the restoration and improvement of machine parts. The use of composite materials and layers in the technological process of restoration of details of agricultural machinery is one of the new directions in improving the quality of restored details

Composite materials are divided into two groups. The first group includes two-component composite materials and layers. In them, the second component of the filler - the matrix is more or less evenly distributed in the composition. The second group includes materials with two or more layers. The properties of the second group depend not only on the properties of each of the constituents, but also on their relative position to each other [1].

The main types of composite materials are metal, polymer, ceramic, depending on the material of the matrix, and depending on the shape and distribution of the compactor are called dispersion-particle, fiber and volumetric.

The naming of a composite material or layer is based on the names of fillers and matrices: metal-ceramics, cermets, metal-polymer, polymer-metal, glass-ceramic, polymer-ceramic, etc.

Metal-ceramics and metal-polymer composite materials are more effective in the restoration of machine parts.

The use of technical ceramics is increasing day by day in the manufacture of machinery and repair of existing equipment, in the manufacture of machine parts, in the manufacture of high-wear working bodies of agricultural machinery, in covering their working surfaces with a corrosion-resistant layer.

he problem of creating new equipment that can operate at high loads and at high temperatures with high reliability is solved by searching for new materials and creating ways to cover them on the working surfaces of parts.

Methods of coating crushed details with powder composite materials can be conditionally divided into several groups.

1. Methods of welding.
2. Heat and glue on the surface of the product to form cermets
based methods.
3. Methods of deposition of materials on the surface of the product in the gas phase.
4. Hardener with one of nickel, copper, chrome, etc.
galvanic using a solution containing solid alloys in phase
coating with a layer-based galvanic-dispersion layer

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methods.

In the methods of welding arc, gas flame, plasma and high-frequency current coating of powder composite materials, particles of carbide, boride, etc. melt in the liquid metal. Scientists have also found that large particles of tungsten carbide with a melting point of 2720^0C can melt in a very short time in liquid steel. Some methods have been proposed to prevent such melting of particles of solid alloys in liquid metal [2]. For this purpose, Professor H.G. Kortensky proposed a method of sprinkling solid alloy particles on the surface of the hardening metal, followed by the immersion of the particles in the metal with a roller pressed on the surface of the part by the mechanical force of the spring.

The use of residual service life of parts is of great importance in increasing the cost-effectiveness of car and tractor repairs. In this regard, our leading scientists have shown that 60 65% of the parts of motor vehicles that have passed the service life before the overhaul have a residual service life and can be used again without repair or after a small amount of repair work [3].

All the details of the machines in use can be divided into three groups depending on the working hours. The first group includes parts (25-30% of machine parts) that have fully passed their service life and need to be replaced with new ones during repairs. The second group of parts (30… 35 percent) can be reused without repair. The working surface of this group of parts is not eroded to the limit size, and they can be used again for a certain period of time. The third group includes the main part (40-45%) of the details. They can be reused only after repair. This group includes more expensive and intricately shaped details. The cost of restoration of these parts does not exceed 30-50% of the cost of their manufacture [4].

In developing the theoretical foundations of electrocontact welding of various coating materials and creating modern technologies, N.N. Dorojkin, A.V. Polyachenko, Yu.S. Tarasov, E.S. Karakozov, Yu.V. Klimenko, V.K. Yaroshevich, V.P. Lyalyakin, N.I. Chernovol, E.L. Levin, R.A. Latypov, B.A. Molchanov, M.N. Farxshatov, D.V. Amelin, E.V. Rymorov and others made significant contributions. However, certain studies have not addressed issues related to the comprehensive solution of existing problems of electrocontact welding of powder materials. Therefore, the analysis of research on improving the efficiency of technology for the restoration of parts by electrocontact welding of powdered materials has led to the following idea: The composition and appearance of the coating material will also depend on the degree of exposure to the magnetic field that occurs during electrocontact welding of the powdery material particles. As a result of the analysis, the following main tasks of our research were identified and formulated:

1. Analysis of working conditions of machine parts, methods of electrocontact welding of powder materials and substantiation of new compositions of powder materials and methods of their electrocontact welding;

2. Theoretical substantiation of the conditions for obtaining powdered materials in the form of heat-formed and powder-polymer tape, expression of the effect of the magnetic field generated by electrocontact welding on powders with ferromagnetic properties and development of a model of bonding of powdered material formed by metal mesh welding;

3. Development of technology and technological equipment for the preparation of powder coating materials and electrocontact welding;

4. To study the appearance of the coating material, the composition of the powder and the effect of electrocontact welding modes on the structure of the restored parts, corrosion resistance, weld strength, fatigue resistance and contact strength;

5. Development of technological recommendations for electrocontact welding of powder materials.

Many materials are used to restore worn machine parts, which differ in shape and composition. For example, in the coating method, wire and tape, metal powder, powdered wire and tapes, and powdered polymer tapes are used to restore the parts. Each of these materials has its own characteristics, which are aimed at improving technological quality and increasing productivity [5]. Currently, iron powder is used as the base metal powder. In addition to it, hard alloy powders (titanium and silicon carbide, aluminum oxide, etc.), as well as powders from alloy steels, nickel and nickel-cobalt-based powders, etc. serve to improve its performance.

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