DEVELOPMENT OF A RESOURCE-SAVING TECHNOLOGY OF PRODUCTION OF SLIDING BEARINGS BY POWDER METALLURGY METHOD

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Abstract: This article covers the importance of metal powder (poroshock) products successfully used in the national economy, how important production is to the machinery and automotive industry, and how extensive work is being carried out on new methods and methods of technological processes.

Keywords: metal, powder, Technology, Metallurgy, semi-finished, compound, alloy, non-ferrous metal, quality, filters, bearings, resistant, contact, chemical, physical, mechanical, thermal, press, shape, part, device, form, pollination, electrochemical, electrodynamic, crushing.

Methods and technological properties of metal powders. Powder metallurgy is understood as a technological process covering the complex of production of metal powders and metal-like compounds, semi-finished products and products made from them or their mixtures from the solution of the main components with non-metallic powders.

The rapid development of powder metallurgy created the necessary conditions for the development of a wide class of alloys that are used as substitutes for traditional casting and hammering, steel and alloys, and materials with properties that cannot be obtained by other technological processes. The advantages of powder metallurgy compared to other methods of production of equipment parts and devices are as follows:

- obtaining products that cannot be produced by other methods (filters, porous bearings, contacts made of alloys based on refractory metals, etc.);

- it is possible to save a lot of metals, use waste (for example, shavings, soot, shavings, etc.) to obtain powders, and obtain products without further mechanical

processing (bushes, gears, balls, etc.), which significantly reduces the cost of materials and finished products will reduce the cost.

In addition to advantages, powder metallurgy has a number of disadvantages: expensive equipment (economic growth in serial and multi-series production), instability of properties, difficulties in the production of large-sized and complex-shaped products.

Metal powders and powders of non-metallic materials are the main raw materials for the production of powder products. The industry produces metal powders: iron, copper, nickel, chromium, cobalt, tungsten, molybdenum, titanium, etc. There are various methods of obtaining metal powders: by mechanical grinding (shards, fragments), metal spraying, recovery of soot or pure oxides, carbonyl, electrolysis and other process methods (Table 1). Powder physical methods can be divided into two large groups, which cover approximately 95% of all technological processes currently in use: mechanical grinding of solids and methods of spraying solutions.

Grinding, grinding, or polishing can be an independent method of obtaining metal powders and an additional operation for other methods of their production. Jaw, roller and conical disc grinders, as well as sieves are used for coarse grinding. Coarse grinding product consists of sand particles with a particle size of 1.. 10 mm. The final grinding of the material is carried out in ball-rotating, vibrating and planetary centrifugal, sharp-edged hammer and hammer mills. The powder particles have a size from 0.2 to 0.002 mm.

Recovery of metals from their oxides is one of the most common methods of obtaining metal powders. Powders of iron, copper, nickel, tungsten and other metals, as well as steel powders, metal alloys - alloyed and corrosion-resistant steel powders are obtained in this method. Oxide recovery methods are classified depending on the reducing agent and aggregates used, the type of charge and its delivery method to the reducing zone, the pressure of the reducing gases and the temperature of the process.

Production of nickel, copper and cobalt powders by reducing their water-soluble compounds with hydrogen under pressure is a common method. This process is often referred to as autoclave recovery.

The chemical properties of metal powders depend on the composition of the main metal or the main components that make up the alloy powder, the composition of impurities, various mechanical impurities and gases. In technical classifications for powders, supplying enterprises usually indicate the composition of the main metal and impurities, so sometimes it is necessary to determine the complete

chemical composition. In this case, the properties of the components are determined by chemical and spectral analysis.

Descriptions of the physical properties of powders include the shape and size of powder particles, particle size distribution, specific surface area of particles, pycnometric density, and the state of the crystalline structure of the powdered metal.

Depending on the method of obtaining the powder, the shape of the particles is spherical (carbonyl and dusted), drop-shaped (dusted), edge-shaped (regenerated), dendritic (electrolytic), plate-shaped and fragmented (powders obtained as a result of grinding in vortex and ball mills, vibration mills, fibrous and petaloid (in breaking down liquid metals). The shape of the powder particles has a great influence on their mass density and compressibility, as well as on the uniformity of density, consistency and pressing. Depending on the particle size, powders are divided into very fine powders with a particle size of less than 0.5 μm; very small (OM symbol) with a size of 0.5 to 10 microns; small (M) - from 10 to 40 microns; medium (C) - from 40 to 150 microns and large (K) - from 150 microns and above. The powder density, pressing pressure, baking shrinkage and mechanical properties of finished products depend on the particle size of the powders, along with other properties. The finer the powders, the more pressure is required during pressing to achieve a certain density of compacts, and the resulting zagatovka are stronger and ripen at lower temperatures. The next important physical characteristic of powders is the specific surface of the particles, which is understood as the total area, the surface of all particles taken in a unit of volume or mass. The specific surface area depends on the particle size and shape. Technological properties include mass density, fluidity and compressibility of powders. The mass density of powders is a volumetric characteristic, and it is the mass of a freely filled powder volume. Bulk density represents the packing ability of powder particles and depends on the density of the powder metal, the actual filling of the powder with a certain volume, dispersion, particle shape and specific surface area. Fluidity of powders characterizes the speed of powder passing through a hole of a certain diameter. The fluidity of the powders is an important property, because it depends on the speed and uniformity of filling the mold, which is especially important in automatic pressing. The main factors affecting the fluidity of powders are friction and adhesion of particles to each other (internal friction). Compressibility is the ability of the powder to form a briquette of a certain shape with a minimum permissible density under the influence of a given pressure. Compression is determined by two technological properties: compressibility and formability. Compression is the dependence of briquette density

on the value of pressing pressure. Compression characteristic is a compression diagram constructed in "density - compression pressure" coordinates.

In order to improve compaction and granulation of powders during the mixing process, plasticizing additives (paraffin organic liquid, wax, rubber, comfort, etc. solutions in organic liquids) are added to the mixer, they create added strength when pressed and reduce their content, wall mi press molds and particles friction between themselves (external friction) and facilitate their fusion during granulation. In addition to additives that improve the pressing process, additives that create certain properties can also be included.

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