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APPLICATION OF POWDER METALLURGY METHODS IN PRINTING PROCESSES

ЗАСТОСУВАННЯ МЕТОДІВ ПОРОШКОВОЇ МЕТАЛУРГІЇ В ПОЛІГРАФІЧНИХ ПРОЦЕСАХ

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Анотація. *Використання методів порошкової металургії у поліграфії відіграє далеко не останню роль у визначенні якості виготовленої продукції. Останнім часом ці методи застосовують у виробництві металізованих фарб та для контролю їх характеристик. Металеві пігменти є порошками тоненько подрібнених на спеціальних млинах міді, алюмінію та їх сплавів.*

Завдяки такій формі ці частинки утворюють у фарбовій плівці лускоподібну поверхню, що добре захищає матеріал основи від впливу агресивного середовища. За основними кольорами пігменти поділені на сріблясті і золотисті. Сріблястий відтінок забезпечує алюміній, а золотистий-сплав міді з цинком. В даній роботі розглянуті деякі властивості пігментів задіяних в поліграфії, а також технології їх отримання методами порошкової металургії.

Ключові слова: *порошкова металургія, металеві пігменти, металізовані фарби, алюміній,фарбовий шар.*

Abstract *The use of powder mettallurgy methods in printing plays a significant role in determining the quality of manufactured products. Recently, these methods are used in the production of metallized paints and to control their characteristics. Metal pigments are finely crushed powders on special mills of copper, aluminum and their alloys.*

Due to this form, these particles form a scale-like surface in the film, which well protects the base material from the effects of an aggressive environment. By main colors pigments are divided into silver and golden. Silver hue provides aluminum, and gold-alloy copper with zinc. In this work, some properties of pigments involved in printing are considered, as well as technologies for obtaining them by powder metallurgy methods.

Keywords: *powder metallurgy, metallic pigments, metallized paints, aluminum, paint layer.*

Introduction

Silver pigment can be in the form of aluminum powder: almost pure aluminum with a content of 3...4% paraffin, which prevents oxide and eliminates the risk of self-fire and explosion[1,2].

The source material is aluminum or copper-zinc alloy, first melted and then passed through a pneumatic nozzle. The resulting particles are sifted and crushed in ball mills in bronze or aluminum powder, which is then washed, dried and polished. In such actions we get extremely thin shiny metal powders in the form of scales. For offset and high printing, metal scales about 1 micron thick and 3.5 microns thick are used, and for deep and flexographic printing-scales about 0.1 microns thick and 8.9 microns in diameter.

The results of the research

Due to the use of patterns of reflection and scattering of light, depending on the structure of the applied pigments, metal pigments based on aluminum, called

"Metallure", were created, which ensures the production of a specific shine in the paint layer on the imprint.

These pigments optimally combined shine, covering capacity and technical properties of use. They are made based on the method of physical thermovacuum spraying, which is usually used to metallize films.

Thanks to this time-consuming method, it is achieved to obtain an exceptionally high smooth surface with very thin particles. During printing with such paints, made according to a special formulation, on high-speed printing machines, pigment is oriented parallel to the movement of the machine, the visibility of the edges of pigments is significantly reduced, light is scattered from the pigment with simultaneous reflection from its surface. At the same time, the orientation of particles and the effect of reflection are largely determined by the quality of the printed material.

For powder paints, the company "Shlenk" offers metal pigments not only in the form of powder, but also in the form of granules. The advantage of metal pigments in granular form is the absence of dust formation during their dosage to the apparatus[3]. This makes the process of production of printing materials practical, fire hazard, hygienic and economical.

The production of powder paints with metal pigments can take place according to three main methods, which are technologically based on the principles of PM:

- extrusion;
- dry mixing of components;
- mechanical alloying.

The extrusion method is one of the most common methods of powder paint production in the European market. But despite this, this method is not very suitable for the manufacture of metallized materials. During extrusion, pigment, usually aluminum, is added at the stage of pre-kneading of powder paint components and, thus, all stages of production of paint and varnish materials (LFM) from extruding to grinding pass. In the process of such processing, the optical properties of pigments with a metal effect are lost or greatly deteriorated due to deformation or destruction of particles.

Therefore, the method of extrusion, as a rule, receive textured powder paints (for example, paints with a "hammer effect"). On the other hand, the pigment is firmly fixed at the base of the paint, which makes it possible to produce tribo-version materials with good reproduction on automated lines.

Dry mixing is the process by which metal pigment is added to the finished powder paint and mixed at low speed in the mixer to form a heterogeneous material. The main advantage of this method is the uniform distribution of pigments in the paint without their destruction and deformation, which ensures the maximum decorative effect of the coatings obtained. However, this method is also characterized by a number of disadvantages. A well-known defect in powder paints obtained by dry mixing is the indeparability of the appearance of coatings.

The method of mechanical alloying is based on the processes of mechanoactivation and mechanochemical synthesis and is carried out in mills with various structural features, energy impact. The main feature of mechanosynthesed powder alloys is their nanocrysalic structure, which was formed at the final stage of

solid phase interaction. The disadvantage of this method is the high energy in inibility of the process.

Conclutions

Taking into account the above, it can be concluded that prepress processes contain elements of powder technologies, and the properties of printing pigments, especially of inorganic origin, are followed by 100% morphological, physical and chemical features of traditional powders.

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