

THE TECHNOLOGICAL PROCESS OF OBTAINING HIGH-QUALITY MOLDS

Berlizeva T., Ponomarenko O., Marynenko D., Grimzin I.

National Technical University

«Kharkov Polytechnic Institute», Kharkov

Increasing complexity, accuracy and reducing thinness of walls of die cast parts along with the requirements to minimize labor costs and effective environmental protection have a significant impact on the development of the die casting technology. In order to obtain a casting free from defects, molding and core mixtures used for mold and core production must satisfy the requirements for a set of certain properties. The main quantity of the produced castings (over 70%) is manufactured in one-off forms, the properties of which are determined by the quality of the castings. However, according to the available data, 40...60% of the casting defects are due to the unsatisfactory quality of molding materials and mixtures.

In modern casthouse production there are a large number of methods for manufacturing molds and cores using multiple combinations of mixtures. Casting into plaster molds is currently used in small-scale and pilot production mainly to obtain castings from aluminum and, less commonly, from copper, titanium alloys and cast iron for castings, which have considerable wall thickness variations. The production of complex castings of non-ferrous alloys of various configurations include body parts, turbine impellers with complex vanes, etc. Plaster casting is widely used in dentistry.

This technology has several advantages: in plaster molds, you can quickly get castings of different sizes ranging from small to large, of different weights ranging from a few grams to tens of kilograms; to obtain castings, you do not need expensive equipment or tools; to manufacture plaster mixtures, you can use such widely spread cheap materials as plaster, sand, asbestos, etc.; the worthy yield makes 70...80%, while when casting the same parts into a sandy mold, it is equal to only 20...30%.

Plaster-based molding mixtures consist of three main components: refractory material (sand, cristobalite, chamotte, marshallit; reinforcing material (various grades of asbestos with different fiber lengths) and binding material in the form of plaster.

A distinctive feature of the plaster mold material is its good flow characteristics when mixing it with water. Good ability to flow, smoothness after hardening and accuracy of reproduction of the imprint make it possible to obtain the molds of any difficulty. The ability of plaster to harden quickly, the easiness and simplicity of molding are also an important feature of this material. Hardening within 5...10 min allows you to produce molds and cores quickly.

There is a fairly large number of studies on the physicomachanical properties of plaster-based mixtures. However, the influence of the components of the sand-plaster mixture on the properties of the mixture has not been determined yet, the mathematical dependence of the drying effect on the properties of various compositions of plaster mold mixtures, optimal conditions and methods of drying have not been determined. The solution of such problems is an urgent task of the casthouse production.