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Materials of compression molds for casting under pressure of zinc alloys and the requirement to them.

In article classifications of the materials used as a basis of compression molds, and also a problem of a choice of specific material depending on casting conditions are considered.
Keywords: a compression mold, casting under pressure, steel, zinc alloys.

Arduous operating conditions of compression molds for casting under pressure do actual researches of materials for form-building details, that is optimum the fitted composition of material provides resistance to the processes leading to a compression mold output out of operation such as: the thermal fatigue, wear, forming, and as a result, increases the operational period of a compression mold in general. There is a big nomenclature of materials for use as a basis for form-building products, but thus there are some possible classifications of the used materials.

A row of researchers [1,2] do division of the used materials on the basis of the basic alloying elements being a part of material: chrome with molybdenum and vanadium steels became, chrome with molybdenum there were also other seldom found materials on the basis of refractory metals, nickel, a cobalt, copper, etc. (fig. 1). According to the specified classification, the main material for compression molds is steel with different alloying elements which provide increase of certain physicomechanical properties of material.

Spreaded steels of the first group are 3H2V8F, 4HV2S, 4H5V2FS 4H8V2, 4H3V11, 5H3V15, 6H4V9F and others. In the compositions specified steels a chromium (Cr) improves a hardness penetration, and also creates an oxide film, I protect from chemical influence from the flooded melt. Availability of tungsten (W) increases heat resistance, and also reduces loss of strength speed in the course of operation. Vanadium (V) prevents enlargement of grain in case of heat treatment and causes dispersion hardening. The amount of carbon as its raised contents reduces plasticity and thermal stability, despite increase in wear resistance and a firmness of the form is important.

The most often meeting for steels of chrome with molybdenum and vanadium steels group are 3H5MFS, 4H5MFS, 4H5MF1S, 4H5MS, 5HNM, 38HMYuA and others. The basic difference between the two first subgroups consists in the content of tungsten and molybdenum in their compositions. Thus in the steel of the second group the alloying elements execute in general the same functions, as in the first, however availability of molybdenum in a certain measure changes value of their influence. In turn, a molybdenum in itself provides viscosity increase.

The last group of materials of the considered classification possesses the increased mechanical and operational properties, thereby increasing operational firmness of compression molds several times on comparing with standard for steels [1], however their use at the moment from the economic point of view is ineffective, because of the high cost of a basic element, any of these materials.

The considered classification allows to separate the materials used for manufacture of compression molds by the principle of application depending on the positive properties of the specified

groups steels, however possesses the considerable shortcoming, being that a large number of the experimental data which need to be touched is necessary before necessary material depending on specific conditions of operation is selected.

From this point of view of the most optimum classification of materials depending on the provided properties [3] looks.

According to it, steel can divide into groups: with the raised depth firmness, with the increased heat resistance and with high heat resistance.

Steel of the first group among themselves can divide into subgroups, depending on percentage of a chromium in it [3]: from 3%, from 5% and more than 8%. Subdividing on subgroup can be explained to that depending on a chromium, and also carbon, steel the raised indices of hardness and a depth firmness have, but when lowering heat resistance and viscosity.

Thus, a big set of production requirements to material demand from it stable operation with the maximum index of operational firmness. Therefore at the moment the most widespread material for casting under pressure of zinc alloys is chrome with molybdenum and vanadium steel 4H5MFS [3]. However, operational firmness of the specified steel not always exceeds the minimum indices of state standard specification 19946-74 [3].

Therefore logical option use of economically inexpensive steel which after certain manipulations will be able to provide operational firmness, the close to steel 4H5MFS is represented. Structural carbon quality steel 45 or its substitute constructional low-alloy steel 40X can be such steel. Use of this sort of materials possibly at the expense of rather "soft" operating conditions of compression molds for casting under pressure of zinc alloys.

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