THE HYDROGENOUS MECHANISM OF A CRYSTALLIZATION OF ALUMINUM ALLOYS

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The molding box and character of allocation of intermediate phases determine different properties of aluminum alloys. For a molten condition it validly first of all as properties of bullions and the casts received with the help of a crystallization of a metal fluid, stipulate an opportunity of holding of all subsequent views of machining.

If it is a lot of stressings, any machining of bullions and casts is impossible because of high fragility that restricts a feasibility of high alloys. In this connection it is necessary to pay special attention to shaping of stressings of intermediate phases with the purpose of transpiring opportunities of regulation of their influence on properties of alloys used nowadays, and also for mining alloys with the heightened contents of alloying elements which now cannot be utilised because of high fragility.

At analysis of process of shattering of molten alloys it is possible to be convinced easily of preferred origin and spreading of cracks on stressings intermediate phases. In all events of stressing serve initiators of formation of sections of a spalling. For example, to the present time, according to the conventional representations about origin and propagation of stressings of a silica phase, it is possible to make the inference, that any prospects of reception of satisfactory mechanical characteristics of the alloys containing 25-50 % Si, no. It first of all is stipulated by availability in their microscopic structure of large stressings hosts of silicium which attach alloys high fragility. Determination of new legitimacies of shaping of stressings of a silica phase that presumes to control its molding box, quantity and character of allocation is very important and, in turn, will open a prospect of use of high-silicon foundry and deformable double and doped alloys. For this purpose other sights at the mechanism of a crystallization as contrasted to conventional are required. At existing necessity of the solution of an acute problem of making superlight alloys with adjustable properties the assaying of shaping of structure of silumins with allowance for actions of hydrogen has been lead. The systematic assaying of the alloys containing from 1 up to 50 % of silicium, prepared with different quantity of hydrogen, has allowed to fix legible linkage between the contents of hydrogen and formation of stressings of a silica phase. These results enable to convert to early stages of shaping of properties of alloys, i.e. to the processes proceeding in a metal fluid up to and during a crystallization. On influence of hydrogen on shaping of structure of molten alloys the blanket pattern of formation and propagation of germs can be presented as follows. In a metal fluid, besides the base builders, there is a hydrogen. It reacts to rejections of temperature, an ambient pressure and as a result creates congestions which stability depends on melt temperature. At refrigeration the stability of fields of a fluid with the heightened contents of hydrogen is incremented. In these sections atoms of the most high-melting builders move. These sections of a melt with the heightened contents of hydrogen cannot be spotted radiographical. In a melt of such fields with the heightened contents of hydrogen it is necessary to consider formation by a stage of prestressing by analogy with an event of formation and propagation of germs at dissolving supersaturated solid solutions.

The following stage of formation and propagation of germs - an aggregate of atoms of more high-melting builders on the basis before the appeared sections with the heightened contents of hydrogen is a stage of formation of "clusters". Important, what atoms of a builder will move first of all in sections of prestressing, i.e. sections of a melt high in hydrogen. If in system the most high-melting is the metal - base (in this case aluminium) sections with the heightened contents of aluminium and already smaller contents of other builders are formed. At the further propagation of germs in linkage with different solubility of hydrogen in a solid chip and an environmental fluid it collects on front of propagation. However some sections in linkage with a nonuniform distribution of temperature in a fluid can prolong to grow. In this connection the arbuscular molding box of a chip is gained. Between its axes, i.e. In sections of the greatest congestion of the hydrogen, distinguished the least solidifying point, will occur accumulation of the most low-melting as contrasted to aluminium of elements.

After the complete solidification of an alloy in its microscopic structure primary arborescent sections α a solid solution enriched with aluminium will be observed. Between axes of these arborescent configurations sections in last turn consolidated a low-melting fluid will be located. In many systems of aluminium with more low-melting as contrasted to it elements these sections are observed by the way a self-contained phase. An instance of such crystallization are alloys of system an aluminium - magnesium. If there are more high-melting elements as contrasted to a metal - base their disalignment to sections of prestressing gives in subsequent in formation and propagation of stressings of an intermediate phase on the basis "clusters". A vivid example of it formation of primary stressings in system aluminium - silicium serves.

Thus, the offered mechanism provides the leading part of hydrogen in shaping stressings intermediate phases.

Competency of such mechanism, as well as anyone other, can be proved only with the help of designed receptions on its ground which will allow to control a relation a solid solution intermediate phases and consequently, all physical, mechanical and chemical properties of alloys [1-6].

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