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UPGRADING OF QUANTITY FOR CASTINGS FROM MAGNESIUM ALLOYS BY METHOD OF FASISOSTATIC PRESSING

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Influence gasisostatic pressing on the quality of casting for magnesium alloys is investigated. It is shown that gasisostatic pressing for casting of responsible use from magnesium alloys is an effective method of raising their physical-mechanical charac-teristics.

Keywords: magnesium alloys, defects, microporosity, gasisostatic pressing, closeness

The increase of reliability for work of machines and mechanisms is determined by quality materials from these there are made [1]. Thus, defects, appearing at making of castings and their exploitation, influence considerably at operating resistance and longevity of work of casting from magnesium alloys. To the defects, to influencing on properties of casting, belong macro- and microporosity, gas shells and nonmetallic. Microvoids are by most often the meeting defect of casting from the magnesium alloys. Therefore a removal of marriage of this type is the important task of casting production.

For the receipt of the responsible magnesium casting are used the alloys of ML5, ML10 and other. The production of them includes smelting of alloy in induction and gas stoves, affinage of liquid fusion by flux, inundation of forms and heat treatment. Thus, in castings of the complicated configuration there can be sections with a microporosity that results to rejection of products and entails the decline of output of the suitable casting at a production [2]. The technology of the gasisostatic pressing can be application as one of perspective directions for removal of microporosity of castings from magnesium alloys. This technology is tested and used for high alloying alloys on the basis of nickel and iron. At the use of this technology there is welding (collapse) of walls of micropoids as a result of high temperature creepage and diffusion of metal. Thus, in a number of papers [3] it is marked that gasisostatic pressing of heatproof alloys on the basis of nickel assisted growing of structural constituents of alloy and their more even distribution shallow in a matrix, and also to the increase of physics-mechanical properties of metal. Application of gasisostatic pressing of magnesium alloys for the correction of casting defects to the present tense was not studied.

Therefore sampling technology of gasisostatic pressing casting from magnesium alloys for the increase of their quality and improvement of physics-mechanical properties is an actual task.

The purpose of this work is research of possibility for application technology of gasisostatic pressing for castings from magnesium alloys, and also study of his influence on a structure and properties of the magnesium casting.

One of important terms of receipt for the high-quality magnesium casting is a receipt of metal of enhanceable closeness without a microporosity and weakness. Therefore castings from magnesium alloys pass control on a hydrostatic test as a re-

sult of which part from them he is not maintained and it is rejected. Quality of castings from the magnesium alloys of ML5 and ML10 at industrial conditions determined with use of the non-destructive methods of control: by x-ray photography, luminescent and coloured.

X-ray photography control of defects in castings from magnesium alloys carried out by means of apparatuses of RAP-150/30, RUP 400-5 and MIRA-2D and registered data on x-ray photography tapes of RM-1 and RT-2.

Luminescent control in castings was carried out by the methods of LYUM-17-P and LYUM-К, using capillary penetration of luminescent liquid to the cavity of defect of product. After washing of product in technical water and drying, on the controlled surface inflicted a developer as oxide magnesium. The presence of defects was set on luminescence in the ultraviolet light, by the created irradiator KDZ-3L.

For fault detection of products by the coloured method TSM15-B, on the preliminary cleared surface products inflicted the layer of indicatory penetrant. After self-control, as a result of which penetrant filled superficial defects, a surface was processed by the liquid of OL-2 and deleted mixture 70 % transformer butter or MC-8P and 30 % fuels of TC-1 or PT. A developer used for fixing of defect.

Samples for metallographic control and determination of mechanical properties made from castings, containing microporosity, before and after gasisostatic pressing. The gasisostatic pressing was carried out in the gas stat of model «QUINTUS» at the temperature of 395 ± 5 °C, pressure 9,2 MPa in a flow 1,5 hour.

Tensile strength and relative lengthening of samples determined on the break machine of R5 at a room temperature.

Continuous durability at the temperature of 150 °C and tension 80 MPa determined on the break machine of АИМА 5-2 at the samples with working diameter a 5.0 mm for GOST 10145-81.

Macro- and the microstructure of the investigated alloys were studied by means of light microscopes of «Neophot 32» and «OLYMPUS ИХ 70».

The sections of castings from the alloys of ML5 and ML10 with the lowered closeness had a homogeneous highly dispersed macrostructure. Thus, microweakness in castings from magnesium alloys were divided by sections with a normal closeness and had the even lowering of closeness in the places of their location, that allowed to classify them, as concentrated woolly weakness [6].

A microstructure of heat treatment alloy ML10 was δ-hard fusion with the presence of eutectic (δ+γ($MgZr_{12}Nd$)) of spherical form. The microstructure of alloy ML5 was characterized by the presence δ-hard solution, eutectic δ+γ($Mg_{17}Al_{12}$) and intermetalides γ($Mg_{17}Al_{12}$). The size of intermetalides phase made 0.5-2.0 mcm, and distance between the axes of dendrites for the second order made 6-10 mcm.

A metallographic analysis showed that gasisostatic pressing did not have influenced on sizes macro- and microprint of castings from magnesium alloys. Thus, there was a compression of metal and micro voids closed. Gasisostatic pressing assisted work-hardening of metal for superficial layers of castings at the oxence of their deformation. The microhardness of metal in the superficial zone of castings was considerably higher than her central part. Mechanical properties of the investigated alloys

showed the improvement of their physics-mechanical characteristics and hot-resistance after gasisostatic pressing.

Gasisostatic pressing of castings from magnesium alloys, containing a micro-porosity, allowed removing her and getting a metal with mechanical properties, satisfying the requirements for normatively-technical documentation.

Conclusions. It is set that the gasisostatic pressing is effective technology for the removal of some defects in castings from magnesium alloys. It is shown that application of gasisostatic pressing removes a microporosity in castings from the alloys of ML5 and ML10, promotes their closeness on 10-15 %, tensile strength on ~ 10 %, plasticity on ~ 20 % and hot-resistance on ~ a 10-20 %. Application of this technology allows reducing the percent of marriage and promoting an output suitable at a production.

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