UDC 669.295

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TECHNOLOGICAL ASPECTS OF DECLINE FOR TITANIC PRODUCT COST

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Possible ways for reduce of cost of titanium products are considered. Highlights three areas: the use of scrap titanium and titanium alloys and also low-grade sponge titanium, economical alloying and use of cheap titanium powders for making by methods of powder metallurgy, are marts.

Keywords: titanium, ingots, scrap, smelting technologies, refining, alloying, sponge titanium, powder, mechanical properties.

All the increasing requirement of civil sectors of industry in titanic alloys sets the problem for production acceptable on a cost, but with the necessary level of technological characteristics of alloys, what can be obtained by a few ways: due to the use of secondary materials, economy alloying, and also by the use of powder-like metallurgy methods.

Maximally complete and rational utilization of wastes reduces in price titanic products due to replacement in composition a charge for smelting of bars for titanic alloys of spongy titan by standard wastes and crow-bar, and also the uses instead of high-grade spongy titan low-grade (brand of TS-Tv).

In particular, the world producers of titanic products began to spare enhanceable attention to spongy titan with high content of iron and spongy titan which was before monopolized by the producers of high-quality steel, and in Russian Federation on the basis of sponge worked out a titanic economical-alloy («low-cost») for application at motor industry [1].

Simplification of technology for receipt of titanic bars without the decline of them quality diminishes cost of ready-to-cook foods from titan and his alloys and does their competitive in relation to non-rusting nickeliferous steels and alloys. At the decision of this task the worked out has the real possibilities by E.O. Paton institute electric welding HAS of Ukraine method of algular-slag remelt (ASR) as more simple and less power-hungry, in relation the technologies (double VAR, scared melting of and other) applied presently [2].

An electro-slag remelt under the active slag systems at the stoves of chamber type in the controlled atmosphere (CESR) can substantially extend possibilities of remelted processes of titan. For the method of CESR all dignities of classic electro-

slag remelt - refining slag environment, directed crystallization and good surface of bar are inherent.

Technology of affinage for titan and his alloys from oxygen-containing and nitrided including, allowing to get bars with content of admixtures at level, % the masses: 0.03-0.06 oxygen, 0.005-0.006 nitrogen, 0.003-0.005 hydrogen and 0.01 carbon is worked out at Donetsk national technical university.

A new technological scheme intended for the production of high-quality titanic alloys from wastes and unshielded sponge, is based on the use of stoves of the disk ground weathering (DGW) with the induction heating [3]. Use of induction stoves which do not have cold copper crucibles, considerably cheaper than the use of cathode-ray, scared, plasma stoves and at a cost comparably with the stoves of VAR.

Casting scrap of titan aluminieds is strongly muddy the admixtures of oxygen and other elements, in this connection needs preliminary desoxydating and affinage In-process [11] new technology, consisting of the next successive stages, is tested: a vacuum induction melting at the special ceramic crucibles, desoxydating by a meltback under a reactive slag, affinage a vacuum arc melting.

Method of receipt of high-clean titan for the production of targets, used for thin-filmed metallization in microelectronics, includes next operations [4]: treatment of rods of iodided titan in a reactor by the stream of the chlorine dried from moisture at a temperature 500 °C and a vacuum floating-zone refining of rod with the receipt of polycrystalline titan which is exposed to the cathode-ray remelt in flat кристаллизаторе, thus the got flat bar is penetrate from every his side to all depth.

During classification of titanic alloys [13] it is suggested to take into account, except for other factors, and their application domain. So, for the use at civil sectors of industry of the USA and Japan alloys which are united by absence in their composition of expensive alloying elements are created

«*RIAM*» (Russian Federation) conception for creation of economically-alloy titanic alloys, based on the strictly rationed additions of oxygen and nitrogen, that allows to get the alloys of high durability and plasticity is worked out [5].

One of priority among technologies of receipt of the finished products is technology of powder-like metallurgy, where the coefficient of the use of material makes about 99 %. Also application for their making of powders, produced from low-grade spongy titan TS-Tv assists the decline of prime price of wares.

At the Zaporozhe metallurgical experienced-industrial plant of titan Institute (ZMEP) titan of shallow factions is produced by the method of the mechanical crushing and growing shallow [6]. By raw material for the production of titan largeness -2 mm is spongy titan, appearing at crushing and dispersion of scared part of block (fraction is a 12 mm).

Spongy titan of fraction is -12 mm expose to preliminary dispersion at faction -2 mm, +2 -5 mm and +5 -12 мм. Material of factions +2 -5 mm and +a 5 -12 mm separately send to crushing, and faction is a 2 mm, after the selection of test - for analytical control at drafting of party of commodity metal. After crushing of material of factions +2 -5 mm and + 5 -12 mm send the got metal directed to dispersion, where from him sow the metal of faction -2 mm. A metal of faction +2 mm send to the repeated crushing with subsequent dispersion.

As a result of mechanical tests next results were got: a closeness averaged 4.40 g/mm^3; tensile strength σ_B was within the limits of 520-570 МПа; values of indexes of plasticity: relative lengthening δ = 7-9 % and relative narrowing ψ = 13-18 %; hardness made 172-188 HB.

Conclusions. Use of bar and wastes at composition a charge for the production of titanic alloys allows to get the high-quality alloys of commercial cleanness by the different types of melting (WAR, EBR, ESR, scared melting). Economical titanic alloys («low-cost») is used for application in which instead of expensive alloying elements iron, oxygen and nitrogen, are created at civil sectors of industry. For the production of wares by the method of powder-like metallurgy with success can be used cheap titanic powders got from bad quality spongy titan.

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