PRESENTING A NEW TITANIUM FOUNRDY

IN EUROPE

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1. INTRODUCTION

In Eastern Europe, namely in Roumania, it is projected to be finished the construction of a new titanium foundry which will produce casting parts using investment casting with lost wax process, casting in rammed graphite moulds, as well as in metallic moulds, the metallic material beeing elaborated starting from titanium sponge.

The achievement of this foundry in Roumania, has been made with regard to the following reasons:

-the possibility to obtain a high grade of using of titanium sponge which will be made in Roumania with domestic resources;

-to cover Roumanian necessities for titanium casting parts, required by aeronautical, chemical, medical and other industries.

The foundry will be achieved based on a licence bought in the same time with the main equipments from the Peoples Republic of China.

The decision to establish this foundry in METAV S.A. has been taken due to the possibilities of using the facilities already existent, with technical equipments at the level of aeronautical requirements for the following activities:

-dies and patterns making possibilities;

-chemical composition analyse;

-nondistructive controls (X-ray, dye penetrant);

-metallographic controls;

-complete mechanical tests.

All the above mentioned activities, except dies and pattern work shop which has some Roumanian equipments, are achieved with imported equipments from Western Europe, from traditional suppliers recognized on the international market.

2. TECHNOLOGICAL FLOW

The technological flow of the titanium foundry is presented on the page no.7.

In the technological flow, the following abbreviations has been made:

-1 = ceramic shells;

-2 = rammed graphite moulds;

-3 = machined graphite moulds;

-4 = metallic moulds;

-5 = titanium alloy.

The operations within border lines will be made in the titanium foundry, and underlined, operations will be made on the existing facilities from METAV S.A.

3. ORGANIZATION AND EQUIPMENTS

The titanium foundry is organized on two levels, the first and second floor. On the second floor will be made the ceramic shells using lost wax technique, and on the first floor will be made the dewaxing of shells, graphite moulding, firing, casting, as well as ingots, and after casting operations.

To achieve the technological flow described at the point no.2, the foundry has the following types of equipments:

-wax melting tanks: -capacity: 100 kg/pc.;

-wax injection machines: -type: horizontal injection;

-clamping force: 35 tons;

-injection capacity: 2 l.

-assambling benches;

-transport trolleys;

-eching equipment;

-tank for first slurry coating;

-rotary equipment for shells;

-tanks for second slurries;

-mechanical handling device far shells;

-drying tunnel;

-dewaxing unit by dissolving;

-firing furnace:

-type: vertical, electrical heated;

-max. working temperature: 1000 °C;

-max. vacuum: 1 x 10^{-3} mbar;

-working chamber dimensions:

ϕ1200 x 1600 mm;

-firing atmosphere: mixed gas H2 + N2

-compacting electrodes press:

-type: hidraulical, 2 ways action;

-max. pressing force: 2 x 650 tf;

-dimensions of pressed electrode:

1/2ϕ105; 1/4ϕ200 x 250 mm;

-plasma welding machine:

-electrode dimensions after welding:

ϕ 105; ϕ 200 x 2250 - 350 mm;

-max. vacuum: 1,3 x 10^{-3} mbar

-VAR furnace for ingots:

-max. weight of cast ingot: 650 kg.;

-ingot dimensions:

ϕ 220 x 1400; ϕ 380 x 1400 mm;

-max. vacuum: 5 x 10^{-2} – 1 x 10^{-3} mbar;

-arc tension: 20 - 40 V dc;

-max. current: 10000 V.

-VAR furnace far casting:

-casting capacity: 100 Kg;

-electrode dimensions:

ϕ 220 x 1400 mm;

-vacuum level: 5 x 10^{-2} - 1 x 10^{-3} mbar;

-arc tension: 20 - 40 V dC;

-max. current: 20000 A;

-max. vacuum: l x 10^{-3} mbar;

-rotation speed of casting table:

150 - 550 rpm.

-knock out hammer;

-cut-off machines;

-chemical cleaning unit;

-sand blasting equipments;

-polishing units;

-chemical polishing unit;

-welding repair unit, in Ar atmosphere;

-Hot Isostatic Press (HIP) for improving internal quality of castings, used in the same time to obtain parts from metallic powders, with the main following characteristics:

-max. working temperature: l450 °C;

-max. working pressure: 1200 at;

-dimensions of working chamber:

ϕ 5500 x 1000 mm;

-working atmosphere: Ar.

-different tools and machines for mechanical machining of small graphite moulds and components, as well as for

machining of castings;

-dimensional control gauges.

Special controls for titanium alloys and titanium castings, will be made in METAV S.A. laboratories which has very good equipments and qualified personnel for:

-dimensional control with great accuracy, performed on 3 coordinate measuring machines, profile projectors, and other specialized equipments;

-dye penetrant control on ARDROX lines, using original equipments and substances;

-X ray control on SEIFERT units;

-chemical analyses, using:

-spectometer with photoelectric reciver in optical emission;

-spectral technique with inductively coupled plasma;

-spectrometry in atomic absorption;

-gasses dissolved analysers units.

-structural analyses, by optical microscopy methods, electronic microscopy with scanning and by transmission, microanalyses and X ray diffraction;

-mechanical tests, static and dynamic;

-mechanical tests for the determination of the material hardness by Brinell, Rockwell and Vikers methods, bending tests by shock by Charpy and Izod methods, fatigue and fracture mechanical tests, creep and relaxation tests, as well as stress corrosion tests.

Among the technological process to produce titanium alloy castings, a great attention will be paid to the recycling of metallic materials as chips, runners, risiers and scraps, which will be made by:

-using at the compacting of electrodes a max. 30% of metallic scraps with the same chemical composition with the ingot wich will be made;

-using at casting, in the crucible, metallic scraps of max. 10% of the charge, with the same chemical composition of the electrode;

-proper welding of scraps to make ingots which can be used for casting of civil parts, without high chemical and mechanical requirements.

The whole process for producing titanium alloy castings, will be made under a strictly quality assurance system, to meet all technical requirements of casting parts.

5. CONCLUSIONS

The achievement of this titanium foundry in Roumania offers a new European facility which is able to satisfy domestic and foreigners demands for different industries.

The technology which will be used, in the same time with all equipments, already verified in industrial practice, gives a guarantee for the quality of castings which will be produced in this foundry.

METAV S.A., following the economical opening policy of Roumania, is interested in cooperation with foreigners partners from Europe and from all over the world, in order to produce high quality castings at the lowest possible price.

The titanium alloy foundry of METAV S.A. is, starting from this moment, at disposal of foreigners customers, all orders and requirements being treated with all our attention and rapidity, all interested customers being welcomed in this foundry, as well as in all production capacities from METAV S.A.

THE TECHNOLOGICAL FLOW FROM TITANIUM FOUNDRY