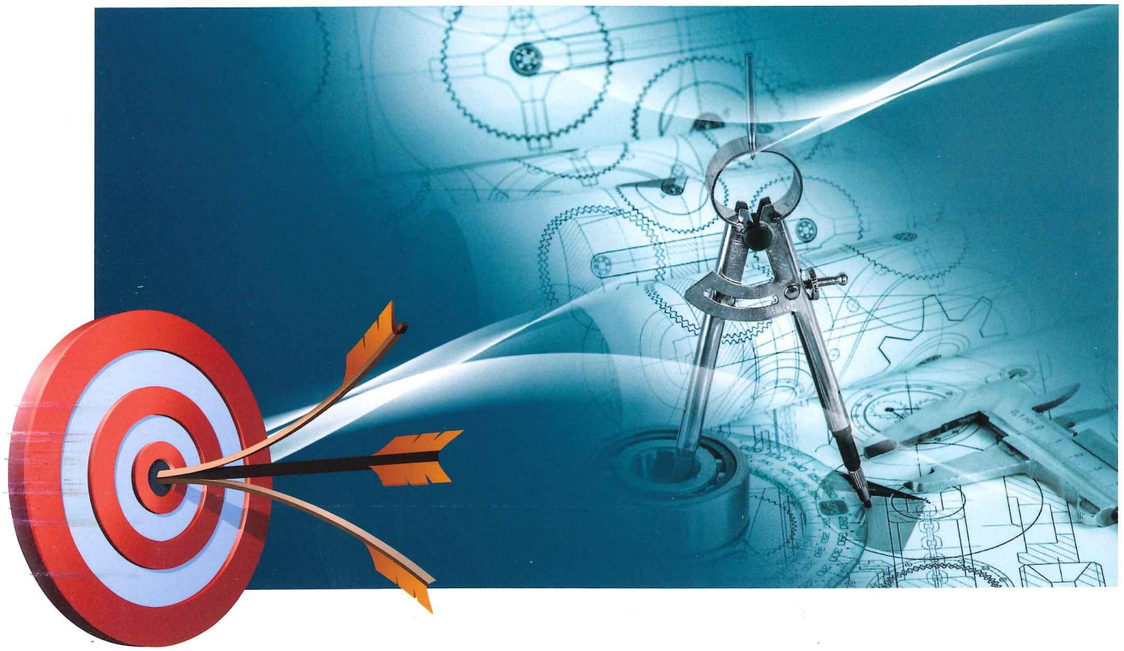
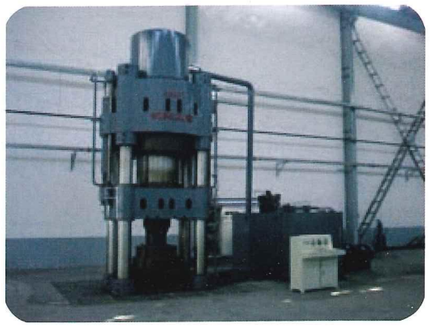
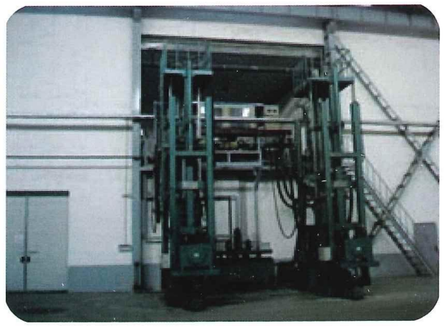
Manufacturing Equipments and Applied Standards



Equipments



◎ 1 Set 2500T Pressing Machine, one set,
Function: Make Spone Tianium/Zirconium into Block



◎ 2 sets 2000kg Vacuum Arc Remelting Furnaces ,
Function: Smelt titanium, zirconium and its alloys, make sponge titanium into ingots

◎ Vacuum smelting casting equipment ,
Function: Smelt and cast the parts of titanium, zirconium and its alloys

800kg Vacuum consumable electrode condensing furnace:1 set

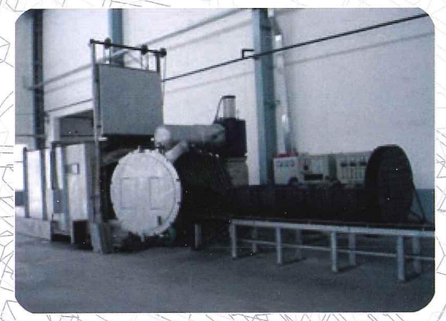
500kg Vacuum consumable electrode condensing furnace:2 set

◎Non-vacuum smelting casting equipment,
Function: Smelt and cast high-temperature alloy, stainless steel, carbon steel, aluminum and other casting.

500kg intermediate frequency furnaces, 1 set;

300kg intermediate frequency furnaces, 1 set;

150kg intermediate frequency furnaces, 2 set;



◎vacuum annealing furnace

Standards

GJB 2896A–2007 *Standard Specification for smelting the precision casting of Titanium and Titanium Alloy Castings*

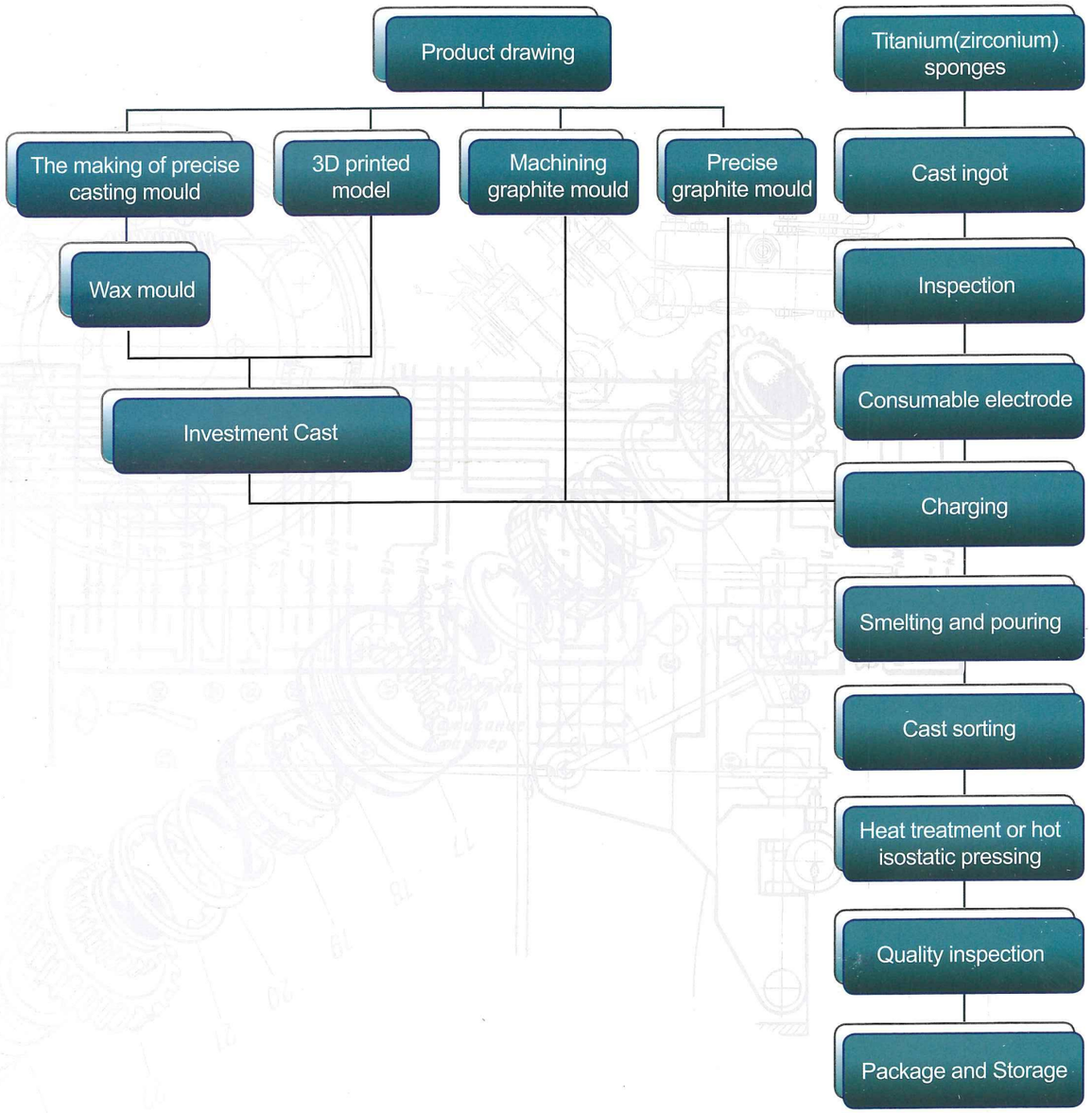
GJB XXXX–201X *Standard Specification for Titanium and Titanium Alloy Castings used in ships* (pre–audition version)

ISO 4990 *General delivery technical condition of casting*

GB/T 6614–2014 *Titanium and Titanium Alloy Castings*

ASTM B 367–06 *Standard Specification for Titanium and Titanium Alloy Castings*

Vacuum casting process



Moulding and casting

1. Graphite Casting

For Titanium, the features of Graphite are: a. Thermo chemical stability and refractory degree is high; b. strength is high. When the temperature becomes higher, the strength of graphite become higher; c. because of low coefficient of linear expansion, it can be casted the casting with correct geometry and high precision size. d. graphite has a good wettability for Melting Titanium. At normal temperatures, it is higher 20%–30% than Oxide ceramic material. So it is useful to pack the casting mold and cast the perfect outlook castings.

The process of machining graphite can produce the large and middle titanium casting. Has a short production time with good quality. The casting's thickness of titanium and zirconium is more than 3mm, the weight of titanium casting can reach to 300kg.

Graphite impeller 1 by numerical control machining

Graphite impeller 2 by numerical control machining

2. Precision–investment casting

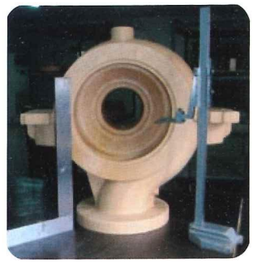
Precision–investment casting is a casting method which use once mold and once shape to cast the products.

Technology features: a. The size of casting is high precision, and the surface is low roughness

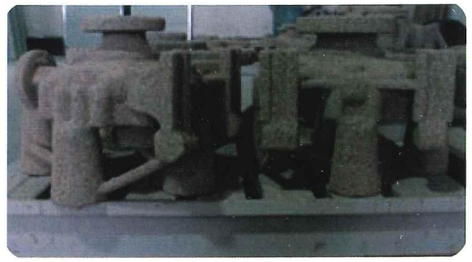
b. It can cast the complex shape ones.

c. Alloy material isn't restricted.

d. The production has high flexibility and strong adaptability.



Making Wax Mould



Painting the mould shell.

3. Precision–investment casting for titanium alloy.

We adopt the mold system with Oxide ceramic shell. It is for producing mass of precision castings of titanium, zirconium and its alloy, and also for the aerospace industry of less than 3mm thickness, and other more required large, middle and small casting with complex shape.

4. Rapid prototyping precision casting

Fast molding precise casting is a process that, based on the 3D fast print molding machine, makes a physical model of product, and then, conducts the making of shell and cast's pouring by the mould.

3D rapid prototyping printer can omit the wax mould process and save the production time. The precision of its mould size can reach ±0.2mm, so that the complex product also can produced.

3D Printer

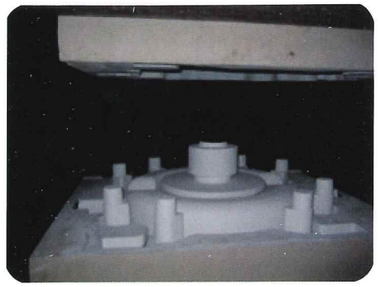
The Aero–engine casing mould

Impeller mould

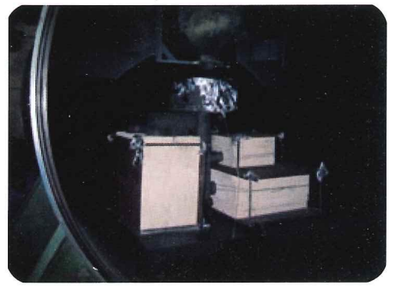
5. Sand casting

The sand casting for titanium, zirconium and its alloy is our patented technology. We adopt the refractories that are stable for high–temperature metal liquid of titanium, zirconium and its alloy. Painting a layer of refractory coating on the mould cavity surface is to make the sand mould, so as to cast the titanium, zirconium and its alloy.

The technology of sand casting is suitable for producing the large–size titanium, zirconium and its alloy casting with many quantities. Its production time is short and cost is less.



Assemblied case



Casting in furnace

Hot Isostatic Pressing (HIP)

The HIP process subjects a component to both elevated temperature and isostatic gas pressure in a high pressure containment vessel, vacuumizes and then fill in the high pressure inert gas, heat until to the predicted temperature, to compact and close the closed pores, shrinkage pores, shrinkage in casting inside Under the action of high temperature and all isostatic high pressure. HIP improves the material's mechanical properties and workability.

Now HIP has become an important process in titanium casting industry. Technical conditions of titanium alloy casting at abroad and home is clearly defined: class Ⅰ、Ⅱ castings in Aeronautics and Astronautics should has HIP.

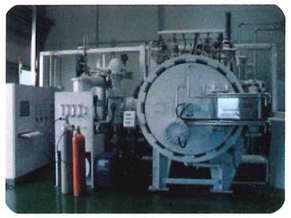
△ Max Temperature: 1000℃

△ Working Pressure: 150MPa

△ Effective working diameter in furnace: Φ1200mm

△ Furnace Height: 1500mm

△ Working load: 1 ton.

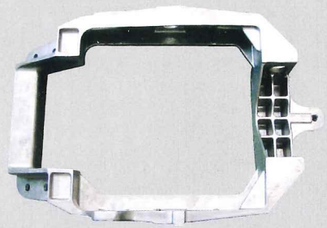


HIP Equipment

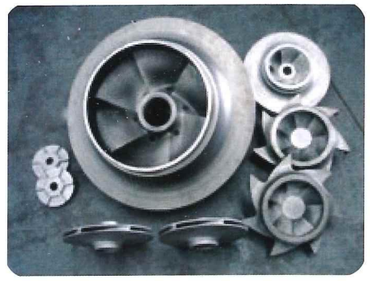
Titanium alloy casting after HIP

Castings Samples

Titanium Castings for Engine



Tiatnium Alloy Casting for Military Use



Titanium Impeller Castings for Japan Client

Pump Body Castings For Iran Client

Investment Castings Used For Acid Plant

High–temperature Turbo Casting for Borg Warner