

# Titanium parts on ships

There are many parts made of [titanium and titanium alloy](#) on the ship. It is difficult to check clearly. Now we can only talk about the parts that have been applied and show effective results. Japan systematically studied and evaluated the parts made of titanium alloy on ships.

Sonar shroud with excellent comprehensive performance

In the former Soviet Union-Russia, the past production of naval flow hoods was made of glass reinforced plastic (FRP), and later mostly changed to [titanium alloys](#). The use proves that titanium alloy sonar shrouds have excellent comprehensive performance, they produce The "Kursk" sonar system is made of titanium. The sonar shrouds of K877, K636, 956, and "Liaoning" aircraft carriers purchased in China are all made of titanium alloy. The ship sonar shrouds built in China in the early years are different according to the requirements of underwater and water surface applications. Some are made of stainless steel, some are made of FRP, and the titanium alloy shroud is deeply integrated during the Ninth Five-Year Plan period. The research has achieved fruitful results and is now gradually being converted to titanium alloys.

Titanium propeller life is more than 5 times longer than copper alloy

The ship's propeller requirements for materials are: [high strength, strong fatigue resistance to seawater, erosion resistance and cavitation corrosion](#). Titanium alloys are the material of choice for these materials in terms of existing materials. The US Navy is the first to use a 1500mm, four-leaf detachable supercavitating titanium alloy propeller on a hydrofoil. In 1972, China developed a hydrofoil speedboat titanium alloy propeller. By 2014, it is estimated that it has produced about 800 pieces of various kinds of pulp with a diameter of 450mm~1500mm, and the largest mass exceeds 160kg. However, long-term use and operation show that the advantages of titanium alloy propeller and its shaft in manufacturing cost have not been fully demonstrated. Therefore, the application of titanium alloy propeller has not reached the stage of universal practicalization, and needs further research and development. Also included in the titanium propeller parts are the rudder and the bearing housing.

[Engine exhaust cooling pipe and muffler](#)

In medium-sized speedboats, the engine emits a gas temperature of up to 500 °C, which is exhausted from the stern through the pipeline inside the ship. On the one hand, it is necessary to cool the seawater to the inside of the pipe

(double cooling pipe) to cool the exhaust gas, and a muffler is installed on the other side (Silencer ), the exhaust noise is reduced to less than 60dB, titanium is a good material for the manufacture of muffler: [durability at high temperatures](#) is stronger and longer than aluminum alloy, density is lower than stainless, and good noise reduction effect.

Most of the inverters (mixer Minxing) in the Japanese muffler have been replaced by titanium. The reason for using titanium to make the mixer is that the temperature at the high temperature end is as high as 500 ° C, and the material is required to have [good high temperature and long-lasting strength](#); Although the temperature is not high, it is around 100 ° C, but it is required to have high corrosion resistance when it comes into contact with sea water. At present, the inverter devices of medium-sized high-speed ships are mostly made of aluminum, but the high-temperature performance of aluminum is not good, and it is easy to crack in the weld and heat-affected zone. The low-temperature end is susceptible to seawater corrosion; if it is made of stainless steel, the welded part will be stressed. Corrosion cracking. They have a service life of 5a~10a and require multiple repairs during the period.

Titanium has a higher strength than aluminum. At equal strength, the thickness of titanium used is much thinner than that of aluminum, which is about 40% thinner than that of stainless steel. In addition, in terms of the price of finished products, the price of [titanium products](#) is about twice that of aluminum products and stainless steel products. If you consider the cost of repairs and the cost of replacing a new part, it is undoubtedly more cost-effective to use titanium parts. The Japan Coast Guard Agency proposed in 2002 that the seawater and exhaust gas mixing devices on ships should be made of titanium.

Pumps, valves, piping on ships, such as engine cooling water and fire-fighting seawater piping systems, work in very harsh conditions. They used to be made of copper. They are also made of coated steel and stainless steel tubes, but their service life. It is not long, only 2a~5a. If it is changed to titanium pump, titanium valve and [titanium pipeline](#), the service life is up to 25a~30a, which not only reduces the total cost, but also is safe and reliable during operation, and will not cause corrosion or leakage. Other security incidents.

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