**Several tricks against valve corrosion**

It can be said that metal valve is the most vulnerable to corrosion failure in engineering equipment of the key parts structure. Usually, metal valve sealing surface, valve stem, diaphragm, small spring and other valve pieces generally use a material, valve body, valve cover and other suitable for two or three materials, used for high pressure, toxic, flammable, explosive, radioactive medium valve, choose very corrosive materials

     Metal valves in the atmosphere or solution not only complex work conditions such as time going on uniform corrosion of the metal surface, the metal also easily happened on the local position of pitting corrosion, crevice corrosion, intergranular corrosion, delaminating corrosion, stress corrosion and corrosion fatigue, corrosion, selective corrosion, wear and cavitation corrosion, the corrosion of the vibration and local corrosion such as hydrogen corrosion.

   Anti-corrosion measures for metal valves:

       1、Corrosion resistant materials are selected according to the corrosive medium

     In the production practice, the corrosion of the medium is very complex, even in the use of a medium in the valve material, the medium concentration, temperature, pressure is different, the medium to the material corrosion is not the same. The corrosion rate increases approximately 1~3 times for every 10℃ increase of medium temperature. Medium concentration has a great impact on the valve material corrosion, such as lead in a small concentration of sulfuric acid, corrosion is very small, when the concentration exceeds 96%, the corrosion increases sharply. On the contrary, the corrosion of carbon steel is the most serious when the sulfuric acid concentration is about 50%, and decreases sharply when the concentration increases to more than 6%.As aluminum in the concentration of 80% or more concentrated nitric acid corrosive, but in the medium and low concentration of nitric acid corrosion is serious. Although stainless steel corrosion resistance to dilute nitric acid is very strong, but in more than 95% of concentrated nitric acid corrosion but increased.

     From the above a few cases can be seen, the correct choice of valve material should be based on the specific situation, analysis of various factors affecting corrosion, according to the relevant anti-corrosion manual selection of materials.

       2、Adopt non-metallic materials

Non-metallic corrosion resistance is good, as long as the valve using the temperature and pressure in line with the requirements of non-metallic materials, not only can solve the problem of corrosion, and can save precious metals. The valve body, valve cover, liner, common non-metallic materials, such as sealing surface for the gaskets, non-metallic materials packing main death. PTFE with, plastics, such as chlorinated polyether, and using natural rubber, neoprene, nitrile butadiene rubber lining rubber valve, the valve body, valve cap body is generally made from cast iron, carbon steel, which guarantee the intensity of the valve, and ensure that the valve is not subject to corrosion. Clip pipe valve is according to the excellent corrosion resistance of rubber and excellent performance Designed. Now more and more of the PTFE with nylon, plastic, such as the use of natural rubber and synthetic rubber in all kinds of sealing surface, sealing ring, used for all kinds of valves, such as non-metallic materials of sealing surface differ, not only good corrosion resistance, and good sealing performance, especially suitable for granular medium use. Of course, their strength and heat resistance is low, the scope of application is restricted. The emergence of flexible graphite, non-metallic entered the field of high temperature, solved the difficult to solve the problem of the packing and gasket leaking for a long time, and is a very good high temperature lubricant.

       3、 Surface Treatment

　　 Connection Parts

Galvanization, chromium plating and oxidation (bluing) treatment are commonly used to improve the resistance to atmosphere and medium corrosion. Other fasteners also adopt phosphating and other surface treatments according to the above methods.

　　Nitriding and boriding surface processes are often used to improve the corrosion resistance and wear resistance of sealing surfaces and closed parts with small diameters.

　　Stem anti-corrosive widespread adoption of nitriding, boronizing, chrome plating, nickel plating surface treatment technology, such as to improve its corrosion resistance, corrosion resistance and wear abrasion performance. Different frontal surface treatment shall be suitable for different stem material and working environment, in the atmosphere, water vapor medium contact with asbestos packing stem, hard chromium plating, gas nitriding process can be used (stainless steel should not adopt ion nitriding process);The high phosphorus nickel plating has a good protective performance in hydrogen sulfide atmosphere.38CrMoAlA can resist corrosion by ion and gas nitriding, but hard chromium coating is not suitable. After quenching and tempering, 2Cr13 can withstand ammonia corrosion. Carbon steel using gas nitriding can also withstand ammonia corrosion, while all phosphor nickel coatings are not resistant to ammonia corrosion. After gas nitriding 38CrMoAlA material has excellent corrosion resistance and comprehensive performance, it is used to make more valve stems.

       Small sizes valve bodies and handwheels are often chromed to improve corrosion resistance and trim valves

       4 Thermal Spray/ FBE

     Thermal spraying is a square in the preparation of coating technology, has become one of the new technology of material surface protection. It is the use of high energy density of heat (gas combustion flame, arc, plasma arc, electric, gas combustion, etc.) after heating the molten metal or nonmetal material, in the form of atomized spray to the pre-treatment of base surface, the formation of coating layer, or at the same time the basic heating surface, the coating on the surface of the matrix, melt, forming the surface strengthening technology of the spray welding layer. Most of the metals and their alloys, metal oxide ceramics, ceramic composites and hard metal compounds can use one or several of the thermal spraying methods, in metal or not A coating is formed on the metal substrate..

　　Thermal spraying can improve its surface corrosion resistance, wear resistance, high temperature resistance and other properties, and extend its service life.Parts can be repaired by thermal spraying.

       5 Coating

　　A anticorrosive coating is the most widely used method, on the valve products is a kind of indispensable anticorrosion materials and identification marks. Coating also belong to non-metallic materials, it usually consists of synthetic resin, rubber slurry, vegetable oil, solvent mixture, such as covering the metal surface, isolation medium and the atmosphere, achieve anticorrosive. Coating is mainly used for water, salt water, sea water, atmospheric corrosion environment is not too strong. Valve lumen commonly used anti-corrosion paint besmear to brush, prevent water, air and other media corrosion. The valve inside the paint mixed with different colors, to representation, the materials used. The valve spray coating, generally in the six months to one year at a time.

       6 Add corrosion inhibitor

    The mechanism of controlling corrosion inhibitor, is that it promotes the polarization of the battery. Corrosion inhibitor is mainly used for medium and packing. Medium corrosion inhibitor is added, can make the corrosion of equipment and valves to slow, such as chromium nickel stainless steel in sulfuric acid containing no oxygen, a wide range of solubility into cremation, corrosion is serious, but add a small amount of copper sulfate or nitric acid such as oxidant, can make the stainless steel change passivity, generated on the surface of a layer of protective film, prevent erosion of medium, in hydrochloric acid, if add a small amount of antioxidant, can decrease the corrosion of titanium. The valve pressure testing water is commonly used as the test medium, easy to cause the corrosion of the valve, adding a small amount of sodium nitrite in the water can be prevented Corrosion of valves by water. Chloride in asbestos packing is very corrosive to the stem. If the use of distilled water washing method can reduce the content of chloride, but this method is difficult to implement, can not be generalized, ester is suitable for special needs.

In order to protect the stem and prevent corrosion of asbestos packing, the stem is coated with corrosion inhibitor and sacrificial metal in asbestos packing.The solvent can make the corrosion inhibitor dissolve slowly, and can lubricate;Make sacrifice metal zinc powder is added in the asbestos, in fact, is also a kind of zinc corrosion inhibitor, it can combine with asbestos in the chloride, first has greatly reduced chloride and stem metal contact, so as to achieve anti-corrosive purpose. If joined the red lead in paint, lead acid calcium, such as corrosion inhibitor, painted on the surface of the valve can prevent atmospheric corrosion.

       7 Electrochemical Protection

       Electrochemical protection, which has two kinds of the anode and cathode protection. Such as protected with zinc, iron, zinc corrosion, zinc metal called sacrifice. In production practice, the anode protection using less, cathodic protection applications. More large and important valve adopts the cathodic protection, is a kind of simple and effective method in economic. Add zinc, asbestos packing protection valve stem falls under cathodic protection.

       8 Corrosive environment control

     The so-called environment, there are broad sense and narrow sense of two, broad sense of the environment refers to the valve installation around the environment and its internal circulation media;Narrow environment refers to the conditions around the valve installation. Most of the environmental control, production process and do not any change. Only if will not have damage to the product, process, etc, can adopt the method of control environment, such as boiler water deoxidation and refining process of alkali PH adjustment. From this point of view, the adding corrosion inhibitor and electrochemical protection control corrosion environment

     Atmosphere filled with dust, vapor, smoke, especially in a production environment, e.g. halogen, equipment emit toxic gases and fine powder, will have different degrees of corrosion on the valve. The operator should according to the provisions of the operating rules of regular cleaning, purge valve, refueling regularly, this is the effective measure to control environment corrosion. The valve stem cover installation, set well, valve surface spray paint, etc., all of this is to prevent the corrosion of material erosion method of the valve. The environment temperature and air pollution, especially for equipment and valves closed environment, will accelerate the corrosion. Should be used as far as possible with open workshop or ventilation, cooling measures apply to reduce environmental corrosion.

       9 Machining process and valve structure improvement

　　The corrosion protection of the valve is considered from the beginning of the design, a reasonable design of the structure, the correct process method of the valve product.

　　Therefore, the design and manufacturing departments should improve the parts with unreasonable structure design, incorrect process method and easy to cause corrosion to meet the requirements of different working conditions.

　　Methods to prevent intercrystal corrosion of austenitic stainless steel valve parts include: "solid solution quenching" treatment, that is, heating to 1100℃ or so water quenching, choose austenitic stainless steel containing titanium and niobium, and carbon content below 0.03%, to reduce the generation of chromium carbide.

　　Stress corrosion a rupture that occurs when corrosion and tensile stresses occur simultaneously. Methods for preventing stress corrosion; Eliminate or reduce the stress in welding and cold working by heat treatment, improve the unreasonable valve structure, avoid stress concentration, adopt electrochemical protection, spray brush anti-corrosion coating, add corrosion inhibitor, apply compressive stress and other measures.

　　Wear corrosion is a form of corrosion produced by alternating action of fluid on metal wear and corrosion, which is a common type of corrosion of valves. This kind of corrosion occurs mostly in the sealing surface. Prevention methods: choose corrosion-resistant and wear-resistant materials, improve the structural design, and adopt cathodic protection.

　　Frictional vibration corrosion are the two parts of mutual contact load at the same time, the destruction of the contact surface caused by vibration and sliding. The corrosion occurred in bolted joint, the valve stem and shut down a joint, ball bearings and shaft etc. Between coating can be used lubricating oil, reduce friction, surface phosphating, hard alloy, and treated with spray tile or cold working method to improve the surface hardness of protection.

　　After welding we will try to use the corresponding protective measures such as annealing treatment. Improve the surface roughness and other valve stem processing surface roughness, the higher the level of surface roughness, the stronger the ability to resist corrosion. To improve the processing technology and structure of the packing and gasket, the use of flexible graphite and the plastic packing, and flexible graphite paste PTFE gasket and using the package gaskets, can improve the sealing performance and reduce the corrosion to stem and flange sealing surface.