

## Structural characteristics of centrifugal pump and its maintenance and dialysis

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*Abstract: Centrifugal pumps are widely used in petrochemical, coal chemical and other chemical industries to transport liquids of different natures, providing the pressure and flow required for chemical reactions. There are many types of centrifugal pumps, which can be divided into acid pumps, alkali pumps, clean water pumps, mud pumps, etc. depending on the nature of the transport medium. The working temperature and working pressure of the conveying medium are different. Therefore, effectively extending the life cycle of the centrifugal pump and reducing the amount of maintenance have a great effect on improving the economic efficiency of the factory.*

*Keywords: centrifugal pump. Improving; maintenance.*

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### 1. CLASSIFICATION OF CENTRIFUGAL PUMPS

The model of the centrifugal pump is generally composed of the first part, the middle part and the last part. The first part is the number, which indicates the main size and specification of the pump, which is generally the suction port diameter (mm or inch) of the pump. The middle part uses Chinese pinyin to indicate the type of the pump. , characteristics or uses, such as D means multi-stage segmentation, Sh means single-stage double suction, F means corrosion-resistant pump, Y means centrifugal oil pump; tail generally uses digital to indicate the main performance parameters of the pump, such as single-stage rated head, The number of stages of the multistage pump, etc. If the pump is equipped with a cut impeller, add the words A, B, and C to the end of the tail.

For example: 80AY100×2A84. The power pump continuously applies energy to the liquid to be delivered through a high-speed rotating impeller or a high-speed moving fluid, so that the speed in the pump casing is increased to a maximum value, and then, through the change of the cross-section of the flow passage in the pump casing, the speed Gradually lower and partially convert its kinetic energy into the pressure energy at the pump outlet.

The dynamic pump can be divided into two types: vane type and jet type (special action pump). According to the flow direction of the fluid in the pump casing, it can be further divided into a centrifugal pump, an axial flow pump and the like. The positive displacement pump relies on periodic changes in the volume of several enclosed spaces, by applying energy to the liquid by squeezing, and directly increasing the pressure value to the desired value for transporting the liquid through the valve or orifice into the line. According to the movement characteristics of the pressurized element, the positive displacement pump can be basically divided into two types: reciprocating type and rotor type.

According to the channel classification of the liquid flowing into the impeller, it can be divided into a single suction impeller (one inlet on one side of the impeller) and a double suction impeller (liquid flows symmetrically from both sides of the impeller into the impeller flow passage).

## **2. THE PRINCIPLE OF THE CENTRIFUGAL PUMP**

The centrifugal pump is mainly composed of a pump body, an impeller, a sealing ring, a rotating shaft, a shaft sealing box, and the like, and some centrifugal pumps are also equipped with a guide wheel, an inducer wheel, a balance plate, and the like. The pump body is the casing of the pump, including the suction chamber and the pressure chamber; the function of the suction chamber is to uniformly flow the liquid into the impeller; the function of the pressure chamber is to collect the liquid and send it to the lower impeller or the guide discharge tube. At the same time, the speed of the liquid is lowered, and the kinetic energy is further changed into pressure energy.

The pressure chamber has two forms: a volute and a guide wheel. The volute is named after the spiral shape of the flow path. The liquid flows along the spiral. As the cross section of the flow path increases, the velocity decreases, and the kinetic energy becomes pressure energy.

The guide wheel is commonly used in the segmented multistage pump. The structure is simple and compact, and the energy conversion between the primary impeller and the secondary impeller adopts a guide wheel, and the liquid flows along the flow path defined by the guide wheel to the inlet of the secondary impeller. The impeller is the only component of the centrifugal pump that transfers energy to the liquid, through which the pump changes the mechanical energy into the pressure energy of the liquid, increasing the pressure of the liquid.

The impeller is fixed to the shaft by a key, and the shaft is rotated by the prime mover, and the energy of the prime mover is transmitted to the liquid through the blade.

Before the centrifugal pump is started, the pump should be filled with liquid. This process is called a pump. The driving machine (motor) drives the impeller to rotate through the pump shaft, and the blades of the impeller drive the liquid to rotate together, thereby generating centrifugal force. Under the centrifugal force, the liquid is swept along the blade flow path to the impeller outlet, and the liquid is collected and sent through the volute. tube. The liquid receives energy from the impeller, increasing both pressure energy and velocity, and relies on this energy to deliver the liquid to the work site. When one of the impellers does not allow sufficient energy for the liquid, multiple impellers can be used in series or in parallel to work on the fluid. While the liquid is being raked toward the impeller outlet, a low pressure is formed at the center of the impeller inlet, and a pressure difference is generated between the liquid at the center of the suction tank and the impeller, and the liquid in the liquid suction tank is continuously subjected to this pressure difference. The ground enters the impeller through the suction line and the suction chamber of the pump. In this way, the impeller continuously draws in liquid while rotating, and continuously discharges the liquid with a certain amount of energy to the inhaled liquid, so that the centrifugal pump operates continuously.

## **3. STRUCTURAL FEATURES AND DISASSEMBLY OF SINGLE-STAGE DOUBLE SUCTION CENTRIFUGAL PUMP**

Structural related parts of single-stage double-suction centrifugal pump: shaft, impeller, snap ring, seal ring, mechanical seal bushing, sealing body, mechanical seal, sealing gland, water retaining ring, bushing, bearing body, bearing Retaining ring, retaining washer, pump cover, boring, pin, bearing oil

seal and other components. It also covers flexible couplings and motors. Single-stage double-suction centrifugal pump (medium open pump) Material: If no special requirements are put forward, the main parts of the single-stage double-suction centrifugal pump are pump body, pump cover, impeller, double suction seal ring, bushing, etc. It is a 45th carbon steel. According to the need, the shaft can be made of 2Cr13, 40Cr and other materials. Other major overcurrent components can be made of ductile iron, cast steel, bronze and stainless steel.

Single-stage double-suction centrifugal pump rotation direction: From the motor end, the pump shaft rotates clockwise (ie the pump inlet is on the right). If necessary, it can be rotated counterclockwise. The reverse pump is indicated by the letter F at the end of the pump model. Single-stage double-suction centrifugal pump structure description: S/SH series single-stage double-suction centrifugal pump (medium open pump) is a single-stage, double-suction, volute centrifugal pump with axially open pump casing. Both the pumping inlet and the spouting outlet are below the pump shaft and are horizontal.

The mechanical seal of the centrifugal pump mainly achieves the purpose of sealing by the relative movement between the moving ring mounted on the shaft and the stationary ring fixed on the pump casing. There are many kinds of mechanical seals for pumps, and the models are different, but there are five main leak points: the seal between the sleeve and the shaft; the seal between the moving ring and the sleeve; the seal between the moving and static rings; the static ring and the stationary ring Seal; seal between the seal end cap and the pump body. In general, the leakage between the shafts, the sealed end caps and the pump body of the bushings is easy to find and solve, but it needs to be carefully observed, especially when the working medium is liquefied gas or high pressure, toxic and harmful gas, it is relatively difficult. some. The remaining leaks are difficult to distinguish and judge intuitively. It is necessary to observe, analyze, and study the leak symptoms on the basis of long-term treatment and maintenance practices in order to draw correct conclusions.

#### **4. CENTRIFUGAL PUMP MAINTENANCE**

The use of the centrifugal pump to maintain the centrifugal pump will inevitably lead to some failures in the work, after the failure occurs, the necessary steps for maintenance, in fact, the centrifugal pump repair is not very simple, but as long as the centrifugal pump structure is well resolved. Then, if you pay attention to the maintenance of the centrifugal pump during daily use, it will reduce the number of failures and extend its service life.

When the centrifugal pump is running, pay attention to the following maintenance work: Always pay attention to the readings of the pressure gauge, vacuum gauge and ammeter. If abnormalities are found, the cause should be found to be eliminated in time; the lubricating oil mark should be observed frequently to keep the oil amount within the specified range. Check the quality of the lubricating oil and immediately change it according to the specified grade; always observe the supply of lubricating oil, sealing oil and cooling water; frequently check the tightening of the centrifugal pump and motor anchor bolt, the temperature of the pump body and bearing And the sound of the pump running, etc., if there is any problem, timely processing; for the centrifugal pump with complex structure and high degree of automation, it must be started, maintained and parked according to the relevant operational regulations, without scientific basis and experimental evidence. Just change the method of operation.

## **5. CONCLUSION**

The key to the value of the centrifugal pumps use over a long period of time is the careful maintenance and day-to-day management in proper use. Operating under harsh operating conditions, it is highly probable that premature damage will occur, which inevitably increases the risk of cost loss and reduced productivity due to downtime. The centrifugal pump must perform necessary maintenance after a period of operation. The sound maintenance system ensures the long-term smooth operation of the centrifugal pump and eliminates all accidents that should not occur, so as to exert the best technical performance of the centrifugal pump.

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