

Hydraulic Pump Components

Product Introduction Manual

Introduction

This manual mainly introduces our full range of core hydraulic pump components, covering major product categories such as cylinder blocks, pistons, ball guides, retainer plates, valve plates, swash plates, drive shafts, and valve blocks.

All of our hydraulic pump components are manufactured with precision machining processes and strict production standards. They feature high precision, strong wear resistance, and excellent compatibility, helping to improve equipment operating stability and service life.

These components are widely used in construction machinery, mining equipment, hydraulic pumps for agricultural machinery, firefighting water pumps, seawater hydraulic pumps, oil pumps, hydraulic systems, and many other applications.

一、Cylinder Blocks

Product Categories

Our cylinder blocks are available in two main categories to suit hydraulic pump equipment with different operating conditions and service life requirements.:

1. One-piece ductile iron cylinder blocks



2. Cylinder blocks with copper-fused bottom surfaces



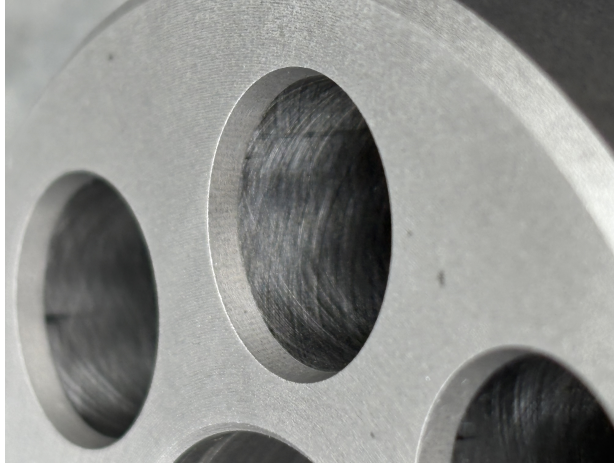
Core Production Processes and Advantages

(—) Post-Nitriding Honing Process

Our company is equipped with Sunnen vertical honing machines and adopts a dedicated machining process: the piston bores are rough-honed before nitriding and then finish-honed after nitriding. This allows us to precisely control the bore accuracy and performance of the cylinder block. The key advantages are as follows:

1. **Improved wear resistance:** The loose surface layer formed during nitriding is precisely removed, while the high-hardness nitrided wear-resistant layer is fully retained. This significantly improves the overall wear resistance of the cylinder block, making it suitable for high-intensity continuous operation.。
2. **Reduced start-up wear:** The honing process creates a dedicated microscopic honing pattern that helps retain oil at the micro level. This effectively reduces dry friction during cold pump start-up and minimizes initial component wear.。
3. **Stable dimensional accuracy:** After honing, each piston bore achieves extremely high dimensional accuracy, with strong dimensional consistency within the same batch. This helps prevent assembly sticking, jamming, and pressure loss caused by dimensional deviations.。
4. **Excellent surface finish:** After honing, the surface roughness of the cylinder block bores is controlled within Ra 0.2, providing smooth inner bore surfaces and reducing frictional resistance during the reciprocating motion of the pistons.。

5. **Correction of machining deformation:** This process precisely corrects slight bore deformation caused by the nitriding process. Cylindricity and roundness are both strictly controlled within 0.003, ensuring high assembly accuracy and stable operating precision of the components.



(二) Bimetallic Fusion Casting Process

For cylinder blocks with copper-fused bottom surfaces, we use a vacuum high-temperature fusion casting process to precisely bond the copper material with the iron substrate. This process offers significant advantages:

1. **High bonding strength:** The copper layer and the iron substrate are strongly bonded and integrally formed. Under long-term high-pressure reciprocating operation, the copper layer is highly resistant to detachment, cracking, and peeling.。
2. **Stable material performance:** The sealed vacuum fusion casting environment effectively isolates impurities and air interference, ensuring the purity of the copper material composition. This allows the copper layer to consistently deliver excellent wear resistance, friction-reducing performance, and thermal conductivity.。



二、Pistons

Product Categories

Based on differences in structure and manufacturing process, our pistons are divided into two main categories to meet the pressure requirements of different hydraulic pump operating conditions:

1. Standard-wrap piston-shoe assemblies
2. Bimetallic reverse-wrap piston-shoe assemblies



Core Production Processes and Advantages

(一) Precision Rotary Swaging Process (Applicable to All Piston Series)

Instead of the traditional press-crimping process, we use a high-precision rotary swaging process to significantly improve piston performance.:

1. **Higher fitting accuracy:** The fit between the piston ball head and the piston shoe is greatly improved, achieving a tight, gap-free connection. This helps prevent oil leakage and pressure loss during operation, ensuring stable hydraulic system pressure.
2. **Longer service life:** Compared with traditional processes, the rotary-swaged structure provides significantly higher pull-out resistance. Under high-frequency reciprocating operation, the piston shoe connection is less likely to loosen or detach, significantly extending the overall service life of the piston assembly.

(二) Dedicated Process for Bimetallic Reverse-Wrap Piston-Shoe Assemblies

Bimetallic reverse-wrap piston-shoe assemblies are manufactured using an advanced bimetallic fusion casting process, creating a strong metallurgical bond between the iron and copper materials. After forming, the copper layer achieves extremely high bonding strength and is highly resistant to detachment under long-term complex operating conditions. Compared with conventional pistons, it offers far superior wear resistance and impact resistance, making it suitable for heavy-duty, high-pressure, and high-frequency operating equipment.

三、 Ball Guides

Production Process and Advantages

Ball guides are prone to deformation, insufficient surface finish, and dimensional deviations after basic heat treatment, which directly affects equipment assembly accuracy. To address this, our company has developed a dedicated finishing process: after heat treatment, each ball guide undergoes precision finish turning, followed by spherical grinding and polishing.

Through multiple precision machining processes, deformation errors caused by heat treatment are thoroughly corrected. The overall dimensional accuracy and spherical surface finish of the ball guide are strictly controlled, allowing smoother and tighter matching between the ball guide and the retainer plate. This helps ensure smooth equipment operation without jamming or abnormal noise, while significantly reducing mechanical wear.。



四、Retainer Plates

Production Process and Advantages

After nitriding, retainer plates commonly experience slight deformation, which may lead to misalignment with the ball guide and inconsistent piston mounting height, affecting the operating stability of the equipment.

To address this issue, we have optimized the machining process. After nitriding, the inner spherical surface of the retainer plate is precision finish-turned, while the flat surface is precision-ground. This dual precision correction process effectively resolves deformation after nitriding. It ensures accurate matching between the retainer plate and the ball guide, while maintaining uniform mounting height for all pistons. As a result, the hydraulic pump operates more smoothly and evenly, reducing failures such as uneven wear, abnormal noise, and vibration.



五、Valve Plates

Production Process and Advantages

The valve plate is a core precision component for pressure control and flow distribution in hydraulic pumps. Its surface parallelism and surface roughness directly determine the sealing performance and pressure stability of the hydraulic pump。

Our company uses **high-precision double-sided grinding equipment** to finely grind both sides of the valve plate. This allows precise control of key parameters such as parallelism between the two sides, surface roughness, and flatness, ensuring product accuracy that meets high-end industry standards.



The finished valve plates provide excellent sealing performance, uniform flow distribution, reduced pressure loss, and minimized flow deviation. They effectively improve the working efficiency and pressure stability of hydraulic pumps and are suitable for high-precision hydraulic systems.

六、Swash Plates

The swash plate is a key load-bearing and angle-control component in hydraulic pumps. Our swash plates are made of high-quality alloy steel and processed through multiple procedures, including through-hardening, precision grinding, and finish grinding to final dimensions.

The product features high hardness, impact resistance, wear resistance, and low deformation tendency. The plate surface is flat and smooth, with accurate angle control. Under long-term high-pressure reciprocating loads, it is highly resistant to deformation and wear. After assembly, it can precisely control the pump displacement angle, ensuring stable displacement and accurate operation. It is suitable for various standard and heavy-duty hydraulic pump applications.

七、Drive Shafts

The drive shaft is the core power transmission component of a hydraulic pump. Our drive shafts are made from high-strength alloy materials and manufactured through a complete set of precision processes, including forging, precision turning, precision grinding, and quenching and tempering heat treatment.

The product features high coaxiality, uniform hardness, and high torsional strength, with excellent fatigue resistance, fracture resistance, and wear resistance. It can reliably withstand high-frequency and high-torque power transmission, operating without vibration or deviation. This effectively helps prevent shaft breakage, uneven wear, and power transmission loss, ensuring continuous and stable power output of the hydraulic pump.



八、 Valve Blocks

As a core component for oil circuit control in hydraulic systems, our valve blocks are available in high-quality aluminum alloy or cast iron materials. They are machined through precision CNC drilling, groove milling, chamfering, and full deburring. The oil passages are accurately formed, with smooth inner walls, and are free of internal impurities and residual burrs.

The product features a well-designed oil circuit layout, high precision, excellent sealing performance, and strong pressure resistance. It can accurately control the on/off function, flow rate, and pressure of hydraulic oil circuits. With strong assembly compatibility, it is less prone to external oil leakage, internal cross-leakage, and oil circuit blockage. It is suitable for various hydraulic pumps and hydraulic control systems, delivering stable and reliable operation.

Product Summary

Our full range of hydraulic pump components is supported by advanced precision machining equipment, mature dedicated processes, and strict quality control standards. Every stage is carefully controlled, from raw material selection to finished product machining.

The products feature **high precision, strong wear resistance, low deformation tendency, wide compatibility, and long service life**. They can serve as reliable replacements for OEM parts and effectively help solve common hydraulic pump issues such as pressure loss, wear, abnormal noise, vibration, and insufficient output power, providing reliable support for the stable operation of various hydraulic equipment.