



Note on Working Principle of Hydraulic Pump

Shengnan Tang*

Department of Mechanical Engineering, Jiangsu University, Zhenjiang, China

DESCRIPTION

The hydraulic pump, which is the heart of a hydraulic system, is a mechanical power source that converts mechanical power into hydraulic energy (hydrostatic power, that is, flow, pressure). It creates a flow with sufficient force to overcome the pressure caused by the load at the pump outlet. Mechanical torque is the product of torque and velocity, while hydraulic power is the product of pressure and flow rate.

When the hydraulic pump is operating, a vacuum is created at the pump inlet, pushing fluid into the inlet line from the reservoir to the pump, which is mechanically pushed into the pump outlet and hydraulic system.

The hydraulic pumps used in hydraulic systems can be hydrostatic or hydrodynamic. A hydrostatic pump is a positive displacement pump, while a hydrodynamic pump can be a fixed displacement pump or a variable displacement pump. In the case of fixed displacement pumps, the displacement (i.e. flow through the pump per pump rotation) cannot be adjusted. In the case of variable displacement pumps, the construction is more complicated, allowing the displacement to be adjusted.

Hydrodynamic pumps are more common in everyday life. All kinds of hydrostatic pumps operate on the principle of Pascal's law.

MECHANISM

The working principle of hydraulic pumps is based on the principle of positive displacement pumps. Hydraulic pumps are the main part of a hydraulic system that converts the mechanical energy of an engine or motor into hydraulic energy. Hydraulic pumps consist of pressure and flow rate to perform useful work.

The working principle of hydraulic pumps is the same for all other pumps. The pump creates a negative pressure at the inlet by mechanical action. This causes atmospheric pressure to push the liquid into the inlet of the pump. The pump then pushes the fluid into the hydraulic system. The pump contains two check valves. Check valve 1 is connected to the pump inlet so that

fluid can only flow in through the pump inlet. The check valve 2 is connected to the pump outlet and only allows fluid to escape through it. Pulling the piston to the left creates a partial vacuum in pump cavity 3. This vacuum keeps check valve 2 in place and atmospheric pressure pushes fluid through check valve 1 into the cylinder.

When the piston is pushed to the right, the movement of the fluid closes the check valve 1 and opens the outlet valve 2. The amount of fluid pushed away by the piston is pushed out of the cylinder. The amount of liquid that is pushed away by the piston during the discharge stroke is called the displacement volume of the pump.

Hydraulic pump maintenance

The need for hydraulic preventive maintenance is determined over time by the operating conditions of the various hydraulic components. For example, a service interval of 10,000 hours (about 14 months) is generally recommended for piston pumps. Below is the list of daily maintenance tasks.

- Check oil levels in power unit tanks.
- Check for temperature changes in the oil.
- Check the system for water or dirt in the oil.
- Check for leaks.
- Checking screws and pipe clamps.
- Verify pressure gauge reading.
- Monitoring the running noise of hydraulic pump and electric motors to identify the changes.
- Empty all valve panel drip pans.
- Check for possible leaks in valves by wiping an item clean before inspecting it.
- Keeping surfaces of pipes, components, and tanks always clean. Check with operators to determine if any maintenance is required.

Correspondence to: Shengnan Tang, Department of Mechanical Engineering, Jiangsu University, Zhenjiang, China, E-mail: tangsn6439@tim.edu.cn

Received: 25-Feb-2022, Manuscript No. JAME-22-16392; **Editor assigned:** 28-Feb-2022, Pre QC No. JAME-22-16392 (PQ); **Reviewed:** 16-Mar-2022, QC No JAME-22-16392; **Revised:** 21-Mar-2022, Manuscript No. JAME-22-16392 (R); **Published:** 01-Apr-2022, DOI: 10.35248/2168-9873.22.11.406.

Citation: Tang S (2022) Note on Working Principle of Hydraulic Pump. J Appl Mech Eng. 11:406.

Copyright: © 2022 Tang S. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.