

GETTING THE BEST FROM OUR HYDRAULIC SYSTEM

I.R. COOPER  
Sales Manager  
Industrial Hydraulics Ltd

How do we get the best from our hydraulic system? Like all equipment, hydraulics require servicing and this is the key to maintaining the performance of the equipment.

How do we service our hydraulic system? It is not just filling the tank with oil when necessary.

The hydraulic system should be topped up with the correct grade of clean hydraulic oil. Care should be taken in keeping the filling component clean so as not to introduce dirt into the system.

Every hydraulic system should incorporate filtration and with modern hydraulic filters these are usually full flow (that is, all the oil passes through the element) and of 10 micron nominal rating (10 micron is the nominal size of particles down to which the filter element will remove and retain from the oil). In conjunction with the filter, there may be a suction strainer on the inlet to the pump.

Filter elements should be changed on a regular basis, by monitoring the element condition indicator or on a time basis. Again cleanliness in changing the element is important.

Checks of the hydraulic system should be made at regular intervals, whereas filter condition and oil levels should be made daily when the system is warm. The following should be made on a time basis and/or when service checks on the rest of the machine are carried out:

1. For leaks, if found, they should be properly remedied which may mean a new fitting. These should be non galvanized and of the hydraulic type capable of withstanding the full system pressure.
2. For chafing or damaged hoses. These again should be replaced immediately before they fail at an embarrassingly inopportune moment. When replacing hoses on fitting, cleanliness is again very important. Hoses should be cleaned internally before fitting.
3. Ram shafts should be checked for scoring, chrome peeling or shaft packing leaking and if found, remedial action taken.

4. Pumps and motors should be checked for leaks on ports and shafts.
5. System pressures should be regularly checked using a good quality pressure gauge and the manufacturer's recommended working pressure maintained.
6. Where hydraulic pumps and motors are fitted with external drain lines the flow rate from these drains can be used to monitor the pump/motor performance. A drain test taken with the system running at the operating pressure each time, can be compared with the same test taken when the system was new and compared with the manufacturer's recommended leakage rate. When this leakage rate falls outside that recommended, it is time to overhaul that pump or motor. An overhaul at this point could mean some small remedial work and a seal kit, whereas if left, pump/motor failure would occur at an inopportune moment causing costly down time for the machine.

Lastly but probably the most important, get to know your hydraulic system. It would also be worthwhile engineers working with hydraulic equipment, attending a basic hydraulics course. These courses are run by reputable hydraulics companies and some technical institutes.

Along with the above routine maintenance, the components in the hydraulic system also should be routinely overhauled. How often should we overhaul the hydraulic components in the system? Unfortunately, this varies from system to system, depending on the conditions in which it is operating, the system design and the operating pressure. A guide for this period can be made from the recommended maintenance guide from the vehicle engine.

So even though we have maintained our hydraulic system, a fault has developed. When fault finding in a hydraulic system, carry it out systematically. If it is a faulty operation on one part of the system, then start at the component which is suspect and carry out a test on it to ascertain if it is operating correctly. If so, slowly move down the system towards the pump checking each component as you go. If you are not sure how to carry out fault finding or the fault is obscure call in an expert, it could save a lot of time and money in the long run.

For routine overhaul of hydraulic components, this is often best left to the experts. A reputable hydraulics company will be able to overhaul, repair and test the components prior to returning them to you.

The above covers our existing hydraulic system, how do we obtain the best from our proposed system? Here it is important to make contact in the initial stages with a reputable hydraulics company that can offer system design capability.

They will be able to assist you with not only the hydraulic circuit design and selection of componentry, but mounting details, where to place valving physically in the circuit and where and how to run pipes. They can recommend the size of the prime mover or the best place to power the pump from, the size of reservoir required and its design, filtration and in-take line sizes to the pump, plus many more important details.

Which way are hydraulics headed? We are likely to see higher system pressures with correspondingly lower flows and power sensitive systems, improving energy utilization.

There will be an increase in the use of hydrostatic transmissions in industrial and logging machinery. These transmissions are already in use in the latest generation of crawler tractors, thus enabling each track to have a fully variable speed including reverse with respect to the other track. This enables the machine to be driven in a curve or turned in its own length, eliminating the old clutch and brake system of skid steer.

The hydrostatic transmission offers the advantage of single lever/pedal control, the further you push the lever/pedal the faster it goes, bring it back to neutral and it stops, move it in the other direction and it goes in reverse. The further you move the lever/pedal in the reverse direction the faster it goes.

The hydraulic hydrostatic system does away with clutch/torque converter and the gearbox. The prime mover should be constant revving and controlled by a governor, thus if set right, optimum performance is always available from the engine.

One major advantage with a hydrostatic drive is that at vehicle stall, full torque is available at the driving wheels, unlike a clutch/gearbox set up where vehicle stall is also engine stall.

So what is a hydrostatic drive? A hydrostatic drive is a hydraulic pump and motor linked in a loop, the exhaust oil from the motor feeding directly into the pump inlet. The pump and motor are usually of reciprocating piston design, with the pump having variable displacement whilst the motor is usually fixed.

The hydrostatic pump has not only variable displacement, but the ability to reverse the direction of oil flow in the circuit without reversing the input rotation. A charge pump is also usually incorporated in the hydrostatic pump and its function is solely to keep the loop full of oil.

A hydrostatic circuit does not only offer us a step less drive with constant torque output, but will also give dynamic braking, although a standard braking system should be incorporated in a vehicle with hydrostatic drive.

Hydraulics offer an extremely flexible method of power transmission. The industry has not achieved its peak and the future will bring more applied hydraulics to industry.