

How to check the performance of an excavator's hydraulic pump?

White paper on heavy machinery inspection. Useful for pre-purchase inspection or to deepen knowledge of machinery in a fleet.

Some free *how-to* and *why-doing-it* explanations for inspections of used heavy machinery. Feel free to share the document. If you are interested in reading more about the topic, feel free to visit our Blog page which is linked at the end of the paper. There we post several knowledge-articles per month.

How to check the hydraulic pump?

How can I check if my excavator hydraulic pump is working well?

In the event that the hydraulic excavator does not have enough power or even when buying an excavator, it is useful to check whether the hydraulic pump has enough power. Normally, however, you do not have any equipment for measuring pressure with you. And don't forget that pressure alone is not a criterion for sufficient power. You would also have to measure the volume of the oil flow.



Hydraulic Pressure Testing during inspection of an excavator

So, what can be done to check the performance of the hydraulic pump?

An excavator usually has a so-called load-sensing pump. The pump's sensors constantly check the pressure and the oil volume demanded. The pump permanently adjusts the volume flow and the pressure to the requirements during work. To check performance, an experienced inspector will usually test whether the excavator can make three different working movements at the same time without slowing down the flow of one working movement. For example, lifting the boom, extending the arm and extending the bucket at the same time. The inspector must note whether there are one or more hydraulic pumps for the different components. Often the traction or swing drive has a separate pump.

Pressure test for comparison with the manufacturer's data

The type of test described so far is helpful if you do not have a pressure gauge available. However, for a more accurate test of performance, it is helpful being able to measure pressures. To do this, the inspector needs to connect a pressure gauge to the test ports and measure the pressures for the pump and the pilot pressure. The recorded data must be compared with the manufacturer's specifications.



Hydraulic-Pressure gauge for excavator testing

To test pressure, it is required to have gauges appropriate for the pump pressure. It needs to sustain at least 400 bar (5.800 psi). Modern gauges select automatically the correct pressure range.

How to measure swing bearing play?

Excavator swing bearing (slewing ring) play measuring

The swing bearing is one of the weakest points in the structure of an excavator. At this point, the stable undercarriage, the so-called X-frame, is connected to the superstructure. The superstructure rotates endlessly on this pivot. On a larger excavator, you will find a counterweight weighing perhaps 15 tonnes. It balances the whole machine and is designed to keep the machine stable and balanced with the arm extended and the bucket full. On the other hand, this means that when the bucket is empty and the arm is close to the machine, the rear side of the machine is loaded.

To ensure that everything runs well, the pivot bearing, also called the slewing ring, has several lubrication points. Ideally, these are supplied with grease of the right consistency by an automatic lubrication system.



Where the wear occurs on a slewing ring of an excavator

The rollers or rolls of the large bearing now run permanently over the running surfaces, generating wear through friction and pressure. At some point, the play becomes so large that machine safety is endangered. When inspecting a used excavator, it therefore makes sense to measure whether the play is still within the permissible tolerance.

How to measure it?

To do this, the slewing ring must be loaded once and then unloaded again after the dial gauge has been placed on it. The play is measured between these two states. Most inspectors for construction machinery know the procedure. Depending on the equipment of the machine, one must decide whether a filled excavator bucket is sufficient to achieve the load on the front, or whether additional weights are required. Also, the use of a hydraulic jack can be considered.



When to measure, cost for replacing?

Our inspectors have the necessary knowledge to carry out a measurement correctly. During used machine inspection process the inspector does a functional test. Experienced technicians can feel already at this stage if a measurement is required. After the measurement, we can help to decide whether the play is acceptable or whether you need to replace the slewing ring. The Liebherr R964 excavator pictured above had 5mm clearance across the front of the frame and 4.7mm across the side. It is not safe to continue working with this slew ring. Exchange will cost probably more than 12.000 \$

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