

fluid

DAS UNABHÄNGIGE TECHNIKMAGAZIN

ZUKUNFT

Wie Künstliche Intelligenz Werkzeugmaschinen wartet

14

HYDRAULIK

Wie Instandhalter Fehler bei einer zentralen Schmierstoffanlage vermeiden

18

MECHATRONIK

Taktilles Messen für weniger Maschinenstillstände

30

Druckluft

Parallelgreifer der Zimmer Group für sibirische Glattwalzanlage

08



Oil condition monitoring made simple

Effective oil condition monitoring helps to prevent machine downtime

Onboard measurement of fluid condition parameters in machines and processes is an important factor in hydraulic efficiency improvement. The monitoring of the oil condition does not have to be expensive and complicated thanks to new innovation from Hydrotechnik.

The keywords Oil Condition Monitoring or Predictive Maintenance in a time of IoT

is not a passing technical term. For the construction manager in the development of motors, machines and plant, the most important theme is well understood: causes of breakdowns should be prevented, recognition of maintenance errors, increase in runtime and optimisation of service intervals which thanks to modern oil condition sensors is all possible. The complexity of condition monitoring sensors can be daunting, to a lot of users but Hydrotechnik have developed the HySense® CX 197 easy to use system.

It uses Minimes® test points for safe easy connection through an intelligent suite of oil sensors to the user friendly MultiSystem 5070. For the inexperienced user, the acquisition of oil parameters, detection of oil property deviation and condition evaluation is possible.

Oil condition analysis

Due to cumulatively high costs and long waiting times, laboratory oil condition analysis is not always suitable. The investment for maintenance and upkeep is offset against oil changes and

unplanned machine breakdown is often not taken into consideration. Compare this against premature oil change to avoid plant disruption, downtime or damage. With current technical possibilities, a condition monitoring of the hydraulic system is more practical and cost effective long term. The combination of several parameters such as particle counting, moisture, conductivity, viscosity, permittivity and temperature present many users with a huge hurdle for correct interpretation of the data.

Dirt particles in hydraulic oil

Precise lubrication and hydraulic systems work in micrometre clearance range so that even the tiniest dirt particle can cause an increase in energy consumption, reduction in power efficiency and often breakdown due to friction and wear. This causes not infrequently unplanned change of the hydraulic oil or the replacement of sensitive components. Contamination of the hydraulic oil can have several consequences including the long-term reduction of the operating performance of the equipment. Basically, one has to differentiate between oil contamination already present or caused as a result of the operation.

For the determination of hydraulic oil cleanliness, the experts consider the number and size of dirty particles in a 100 ml volume. The shape and quality of the particles are not differentiated. For a meaningful comparison of the contamination grade, the cleanliness class classification Standard according to ISO 4406 is most commonly used.

The CX 197 measuring kit is an intelligent measuring system fitted with a particle monitor Patrick, a viscosity sensor CV 100 and a moisture sensor CM 100. The data can also be read individually from the sensors.



The Standard uses a cleanliness classification of all particles larger than 4, 6 and 14 microns in size. The result of the allocation is cumulative meaning that the quantity given for six micrometre is included for all particles larger than 14 micrometre. The result is compounded into a series of coded numbers for the three particle sizes (example 14/11/8). A permanent oil condition monitoring thereby assists not only to keep an eye on the viscosity or temperature but also the contamination of the oil in question.



Together with the measuring device MultiSystem 5070, different measurement data can be evaluated and the changes in the oil condition can be displayed.

Viscosity, Permittivity, Moisture and Conductivity

In addition to the particle contamination, other parameters are also analysed. The viscosity is a further important parameter where long running time and increased temperature causes oil oxidation which increases the viscosity where as a result, there is a build up of polymer and acid. The viscosity measurement is carried out at a comparable temperature compensated value of 40 degrees Celsius. Moisture contaminates the oil and is equally detrimental as corrodes metal surfaces and can (as free water molecules) freeze at low temperature. Regular oil condition monitoring helps to keep an eye on these parameters. Additionally, the sensor measures the permittivity (dielectric) and the conductivity. The permittivity is a parameter which describes the dielectric behaviour of the oil (meaning its polarity).

It depends on a lot of properties such as the amount of additive, moisture content or the oil type. Oils have a very low conductivity in the order of nS/m. Conductivity is an indicator to determine changes in the oil characteristics.

Permittivity of hydraulic oil

Oil-type	Designation	Permittivity
Mineral oil	HL, HLP, HLPD, HVLP, HVLPD	2,0 - 2,4
Polyalphaolefins (PAO)	HEPR	2,3 - 2,9
Synthetic esters, vegetable oils	HEES / HETG	2,9 - 3,7
Polyglycols	HEPG	> 5
Phosphate ester	e. G. HFD-R	6 - 7

Connected to hydraulic system

Hydrotechnik has developed the HySense® CX 197 solution. In the first step, the basic information of the hydraulic installation such as the oil type used,

the operating temperature and the parameter limits can be configured in the MultiSystem 5070. In the second step, the unit is connected to the operating hydraulic installation using the Minimess® test points. The system stores the oil condition data which can be evaluated at a later time. For the user, a traffic light indication is used to provide a visual guide as to the oil condition. In addition to this visual display, there is the possibility to display all the parameters in detail. On the basis of the comparison of the measured values and the initial values, the system is able to provide information on changes to the oil characteristics. The oil condition analysis and monitoring with this solution is made simple to evaluate. It is also suitable as proof of quality for delivery and rental machines.

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WHAT MAKES AN ACHIEVEMENT POSSIBLE
CAN'T ALWAYS BE SEEN



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KELLER unplugged!

Das Internet der Dinge beginnt mit einem Sensor.

Drucktransmitter und Pegelsonden mit digitalen Schnittstellen sind wie geschaffen für IoT-Lösungen.

Niedrige Versorgungsspannungen und optimierter Stromverbrauch, ideal für batteriebetriebene Funk-Lösungen.

Druckbereiche: 0,3...1000 bar / ATEX-Zertifizierung / Druck- und Temperaturinformationen

D-Linie Drucktransmitter

- I²C-Interface bis 5 m Kabel
- 1,8...3,6 V (optimiert für Knopfzellen)
- 20 µW @ 1 S/s und 1,8 V
- Gesamtfehlerband ±0,7 %FS @ -10...80 °C

X-Linie Drucktransmitter

- RS485-Interface bis 1,4 km Kabel
- 3,2...32 V (optimiert für 3,6 V Lithium-Zellen)
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