SPRING 2023

OELCHECKER

HOT TOPIC

9 golden rules for storage + handling of lubricants

PARTNER FORUM

Best solution. Smart recycling. Doppstadt shredding technology

OELCHECK INSIDE

New and only at OELCHECK: Automated visual assessment!

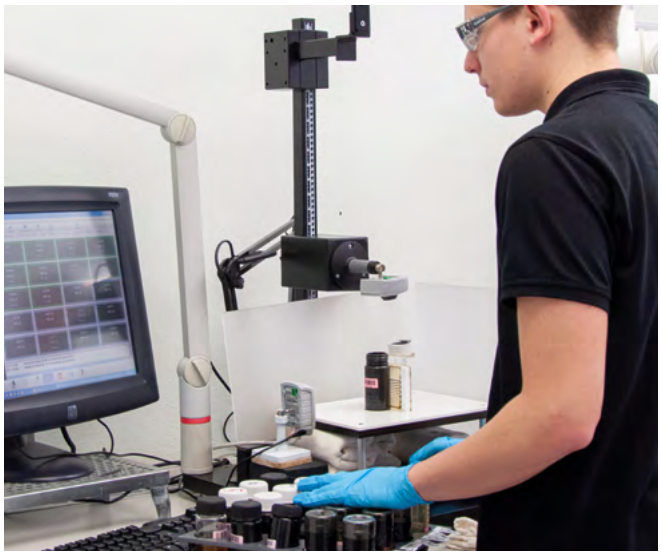
AND MUCH MORE...

PRECISE, FAST AND OBJECTIVE

AUTOMATED VISUAL ASSESSMENT

This test device is unique! It was developed jointly by **OELCHECK** and **HF-Innovation GmbH**, which manufactured it according to our requirements. The innovative device ensures an even more objective assessment of the samples. It handles several work steps in one process and relieves our laboratory staff. The new automated visual assessment has already examined the first test samples and is expected to start full operation by summer this year.

Until now – manual, elaborate and subjective



All samples received by OELCHECK are still visually inspected by our laboratory technicians before further investigations are started and subjected to the so-called "crackle test" for the rapid detection of water. To do this, the sample bottles are first placed upside down, i.e. on the lid, stored upright. Any foreign substances in the oil fall to the white inner surface of the lid and are easily recognisable when the bottles is quickly turned over and opened. The laboratory technician's first diagnostic view therefore immediately falls on the white inner surface of the lid seal, in which abnormalities in the lubricant are visible, e.g. in the form of particles. The inside of the lid and the well-lit, open sample bottle are captured by a camera. After the photograph is taken, an initial assessment is made of the appearance of the oil sample, its colour and any sediments in the lid by means of a comparative assessment.

The previous visual assessment is not only made up of many elaborate steps, but is inevitably subjective, because people do not all see e.g. colours the same.

In the near future – automated, fast and objective

Our new colleague, Automated Visual Assessment, will be installed in the OELCHECK laboratory in the next few weeks. The interior of the device contains a variety of high-quality camera systems, special lighting equipment, motors, grippers, heating elements for the crackle test and a computer-assisted image evaluation. In the future, the new test device will take over several tasks of the laboratory technicians.

The system holds up to 80 sample bottles per sequence and operates in multiple steps:

- A gripper takes one of the sample bottles on its lid and transports it to the first camera system. Here, the barcode of the sample is scanned, a photo of the sample bottle is taken and the various parameters, such as colour, turbidity and filling level, are automatically read out.
- The sample is now transported to the next photo station. The bottle is rotated and the lid removed so that the inside of the sample lid and any particles that may be deposited here are visible. A computer-assisted image evaluation reads out the degree of contamination. Photos are also taken from a bird's eye view of the inside of the sample lid and of the opened bottle. As before, these photos will be included in the laboratory report for the customer.
- A pipette system takes a small amount from the sample and subjects it to a crackle test, a fast method of detecting free water. An oil drop (0.2 ml) is sprayed onto a 180 °C hot plate.

If the droplet contains more than 0.1 % or 1,000 ppm of water, it escapes from the oil with a crackling sound, often in conjunction with steam bubbles. Previously, this reaction was evaluated optically and thus subjectively by a laboratory technician, but now a camera system goes into action. It records the sequence of the reaction and evaluates it objectively.

- From the remaining sample residue in the pipette, a part is placed in a tube for subsequent IR spectroscopy. The pipette is then cleaned in a washing station and dried with compressed air before it returns to action for the next sample.

During the crackle test and preparation of the sample quantity for IR spectroscopy, the sample bottle is closed again with its lid and returned to the batch by a gripper.

An idea became reality

We had the idea of automating the visual assessment for a long time. The thought of this just wouldn't let us go. In 2021, we finally contacted HF-Innovation GmbH. The company from Hörstel in Westphalia develops and supplies complete semi-automatic and fully automatic solutions for laboratory systems from preparation to fully integrated analysis. We had already had good experience with HF-Innovation GmbH in the complete automation of the determination of the PQ index.

And after initial consultations, it was soon clear this time too: We are tackling the new project together.

However, it was a long journey before the device became a reality. Countless real samples were repeatedly tested, values compared and improvements made. After installation in the OELCHECK laboratory, all processes must be precisely adapted and the device must be integrated into our laboratory information and management system, LIMS for short. Our LIMS developed by OELCHECK IT combines a wide range of different, coordinated processes. It captures all examination results and controls workflows.

The new Automated Visual Assessment is still in the test phase, but the device is scheduled to start normal operation this summer. Initially, it will provide precise and objectively determined values for some test procedures, such as hydraulic and gear oils. At the same time, OELCHECK laboratory technicians no longer need to carry out some time-consuming work, especially the manual opening and closing of many hundreds of sample containers per day.

AGGRESSIVE ACIDS IN GAS ENGINE OILS

AN ADDITIONAL TITRATOR FOR DETERMINING THE i-pH VALUE

There are now 20 titrators in use in the OELCHECK laboratory. One of them is a Mettler Titrator Excellence T7. It has proven itself in the determination of the i-pH value of gas engine oils. A second similar device has now been added as a replacement for a predecessor model. The new titrator enables fast operations and also delivers absolutely precise results. Changing samples, complex titrations* and cleaning steps are all automated and facilitate the work of our lab technicians.

20 titrators are currently operated by our laboratory technicians in the OELCHECK laboratory.

The 20 titrators are mainly used to determine the base number (BN), acid number (AN) and water determination by means of Karl Fischer titration. The two Excellence T7 titrators are specialised in the measurement of the i-pH value (initial pH value). This is an important parameter for oils from gas engines that are operated with biogas, biomethane, sewage gas or landfill gas, among other things. Gas engine oils are often so heavily loaded with acids that they can no longer neutralise them sufficiently and therefore cannot protect the engine from their attacks.

Apart from the base number (BN) and acid number (AN), OELCHECK therefore determines the i-pH value of these oils. It provides crucial additional information about their acid load.

The AN specifies the quantity of acids in the oil that are produced during engine operation and increase over time. The BN provides information on whether alkaline active ingredients are still present in the engine oil in order to be able to neutralise acids that have formed. In the case of gas engine oils, the acid-base balance must be considered particularly closely. Even if the BN shows that alkaline active ingredients are still present in the gas engine oil, it may have already been enriched with acids, which primarily come from burning the impurities of the gases.

The i-pH value proves even more accurately the exposure of a used oil to strong and therefore corrosive acids. Even the smallest acid quantities can lead to a measurable reduction of the i-pH value, even if the value of the AN has not yet increased significantly. On the other hand, an increased acid number can be alarming in itself, while only a small change in the i-pH value demonstrates that it is predominantly weak acids which are less corrosive

Safety in a three-pack: By determining the BN (base number), AN (acid number) and i-pH value, OELCHECK analyses provide precise information on the acid-base balance of gas engine oils.

** Titration is a procedure used in quantitative analysis in chemistry. A known substance, such as sulphurous acid, the concentration of which in the oil is unknown, is reacted in a chemical reaction using a standard solution, the concentration of which is precisely specified.*