

CONDAT has been designing lubricants dedicated to the steel industry for over 25 years: high performance technical greases and fire-resistant hydraulic fluids.

CONDAT's ambition is to offer the most efficient solutions to both increase the productivity of its customers and reduce their energy and resources consumption. This is what is the company calls 'Responsible Performance'.

According to CONDAT, its CONDAT MILLENNIUM greases and its CONDAT D fluids offer a very high level of performance. However, to go beyond the plain commercial claim, the company has solicited an independent laboratory to conduct tests on its CONDAT D range and find out how hydrolysis resistance can affect the product performance of fire-resistant oils. Scientific evidence to follow!

Water – a big issue for steel workshop managers

All workshop managers are looking to minimise their maintenance costs and want to optimise the lifetime of their lubricants batch. Indeed, a huge quantity of hydraulic oils are at stake as a tank can contain between 2,000 to 10,000 litres.

One option to increase drain intervals is to monitor carefully the pollution of the fluid in order to increase its operating lifetime.

In workshops, the phenomenon of condensation may be important.

Condensation occurs mainly because of the temperature difference between the hot point on the circuit and the tank or exterior humidity entering the circuit through the air filtered from outside by the air filter.

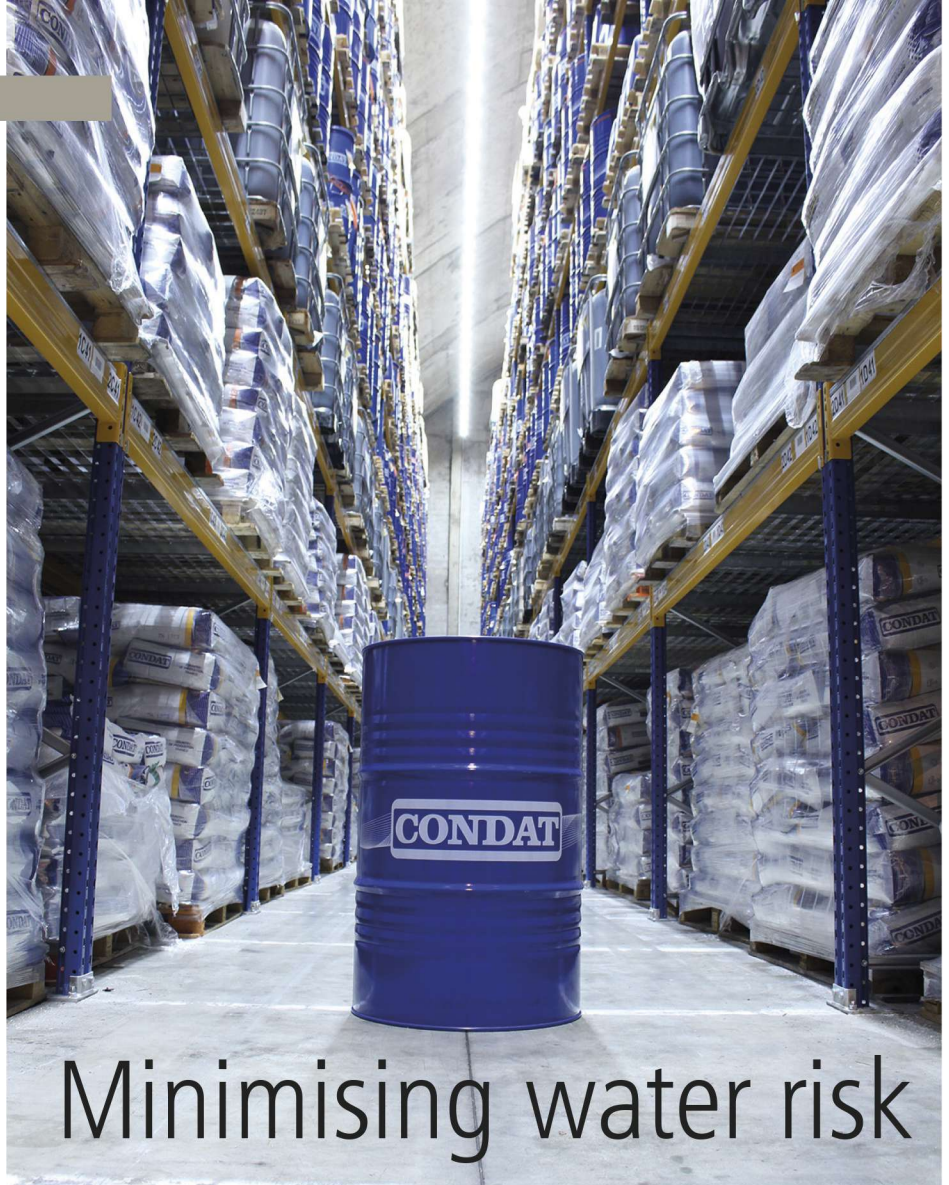
Ester-based HFDU fluids are known to be sensitive to water, which plays a major role in the degradation of the fluid and hence on its operating life time.

In order to monitor water content as closely as possible and to minimise draining, CONDAT advises regular analysis of the fluids in service.

Such analysis should be done at least annually in order to control the water content and other pollutants.

However, the most effective way to reduce water impacts on the operating lifetime of the fluid is to design water-resistant products.

The objective is to keep the fluid in service and in good condition as long as



Minimising water risk

CONDAT, an established designer of lubricants dedicated for use in the steel industry – such as high-performance technical greases and fire-resistant hydraulic fluids – has commissioned independent laboratory analysis of its CONDAT D range of products. **Severine Bourgeois*** runs through the results

possible to save on the lubricants purchase budget!

Hydrolysis – or how water impacts esters

To put it simply, water reacts with the ester to form an acid.

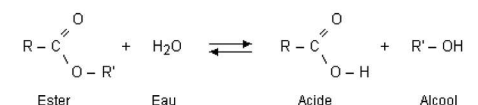
The acid is a more reactive molecule and with high temperature and oxygen, the acid molecules will start to react with the ester molecules.

Once initiated, a chain reaction will take place, the ester-based molecules will be broken and highly unstable and they will react with each other, creating bonds between different molecules and generating acidic by-products.

Looking at an analysis results sheet, this

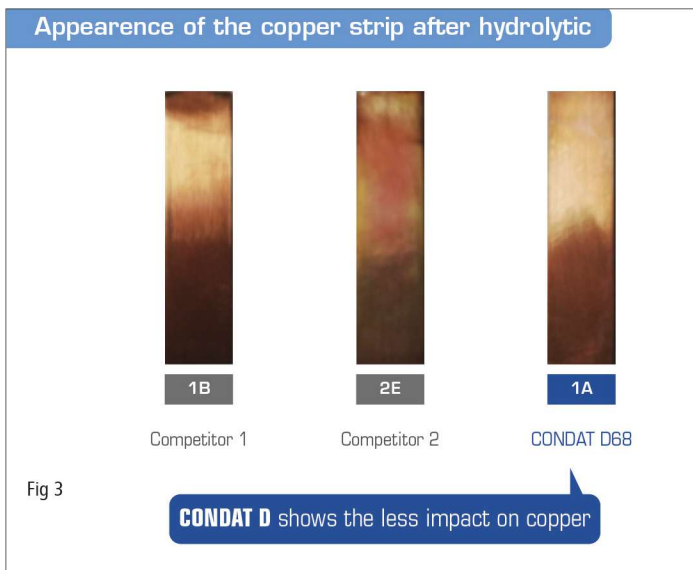
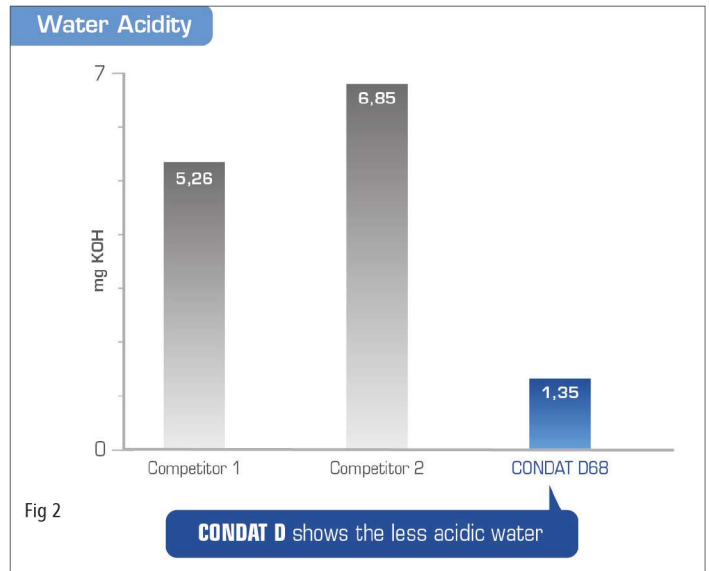
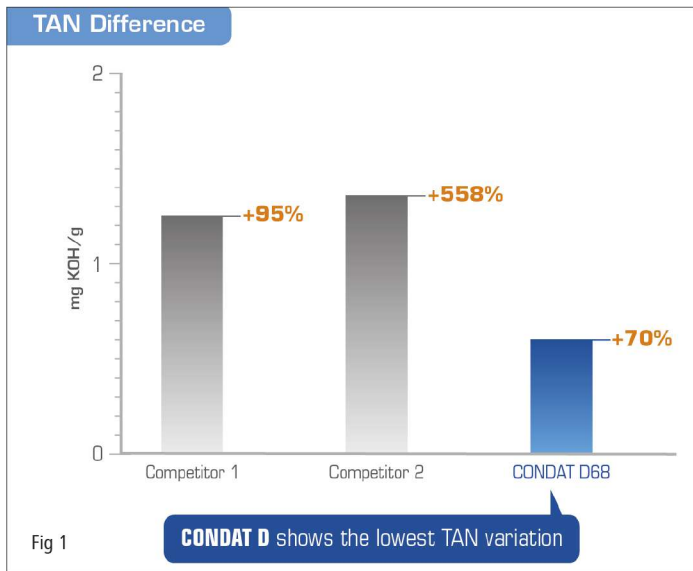
will translate into an increase in viscosity, in the Total Acid Number* (measuring the acids in the fluid). These acidic components will tend to dissolve in the water phase and decrease its pH.

They also tend to be more aggressive to metal, maybe creating corrosion.



Hydraulic fluids that become unstable due to the hydrolysis process form acidic and insoluble contaminants which can lead to hydraulic system malfunctions because of corrosion, valve sticking, or a noticeable change in the viscosity of the fluid.

* Chemical engineer and marketing specialist, CONDAT



Measuring water resistance

CONDAT recently commissioned an independent laboratory to obtain an impartial opinion on the hydrolysis resistance of its CONDAT D fluids. The laboratory was asked to measure the resistance to hydrolysis and oxidation on CONDAT D68 and two equivalent products from the market.

The test method ASTM D2619 differentiates the relative stability of hydraulic fluids in the presence of water under relatively high temperature and the presence of a copper acting as a catalyst to initiate the oxidation reaction.

Here are the results of the independent laboratory: **Figs 1 and 2** (TAN Difference and Water acidity) show how the choice of the esters is important.

Competitor 2 is an HFDU based on natural-based esters: After only 48 hours, TAN variation and acidity of the free water

is significantly higher showing that the hydrolysis process has already started to degrade the fluid. This means more acidic compounds were created by the hydrolysis attack of the water on the esters. Those acidic compounds will create an instability and quicken the oxidation process.

But even with synthetic ester-based fluid, Competitor 1 and CONDAT D68 behave very differently meaning that the choice and selection of the raw materials is of prime importance; and this is after only 48 hours of testing.

After a few weeks or months, the hydrolysis process will lead to an increase in viscosity, meaning that the initial setting for a viscosity of 68 cSt will no longer be valid. Standards accept a $\pm 10\%$ change in viscosity (74.8 cSt is the upper limit). If viscosity change is over 10%, cavitation may occur leading to a lack of lubrication. This can impact the overall performance and

productivity of the system and can damage the hydraulic parts fed by the hydraulic oils.

Damage can also be created by increased corrosion as the water gets more acidic (see **Fig 3**). Condat D68 is less affected by corrosion.

Overall, it is important for workshop managers in the steel industry to regularly control the water content of their fire-resistant hydraulic fluids in order not to damage their equipment and maintain their level of productivity. The use of a fluid resistant to water damage and that shows high hydrolysis resistance can help a lot in this task.

CONDAT D formulation

The good results achieved by CONDAT D fluid in relation to hydrolysis resistance can be explained by the high-quality level of the product's formulation. CONDAT has very stringent requirements regarding the quality

and the type of the synthetic esters used in CONDAT D formulations.

Other characteristics besides hydrolysis resistance are important for the product's success, such as high flash point (also depending on the quality of the synthetic esters), a high 'additivation' level to offer excellent anti-wear behaviour and equipment protection.

If you get a better viscosity stability during the product's lifetime and a better TAN evolution, it means:

- ✓ A constant lubricity during temperature changes
 - ✓ A higher oxidation resistance
 - ✓ A longer life of the product in use:
- overall, CONDAT D products last 30% longer than some market references.

Conclusion

As a premium fire-resistant hydraulic fluid, CONDAT offers steel industry operators the opportunity to make savings on their lubrication budget and reduce maintenance costs. Besides high quality products, CONDAT provides support and expertise,



though lubricant analysis follow-up and interpretation, installation auditing and counselling.

CONDAT also offers complementary services in order to take all preventive actions that will save time and money. Looking for a strong partnership with its customers, but also with the steel industry's main actors and OEMs, CONDAT's philosophy is based on four points:

- Safety for people and equipment
- Longevity and protection of the machines
- Optimised maintenance costs
- Respect of workers and the environment with biodegradable and non-toxic lubricants.

For further information, contact the CONDAT team at info@condat.fr or log on to www.condat.fr. ■