

ECOCOOL / ECO CUT

**Water-miscible / non-water-miscible
Metalworking Fluids**



LUBRICANTS.
TECHNOLOGY.
PEOPLE.



MOVING YOUR WORLD

FUCHS LUBRICANTS GERMANY

We don't just develop lubricants. For highly complex challenges in a wide range of industries, we develop innovative lubricant solutions that enable the mobility of tomorrow. Our goal: to keep our customers' world in motion. Efficient, sustainable, reliable. Today and tomorrow.

What can we move for you?

FUCHS LUBRICANTS GERMANY

Facts and figures

Company: FUCHS LUBRICANTS GERMANY GmbH, a company of the FUCHS Group

Locations: Mannheim, Dohna, Kaiserslautern, Kiel and Wedel; approx. 1,400 employees

Product range: A full range of more than 3,000 products for all application areas

Certifications i. a.: ISO 9001, IATF 16949, ISO 14001, ISO 45001, ISO 50001, ISO 21469, HALAL, KOSHER (detailed certifications at www.fuchs.com/de/en)

Gate-to-Gate CO₂-compensated**

FUCHS LUBRICANTS GERMANY is a subsidiary of FUCHS SE, the world's largest independent supplier of lubricant solutions. Around 1,400 specialists at the headquarters in Mannheim and the sites in Kaiserslautern, Wedel, Kiel and Dohna work with dedication on innovative lubricant solutions that enable the mobility of tomorrow.

The high level of technical consulting expertise combined with the largest, nationwide network of its own technical contacts makes FUCHS LUBRICANTS GERMANY a reliable local partner. A comprehensive product range, supplemented by digital offerings and Smart Services, as well as many years of lubricant expertise and a high level of research competence are the foundations for the innovative FUCHS lubricant solutions. They reduce wear and energy consumption, extend the running times and service life of machines, and thus keep the world moving - from industrial motors and e-cars to wind turbines and washing machines. FUCHS LUBRICANTS GERMANY is certified according to a wide range of standards and, as a technology leader and development partner, places the highest demands on quality management.

Customers in all industries benefit from this quality management: automotive suppliers and OEM, mechanical engineering, metal processing, mining and exploration, aerospace, energy, construction and transport, agriculture and forestry, as well as the paper, steel, metal, cement, forging and food industries, but also qualified lubricant dealers, car dealerships and workshops.

MOVING YOUR WORLD

*Gate-to-Gate Scope includes GHG-Protocol Scope 1, 2 and selected Scope 3 emissions (water, waste, business travel, commuting)

TIME to ACT

Renewable, bio-based, recycled – building the circular economy.



TIME to ACT

FUCHS has committed to becoming climate-neutral by 2040.

To achieve this goal on time, we need to act now, employing our strongest sustainability instrument yet: **Advanced Circular Technologies** or **ACT**.

ACT is our response to the challenge of completely transforming our value chain from linear to circular without compromising on performance.

Our first step takes place right at the start of the value chain: we begin by successively replacing finite raw materials with renewable, bio-based, or recycled ones and by ensuring that everything that leaves our factories can be effectively recycled.

In short, future lubricants could be based on birch bark instead of crude oil, for instance. Yet this is just the first step on our path to the circular economy.



WATER-MISCIBLE METALWORKING FLUIDS

The demands placed on a cooling lubricant have grown considerably in modern manufacturing. As part of Industry 4.0, the entire value chain of man, machine, systems, logistics, and cooling lubricant is to be networked and optimized in order to enable largely self-organized production with the help of modern information and communication technology. This requires recording and evaluating cooling lubricant measurement data online and implementing appropriate control measures. In order to be able to analyze the measurement data with sufficient accuracy, highly stable cooling lubricants are needed.

Safe, economical, and sustainable to use

FUCHS is the specialist for metalworking. Our water-miscible cooling lubricants are safe to use and comply with all legal requirements, enabling risk-conscious application. The sustainability of our ECOCOOL products is taken into account as early as the formula development stage. FUCHS cooling lubricants therefore ensure a long service life, even with boron-free products.

FUCHS cooling lubricants are:

- Free from nitrosatable secondary amines
- Free from nitrite
- Free from hard complex formers
- Skin-compatible
- Free from chlorine, zinc, and heavy metals
- Sustainable
- Economical

For ECOCOOL users, this means greater safety at the workplace. ECOCOOL lubricants are also extraordinarily long-lasting and economical to use. That lowers operating, maintenance, and disposal costs. An adapted selection of ingredients reduces skin stress even with increased pH values.

Optimal technical properties

FUCHS cooling lubricants meet technical requirements and make manufacturing processes more efficient. ECOCOOL products guarantee

- Optimum cooling and rinsing effects
- Outstanding lubricating performance
- Highly stable wear protection
- Effective corrosion protection
- Low foaming behavior
- Good material compatibility
- Processing of innovative materials
- Good high-pressure stability

For ECOCOOL users, this means greater process safety so that production processes run safely, effectively, and efficiently, and expensive machine downtimes can be avoided.

Worldwide availability

The global presence of our customers means that cooling lubricants have to be globally available. This means that all raw materials have to be registered according to the respective chemical regulatory requirements in the individual countries. FUCHS provides water-miscible cooling lubricants under the ECOCOOL GLOBAL name, which can be produced worldwide with the same formulation. This means that users can also use standardized production processes worldwide for cooling lubricants.

New cooling lubricants with a future

The current discussions about ingredients in cooling lubricants, such as boric acid, formaldehyde depot substances (FAD), dicyclohexylamine (DCHA), and 2-aminoethanol (MEA), make the risk assessment of cooling lubricants in the context of occupational health and safety extremely difficult. As such, there is strong demand for high-performance cooling lubricants without risky ingredients.

New and future generations of ECOCOOL cooling lubricants fulfill the legal requirements and those under discussion from the current perspective. They are:

- Free from boron
- Free from formaldehyde depot substances
- Free from 2-aminoethanol (MEA-free)
- Free from dicyclohexylamine (DCHA-free)

What is more, these products exhibit the high buffering that is typical of cooling lubricants containing boron and they are particularly low in odor, both as a concentrate and in the application concentration.



New synthetic cooling lubricants set new standards

The new high-performance synthetic cooling lubricants of the ECOCOOL S range offer an alternative to oil-based products. Intelligently combined anticorrosion agents and polymers have raised these synthetics to the performance standard of oil-based cooling lubricants, significantly expanding the range of applications. The new synthetics also shine under extreme conditions. Stain-critical aluminum alloys, as well as steel materials can be machined with virtually no foam generation. Whereas oily residues used to have to be removed by additional washing of the parts, in many cases this costly after-treatment can now be dispensed with. In addition, the elastomer compatibility and insufficient corrosion protection behavior of conventional synthetic cooling lubricants has been improved through the use of oil-comparable polymers.

Application experience to date proves the strengths of the ECOCOOL S series:

- High degree of corrosion protection
- Completely foam-free
- Leaves behind no sticky residue
- Outstanding coating and rinsing properties
- High lubricating performance.

During application, this guarantees

- Excellent process safety
- Excellent efficiency.

The world of aqueous processing fluids is changing and calls for visionaries with the courage to reform. Make use of the benefits of FUCHS ECOCOOL lubricants for your manufacturing processes.

Boron-free water-miscible metalworking fluids – Selection guide and notes

Product	Water mixed fluid type	Mono-ethanol-amine free	Cast iron	Steel	Aluminium Si 7–12	Aluminium Si 0.5–1	Non-ferrous metals	Special materials	Mixing water °dH	Comments
A new generation of fully synthetic products										
ECOCOOL S-FC VW	Solution	–	●●●	●●●	●	○	○	○	5-20	High-performance synthetic for grinding and machining; outstanding foaming behavior in soft water
ECOCOOL GLOBAL S-240	Solution	x	●	○	○	○	○	●●● Composite materials CFK/GFK	0-20	Special product for CRP/GRP processing
ECOCOOL S-CO 5 BF	Solution amine-free	x	○	○	○	○	●	●●● Hard metal	5-20	Special product for hard metal processing
ECOCOOL S-G2	Solution	x	○	●●	●●●	●	○	●●● Aero Al, galvanized materials	0-20	Special product for processing galvanized pipes and profiles, and for processing stain-critical aluminum
Semi-synthetic products										
ECOCOOL GLOBAL 1000	Milky emulsion	x	○	●●●	●●●	●●●	●	●●● Nickel-base alloys Titanium	5-20	High-performance cooling lubricant for high-temperature resistant materials and stain-critical aero aluminum; generates long tool service lives and excellent surface qualities
ECOCOOL FERROSTAR MBF	Microemulsion	x	●●●	●●●	●●	●	○	○	5-20	Check stain-critical aluminum for staining
ECOCOOL MACH 300	Milky emulsion	x	●	●●●	●●●	●●●	●	○	5-20	Multifunctional cooling lubricant with outstanding performance
ECOCOOL FC 11	Microemulsion	–	●●●	●●	●	○	○	○	5-20	Special product for cast and steel processing with high corrosion protection
ECOCOOL 2516 MG-DC	Milky emulsion	x	○	●●	●●	●●	○	●●● Mg	15-200	Special product for magnesium machining; prevents residues
ECOCOOL AFB 300	Milky emulsion	x	●	●●●	●●●	●●●	●●●	●●● leaded nonferrous metal	5-20	Multifunctional cooling lubricant especially for leaded nonferrous metals; prevents lead soap formation
ECOCOOL VHCM-1K	Microemulsion	–	●●●	●●	●	○	○	○	5-20	Microemulsion with good service life and low consumption
ECOCOOL AFC 1515 LC	Milky emulsion	x	●●	●●●	●●●	●●●	●	● Ti-Cr-Ni	5-20	Multifunctional cooling lubricant; can be used to process a range of materials

○ unsuitable ● suitable ●● well suitable ●●● very well suitable – no x yes

Other products upon request.



NON-WATER-MISCIBLE METALWORKING FLUIDS

The right cooling lubricants ensure the best possible machining performance and excellent surface properties. However, this performance is also influenced by their compatibility with the other lubricants used. Well-matched lubricants are crucial here.

Increasing productivity while also considering the growing environmental and economic requirements is the most important criterion for maintaining international competitiveness in the metalworking industry. Cost analyses have shown that cooling lubricants make up a significant portion of overall manufacturing costs.

FUCHS ECOCUT and PLANTOCUT non-water-miscible high-performance cooling lubricants for metalworking are manufactured according to the latest research results. FUCHS supports its customers with intensive and extensive research and development activities by feeding its practice-based results directly into the development of new non-water-miscible cooling lubricants.

ECOCUT and PLANTOCUT lubricants comply with current legislation and meet all the requirements for ensuring economical and cost-effective processing.

They offer

- **Good cooling performance**
- **High lubricating power**
- **Good rinsing properties**
- **Active improvement of machining performance**
- **High level of safety for the environment and health protection.**



In conjunction with manufacturers, users, developers, and researchers, we successfully build synergies and create new product and process innovations that drive forward the development of cutting-edge lubricants.

Professional consultation

Our experienced engineers are highly trained to provide expert on-site advice on product selection and the appropriate service, with the aim of shortening process times, optimizing costs, tool life, and process efficiency.

Local and global availability

Cooling lubricant technology needs to adapt to the demands of the global industry. Our global FUCHS Team ensures that the selected products are available to you in other countries around the world in the same quality.

Industry-specific solutions

With ECOCUT and PLANTOCUT, we also offer industry-specific solutions for branches such as the medical sector. Materials used in medicine make the toughest demands on cooling lubricants, particularly in terms of lubrication performance and material compatibility. With ECOCUT and PLANTOCUT, FUCHS offers specially tested, non-cytotoxic coolants for medical technology.

The right products

We have the right cooling lubricant for every machining process in the metal-cutting industry. Ask us, we will be happy to support you

Special product solutions: low-emission cutting and grinding oils



Better for people, better for companies

With FUCHS low-emission oils, we solve health problems caused by the use of conventional cutting oils with high levels of atomization and evaporation. Our tried and tested high-performance products from the low-emission series impress with their outstanding efficiency and low emissions.

When using non-water-miscible cutting and grinding oils in metalworking, emissions are virtually unavoidable during machining processes such as automatic processing, grinding, turning, threading, milling, deep drilling, and broaching.

With the help of special additive technologies, our research and development laboratories have developed low-emission products that are particularly low in oil mist and evaporation. The use of carefully selected base oils reduces evaporation.

Vapors in particular are not contained by the most commonly used separators, which means that they are released back into the room via the clean air duct, unless an external exhaust air system is available.

The special additives used in product manufacturing help to significantly reduce the oil mist produced during machining processes.

The low-emission ECOCUT and PLANTOCUT product ranges offer twofold safety: they keep the breathing air and work area extremely clean and they reduce the risk of fire and explosion in accordance with BGI/GUVI 719.

This provides the following benefits:

- Improved health protection through better air
- Reduced risk of fire and explosion
- Long maintenance intervals for oil separators
- Low consumption.

ECOCUT FT: based on GTL base oils

ECOCUT LE: based on HC base oils

ACT

ECOCUT LCF: based on sustainable mineral oils

PLANTOCUT: based on synthetic ester oils

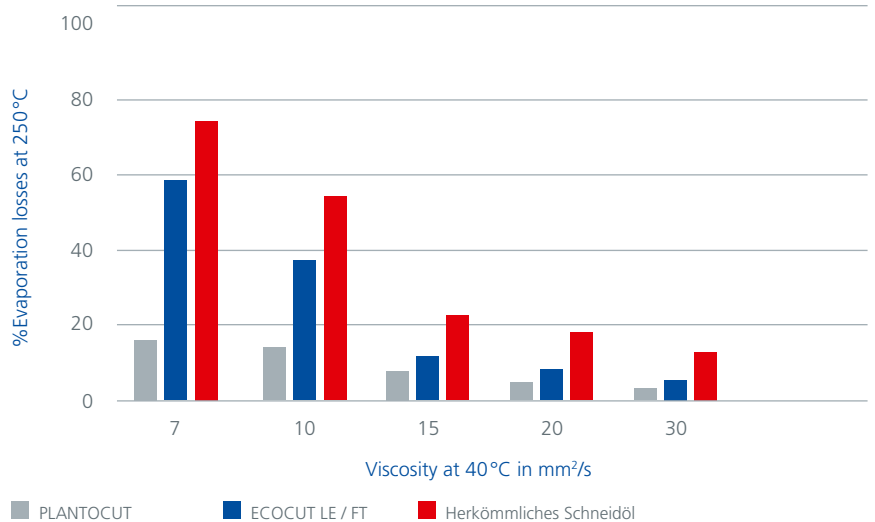
Our application engineers are happy to help you with any further questions.

Efficient from the ground up

Not only do they meet all technical requirements, but their outstanding properties make ECOCUT and PLANTOCUT cutting and grinding oils particularly economical:

- Low consumption
- Good cooling performance
- Good rinsing properties
- High lubricating power
- Long tool service life.

Evaporation loss of various base oils / typical values

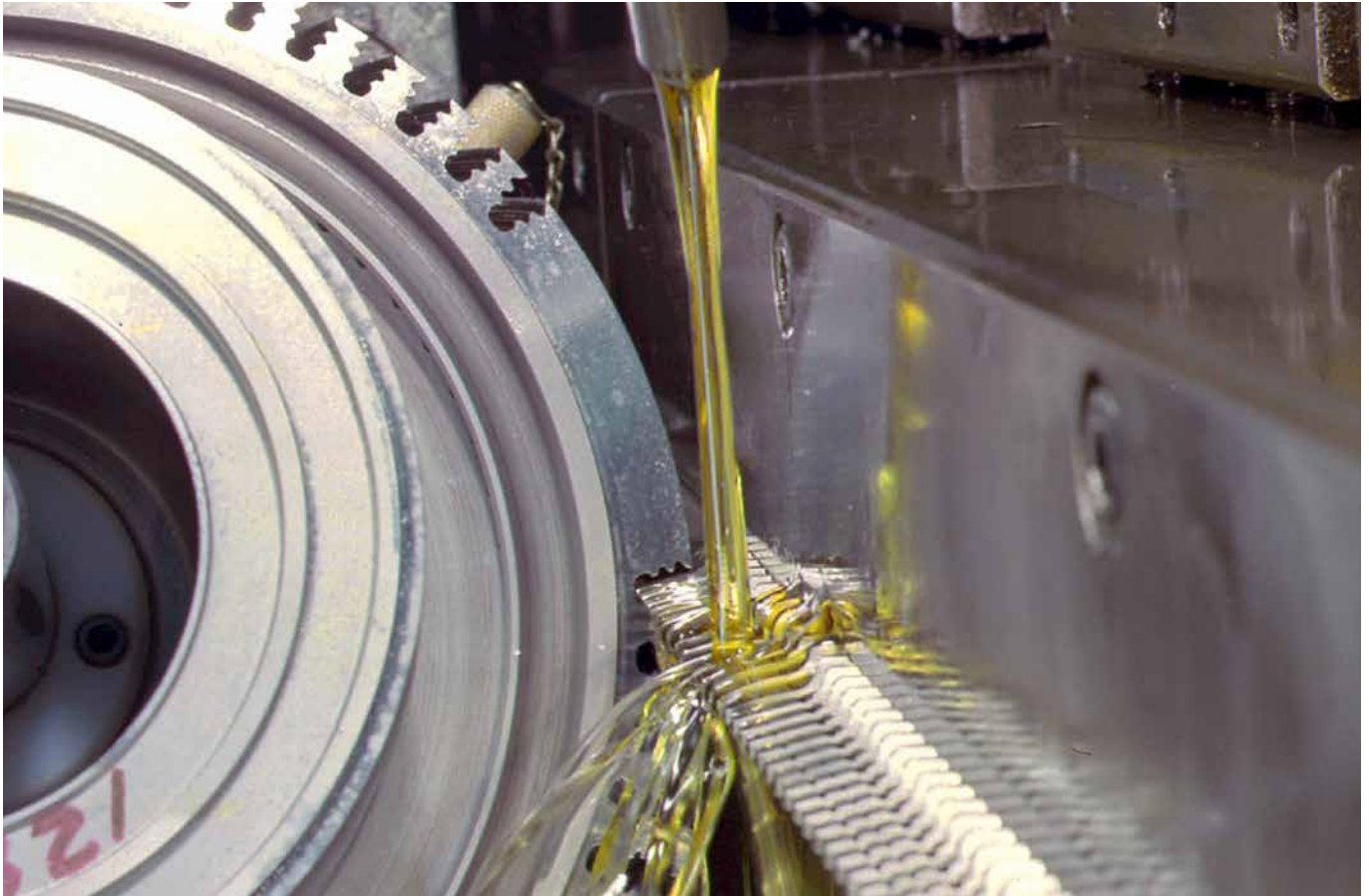


Reduce the risk of fire and explosion with cooling lubricants certified to BGI / GUV-I 719.

Trend	Viscosity class as per DIN 51519 (ISO 3448:1992)	Viscosity at 40°C as per DIN 51562 [mm²/s]	Flash point as per ISO 2592 (process with open cup, Cleveland) [°C]	Evaporation loss at 250°C as per DIN 51581-1, 2 (process as per Noack) [%]	Machining process, example
<p>Reduced risk of fire and explosion</p>	ISO VG 5	4,14–5,06	> 120	< 85	<p>Honing, reaming, grinding, deep drilling, turning, milling, drilling, thread-cutting, thread-rolling, broaching</p> <p>Viscosity tends to increase from honing to broaching</p>
	ISO VG 7	6,12–7,48	> 145	< 80	
	ISO VG 10	9,00–11,00	> 155	< 60	
	ISO VG 15	13,50–16,50	> 190	< 25	
	ISO VG 22	19,80–24,20	> 200	< 15	
	ISO VG 32	28,80–35,20	> 219	< 13	
	ISO VG 46	41,40–50,60	> 220	< 11	

Source: BGI/GUV-I 719

ECOCUT FT – Non-water-miscible metalworking fluids based on novel GTL base oils



Used as operating materials, non-water-miscible cooling lubricants not only have a key influence on the process and the quality of machined parts, but also make a major contribution to improving safety and working conditions in production halls.

The properties of the product used play a part, too, such as the flash point, evaporation, and foaming behavior. Both

the selection of the additives and the quality of the base oils used have a major impact on these features.

FUCHS has many years of experience in formulating high performance, non-water-miscible cooling lubricants that are based on refined Group III base oils. These products make a significant contribution to improving processes for our customers:

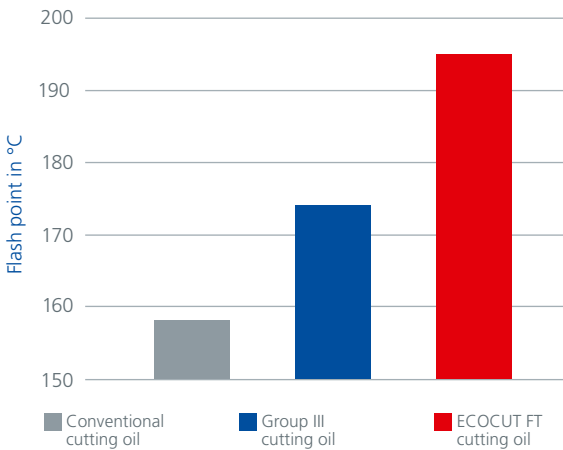
- **Increased productivity**
- **Reduced workplace pollution**
- **Improved occupational health and safety**
- **Excellent efficiency**

Using innovative base oils allows us to further improve and optimize our non-water-miscible cooling lubricants. ECOCUT FT stands for high-grade grinding and cutting oils built on base oils which are produced using the GTL process (Fischer-Tropsch synthesis).

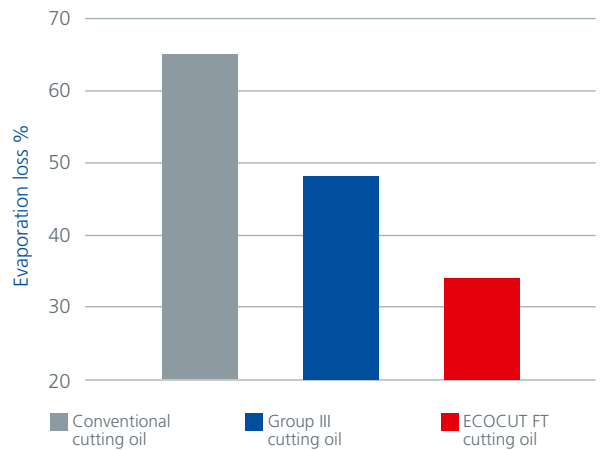
In the gas-to-liquid process, a syngas is generated from natural gas using oxygen and hydrogen. This syngas is subsequently converted to liquid hydrocarbons via Fischer-Tropsch synthesis. Further steps are then employed to produce fuels and base oils from this. We use these base oils in our ECOCUT FT series of cutting and grinding oils.



Typical values:
Flash point in °C
Viscosity at 10 mm²/s at 40 °C



Typical values:
Evaporation loss % (GC-Noack)
Viscosity at 10 mm²/s at 40 °C



ECOCUT FT products offer additional benefits:

- **High flash point** – offers greater fire and explosion protection
- **Low evaporation** – reduces consumption, lowers costs, improves working conditions, increases safety for fire and explosion protection
- **Better air release properties** – improves foaming behavior and cooling effect

Special product solutions: fluid families



Leaks as cost drivers

The complexity of a machine tool is reflected in the range of lubricants used: metalworking oil, hydraulic oil, slideway oil, and gear oil.

Loss through leakage can rarely be prevented completely when operating machine tools. If the individual lubricants are not carefully matched, this can often result in high

costs due to increased tool wear, filtration problems, damage to the machine, production downtime, and poor workpiece quality.

If you want to keep a rein on costs, custom-made solutions in cooling lubricant technology are the answer.

Compatible fluid families – problem solvers when it comes to leaks in hydraulic systems

We have developed the right system solutions for the different requirements and areas of application, enabling smooth, lower-cost, high-performance manufacturing processes:

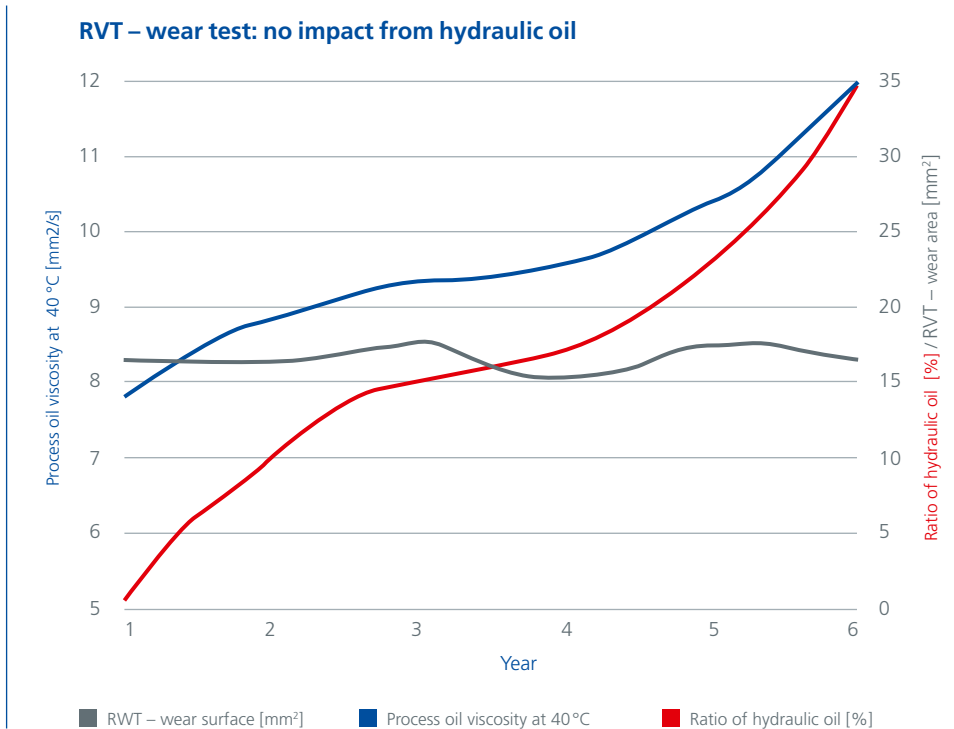
- Non-water-miscible multifunction oils based on low-evaporation mineral oils – ECO CUT HFN
- Non-water-miscible fluid families based on esters – PLANTOCUT, PLANTOHYD, PLANTOLUBE

The benefits for the user are clear:

- Improved process safety
- Increased tool life
- Optimized tool quality
- Extended cooling lubricant life with minimal maintenance and monitoring required.

In short:
Higher performance with lower operating costs.

How a multifunction oil can increase the performance of a machine tool is demonstrated in this diagram of a machine after switchover to the multifunction oil from the HFN range: Despite major hydraulic oil leaks, the wear behavior remains consistently good.



Special product solutions: products for minimum quantity lubrication (MQL)



Photo credit: Bielomatik Leuze GmbH + Co. KG

More than 30 years of minimum quantity lubrication (MQL)

PLANTO MIKRO and ECOCUT MIKRO are product ranges from FUCHS specially developed for MQL. Experience has shown that it is optimizing cooling lubricants that makes the technological process of minimum quantity lubrication economical with suitable machining processes.

Special ester oils and fatty alcohols

Especially well suited and practice-tested for minimum quantity lubrication: Lubricants based on special ester oils and fatty alcohols.

More than 30 years

of application experience in minimum quantity lubrication

PLANTO MIKRO – ester oil-based MQLs

- Have a higher boiling range and flash point even with lower viscosity
- Emit considerably less steam
- Form a thin film on the workpiece but parts feel dry

ECOCUT MIKRO – fatty alcohol-based MQLs

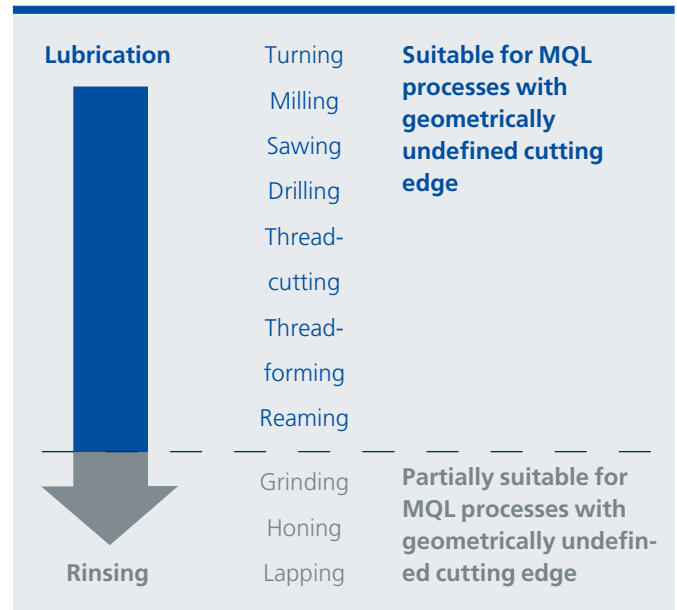
- Have a lower flash point than ester oils with the same viscosity
- Evaporate relatively easily, which leaves the processed parts dry
- Generate a slight cooling effect

PLANTO MIKRO and ECOCUT MIKRO lubricants are low emission in accordance with BGI 718 "Minimum quantity lubrication for machining operations".

The PLANTO MIKRO and ECOCUT MIKRO products are approved by leading MMS equipment manufacturers and excel with the following properties:

- Good sprayability
- Optimum droplet characteristics
- Good lubrication
- Neutral odor
- Practice-tested

Minimum quantity lubrication in different machining processes



PLANTO MIKRO and ECOCUT MIKRO products are suitable for use in 1-channel (AEROSOL BOOSTER) and/or 2-channel spraying systems.

Product	Spraying system		Steel	Cast	Aluminum	Cu
	1-channel	2-channel				
ECOCUT MIKRO PLUS 20	x	x	●●	●●●	●●●	●●●
ECOCUT MIKRO 20 D***	x	x	●●	●●●	●●●	●●●
PLANTO MIKRO UNI	x	x	●●●	●●	●●●	●●
PLANTO MIKRO 30 HD	x	x	●●●	●●	●●●	-

●●● preferred ●● suitable ● partially suitable - not suitable

*** Patented formula with improved cleaning performance with subsequent parts cleaning.

Excerpt from our product range. Other products upon request.

Non-water-miscible cooling lubricants – selection guide

Materials / processing	normally machinable steels	difficult-to-machine steels	very difficult-to-machine steels	Titanium and titanium alloys	Gray cast iron and malleable cast iron	Nonferrous metals	Aluminum and aluminum alloys
Automatic-machining	ECOCUT HFN LE range; LCF range	ECOCUT 600 LE range; FT range; LCF range	ECOCUT 700 LE range; FT range; LCF range	ECOCUT 7520 LE-M; FT range; PLANTOCUT range	ECOCUT HFN LE range	ECOCUT HFN LE range; FT range; LCF range	ECOCUT HFN LE range; LCF range
Deep Drilling	ECOCUT 515; LCF range; PLANTOCUT range	ECOCUT 515; ECOCUT MXB 18; FT range; LCF range	ECOCUT 515; ECOCUT MXB 18	ECOCUT FT range; PLANTOCUT range	ECOCUT HFN LE range	ECOCUT HFN LE range; FT range; PLANTOCUT range	ECOCUT HFN LE range
Broaching	ECOCUT 600 LE range	ECOCUT 700 LE range	ECOCUT 800 range; ECOCUT 8536 S	ECOCUT 800 range	ECOCUT HFN LE range	ECOCUT HFN LE range; PLANTOCUT range	ECOCUT HFN LE range; PLANTOCUT range
Gear-machining	ECOCUT HFN LE range; 600 LE range; LCF range	ECOCUT 600 LE range; 700 LE range; LCF range	ECOCUT 8532	–	–	ECOCUT HFN LE range	–
Planing / Finishing	ECOCUT GBS 5; PLANTOCUT range	ECOCUT GBS 5; PLANTOCUT range	ECOCUT HFN 5; PLANTOCUT range	ECOCUT HFN 5 LE UNI; PLANTOCUT range	ECOCUT GBS 5; HFN LE range	ECOCUT HFN LE range	ECOCUT HFN LE range
Lapping	ECOCUT HO 74	ECOCUT HO 74	ECOCUT HO 74	–	ECOCUT HO 74	ECOCUT HO 74	ECOCUT HO 74
Grinding	ECOCUT HFN LE range; FT range; LCF range	ECOCUT HFN LE range; FT range	ECOCUT HSG LE range	PLANTOCUT range	ECOCUT HFN LE range	ECOCUT HFN LE range	ECOCUT HFN LE range
Thread-machining	ECOCUT 500 LE range; FT range; PLANTOCUT range	ECOCUT 500 LE range; 700 LE range; FT range	ECOCUT 500 LE range; 700 LE range; 8536 S	ECOCUT 7520 LE-M; PLANTOCUT range	ECOCUT HFN LE range	ECOCUT HFN LE range; LCF range; PLANTOCUT range	ECOCUT HFN LE range; LCF range; PLANTOCUT range
EDM-machining	ECOCUT 1520; ECOCUT FE	ECOCUT 1520; ECOCUT FE	ECOCUT 1520; ECOCUT FE	ECOCUT 1520; ECOCUT FE	ECOCUT 1520; ECOCUT FE	–	–
Minimum Quantity Lubrication	ECOCUT MIKRO range	PLANTO MIKRO UNI	PLANTO MIKRO 30 HD	PLANTO MIKRO 30 HD	ECOCUT MIKRO range	ECOCUT MIKRO range	ECOCUT MIKRO range

The products in each range are available in different viscosities.

Complete solutions for your entire manufacturing process

By choosing system solutions from FUCHS, the world's largest independent lubricant manufacturer with the most comprehensive range of metalworking lubricants, you are placing your trust in the specialists. And also in our expertise, our wealth of experience in consulting, and in customized solutions.

Example: Manufacturing gears.



ECOCOOL

MACHINING: WM*

- High-performance
- Economical
- Outstanding lubricating performance



ECOCUT

MACHINING: NWM**

- Increased safety
- Economical
- Low in oil mist and evaporation



THERMISOL

QUENCHING

- Low-warpage
- Low consumption
- High compatibility



RENOCLEAN

CLEANING

- High washing effect
- Seamless processing
- Outstanding emulsifying and de-emulsifying



RENOLIT

LUBRICATION: GREASES

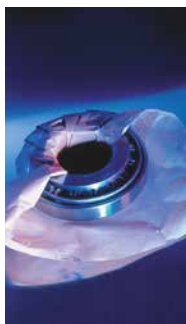
- Compatible
- Permanent and long-term lubrication
- Optim. compatibility with seal materials



RENOLIN

LUBRICATION: OILS

- Compatible
- High corrosion protection
- Optimum wear protection in the plant



ANTICORIT

PROTECTION

- Optimum safety
- Clean application



FUCHS Smart Services

- All Fluid Services
- Auditable documentation
- Better performance
- Greater process safety
- Cost reduction

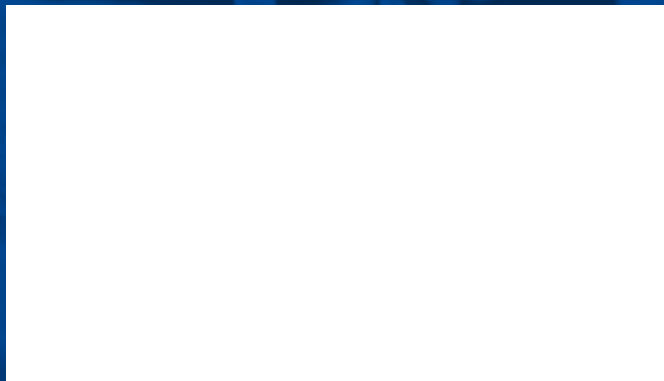
*WM = water-miscible, **NWM = non-water-miscible

FUCHS Lubricants

Innovative lubricants need experienced application engineers

Every lubricant change should be preceded by expert consultation on the application in question. Only then can the best lubricant system be selected. Experienced FUCHS engineers will be happy to advise on products for the application in question and also on our full range of lubricants.

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