ECOCOOL | ECOCUT

Lubricant Solutions for the Aerospace Industry | 2024

LUBRICANTS.
TECHNOLOGY.
PEOPLE.

FUCHS

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 CO_2-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 awide 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)

INNOVATIVE METAL CUTTING FLUIDS FOR AEROSPACE MACHINING

Quality precision machining of aerospace components requires high performance specialist coolants. At FUCHS, we understand the unique challenges of aerospace machining and dedicate our expertise to ensuring our cutting fluids deliver competitive advantage to your production.

We research, develop and manufacture bespoke machining fluids – technology that is approved for use by leading manufacturers and available globally via the FUCHS organisation.

Structures
Materials used in the manufacture of ribs, stringers, spars and bulkheads are becoming more exotic. Utilised for their strength to weight ratio, these materials create unique demands on the cutting fluids, which FUCHS' technology addresses head on.

FUCHS is able to offer specialist cutting fluid solutions providing optimum efficiency, from the initial bulk metal removal through to the high speed machining of thin wall components.

Engines
Aerospace engine machining requires unsurpassed accuracy, precision and quality. Through many years of partnership with leading global engine producers, we are able to supply innovative coolant solutions for all key components and substrates in the modern jet engine.

Turbine blade grinding, blisk milling and super-finishing are just some of the applications for which FUCHS can provide specialist coolant technology.

Landing gear
Modern landing gear uses high strength sophisticated materials (such as Titan 5-5-5-3) in its manufacture. These are increasingly difficult to machine and create unique demands on the coolant.

Only by working with OEM manufacturers, machine tool builders and tooling suppliers is FUCHS able to understand the full parameters of the operation and to develop build coolants capable of matching the production demands of the customer.

Composite materials
In the aerospace industry the use of composites is becoming ever more important, with a large number of secondary structures in aircraft airframes made of composites. The latest progression in the industry is in developing new aircraft in which a large structural percentage is built out of these materials.

Durability and maintainability are key advantages, and composites often outperform their metal counterparts. The demand for coolant is limited, but compatibility with materials and resins, tool life and accuracy/repeatability are just some of the key factors addressed by FUCHS' technology.

INNOVATION AND TECHNOLOGICAL LEADERSHIP FOR LUBRICANTS

We engage in application-oriented development directly at and in cooperation with the customer with the aim of adapting lubricants optimally to the process and machine-related requirements. In addition, great emphasis is placed on basis research in the FUCHS Group.

Our ultra-modern Technology Center at the headquarters in Mannheim coordinates the international network of experts, brings together expertise and supports knowledge transfer on global requirements.

Super difficult metals
Technology designed to assist with high metal removal rate whilst maximising tool life. Specifically designed for titanium and nickel based alloys.

High pressure coolants
Technology designed to withstand the pressures of high velocity coolant delivery. Designed to offer maximum tool life, suitable chip evacuation and machining accuracy on a wide range of difficult-to-machine substrates.

OEM approved
FUCHS' coolant technology is approved by leading manufacturers globally including Boeing, Airbus, Rolls Royce and Pratt & Whitney, providing subcontractors with reassurance of quality and validity.

MQL
FUCHS' product range includes minimum quantity lubricants for spray systems. Approved by aero manufacturers and equipment manufacturers.

Features of our products

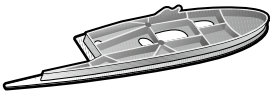
Product	Boron	Emulsion / Synthetic / MQL / Neat oil	Nickel based- and titanium alloys	Aluminium alloys		Composites
				standard	critical	
ECOCOOL GLOBAL 1000	free	emulsion	+++	+++	+++	–
ECOCOOL NI 1000	free	emulsion	+++	+	+	–
ECOCOOL TN 2525 HP-BFH	free	emulsion	+++	+	+	–
ECOCOOL TN 2550	free	emulsion	+++	++	++	–
ECOCOOL GLOBAL S 240	free	synthetic	–	–	–	+++
PLANTOCUT 22 SR	free	neat oil	++	+++	+++	–
ECOCUT MIKRO PLUS 20	free	MQL	++	+++	+++	–

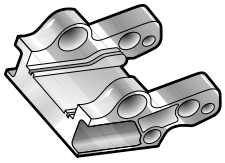
+ suitable ++ good suitable +++ especially recommended

OUR LUBRICANT SOLUTIONS TO THE SPECIFIC REQUIREMENTS OF AEROSPACE MANUFACTURING

Structural solutions I wing rib, engine mount, flap track, wing spar
Engine solutions I front case, engine case, blisk, hub
Landing gear solutions I slider, truck beam, links and braces

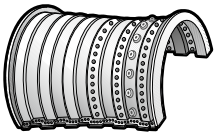
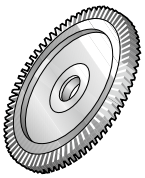
Structural solutions





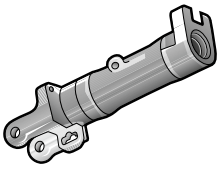

	Wing rib	Flap track	Engine mount	Wing spar
Material	AL2024 and AL7075 aluminium alloy	Titanium alloy Ti6Al4V	Titanium alloy Ti6Al4V	AL2024 and AL7075 aluminium alloy
Operation	Rough milling with solid carbide endmill	Helical side milling, roughing	Drilling and milling	Rough milling, pocketing
Criterion	Surface finish, metal removal rate	Metal removal rate	Application security and productivity	Metal removal rate, productivity
Recommendations	**ECOCOOL GLOBAL 1000** **PLANTOCUT 22 SR** **ECOCUT MIKRO PLUS 20**	**ECOCOOL GLOBAL 1000** **ECOCOOL TN 2550** **PLANTOCUT 22 SR** **ECOCUT MIKRO PLUS 20**	**ECOCOOL GLOBAL 1000** **ECOCOOL TN 2550** **ECOCUT MIKRO PLUS 20**	**ECOCOOL GLOBAL 1000** **ECOCOOL TN 2550** **PLANTOCUT 22 SR** **ECOCUT MIKRO PLUS 20**
Concentration	8–9%	8–9%	8–9%	8–9%
Expected results	Non-staining, increased tool life	Reduced cycle time, improved tool life	Reduced cycle time, improved tool life	Non-staining, increased tool life

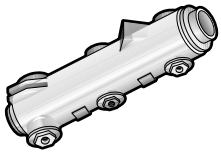
Engine solutions

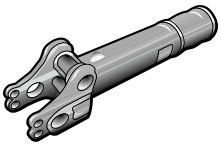




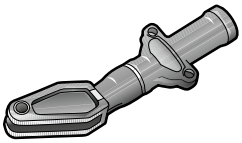

	Front case	Engine case	Blisk	Hub
Material	Inconel 718, Waspaloy	Ti 6Al 4V, Waspaloy	Inconel 718 aged and hardened 48 HRc	Inconel 718 forged
Operation	Rough turning and finish top profile	Rough milling	End milling, slotting	Rough turn internal features
Criterion	Surface finish and dimensions	Metal removal	Surface finish	Reduce cycle time
Recommendations	**ECOCOOL GLOBAL 1000 ECOCOOL NI 1000 ECOCOOL TN 2525 HP-BFH**	**ECOCOOL GLOBAL 1000 ECOCOOL NI 1000 ECOCOOL TN 2525 HP-BFH**	**ECOCOOL GLOBAL 1000 ECOCOOL NI 1000 ECOCOOL TN 2525 HP-BFH**	**ECOCOOL GLOBAL 1000 ECOCOOL NI 1000 ECOCOOL TN 2525 HP-BFH**
Concentration	8–9%	8–9%	8–9%	8–9%
Expected results	Fine finish, increased tool life	Increased tool life	Non-staining, increased tool life	Reduced cycle time, improved tool life

Landing gear solutions



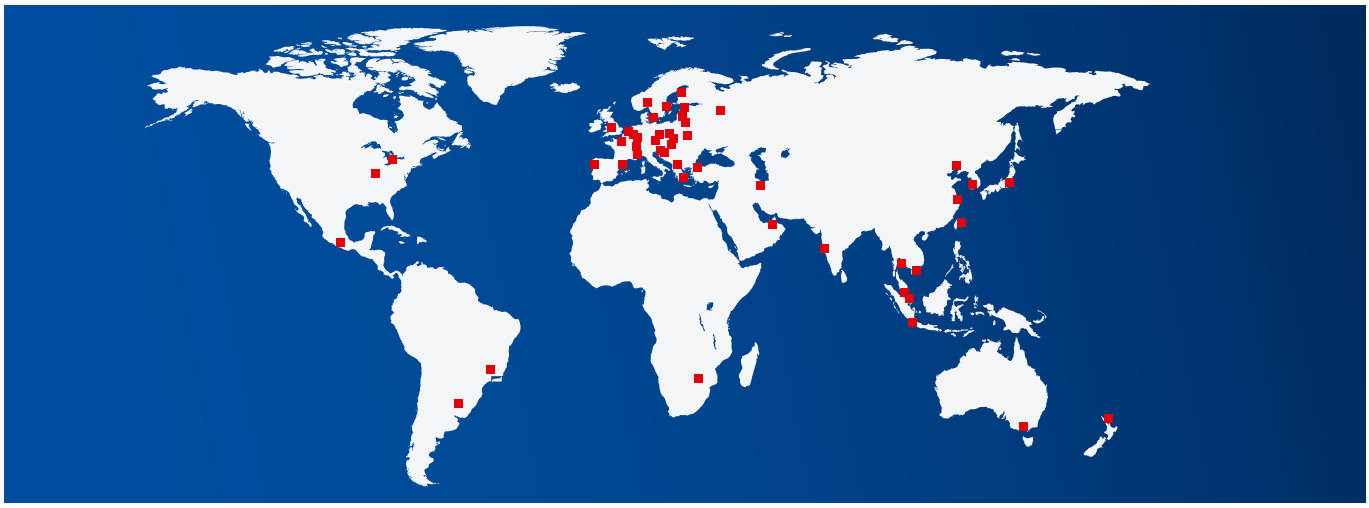






	Slider	Truck beam	Links & braces	Links & braces
Material	Ti 6Al 4V (Ti 6-4)	Ti 5Al 5Mo 5Al 3Cr (Ti 5-5-5-3)	Ti 5Al 5Mo 5Al 3Cr (Ti 5-5-5-3)	Ti 6Al 4V (Ti 6-4)
Operation	Slotting	Rough milling by plunge contouring	3D milling, roughing	Square shoulder milling
Criterion	Metal removal rate, tool life	Metal removal rate, tool life	Metal removal rate, tool life	Metal removal rate, tool life
Recommendations	**ECOCOOL GLOBAL 1000 ECOCOOL TN 2550**	**ECOCOOL GLOBAL 1000 ECOCOOL TN 2550**	**ECOCOOL GLOBAL 1000 ECOCOOL TN 2550**	**ECOCOOL GLOBAL 1000 ECOCOOL TN 2550**
Concentration	8–9%	8–9%	8–9%	8–9%
Expected results	Increased metal removal rate vs tool life	Increased metal removal rate vs tool life	Increased metal removal rate vs tool life	Increased metal removal rate vs tool life

Our support network



Global team
Research and development, as well as product knowledge, are shared amongst our dedicated aerospace specialists across the FUCHS network. Customers, regardless of location, can be reassured by access to a global knowledge and resource base. You will also benefit from the support of expert engineers and metallurgists in the field of aerospace machining to ensure accurate product recommendations.

Coolant technology needs to adapt to the demands of the global industry. Our specialist team ensure that FUCHS' technology is functional, with modern machining techniques and processes, whilst being accepted and approved by leading OEMs.

FUCHS range
The FUCHS range of aerospace cutting fluids has expanded rapidly to encompass the technologies needed for efficient and cost effective aerospace machining. The key to aerospace machining is the optimisation of cutting-edge geometry and coolant technology to the substrate being machined.

Our local engineers are trained to offer expert advice on coolant technology – helping to reduce cycle times, minimise negative outputs and maximise tool life and process efficiency.

Advanced manufacturing research centre (AMRC)
The University of Sheffield Advanced Manufacturing Research Centre (AMRC) with Boeing is a world class centre for advanced machining and materials research for the aerospace industry. FUCHS is a proud partner of this facility and supports advanced machining initiatives, with research and development into the optimisation of the coolant performance in new and extreme machining conditions.

FUCHS uses such research to help customers ensure that all possibilities are explored and that the most practical and advantageous formulations are brought to market immediately.

Certified DMQP partner at DMG MORI
Within DMG MORI's DMQP program, FUCHS exclusively provides metal working fluids and lubricants tailored to machines and processes. The DMQP program creates synergies of the highest quality standards between machine, peripherals, and accessories. It consolidates innovation and technological expertise from selected DMQP partners, who have been exclusively awarded the premium seal of quality for their products.

An example of collaboration between DMG MORI, tool manufacturers, and FUCHS is:

Our support tools

Research and development are key factors in the success
Over 400 FUCHS engineers and scientists engaged in research and development around the globe develop new products and help our customers solve their problems. They guarantee our technical advantage.

The most important facility for R&D is the new Technology Centre in Mannheim, Germany. Opened in 2012, it provides state-of-the-art test rigs, lab equipment and test machines. The laboratory facilities secure the measurements of over 350.000 samples per year. With this Technology Centre and the worldwide FUCHS R&D network we are in the position to guarantee the latest technical trends and perfect technical support for tailor-made solutions.

Service
We have an experienced team of support engineers who can provide expert assistance in fluid equipment management. We can offer advice on all types of fluid handling including storage, distribution, collection, recycling and waste disposal.

We can supply "off the shelf" solutions to basic fluid handling projects but, through the FUCHS knowledge base, we can also design, manufacture and install turnkey solutions to each customer's specific requirement.

FUCHS Smart Services

To obtain maximum efficiency from coolant technology, it is essential to ensure the fluid remains in good health. FUCHS' Chemical Process Management service is a complete lubricant management programme encompassing coolant "health checks". Regular condition monitoring, sampling and maintenance advice are provided to customers to ensure maximum productivity. This service tool is currently utilised by many leading aerospace manufacturers.

Lubricant mangement | Documen-tation | Equipment | Monitoring | Technical consultation

HOLISTIC SOLUTIONS TO THE AEROSPACE INDUSTRIES

Premium quality water miscible coolant solutions are just part of the FUCHS portfolio. FUCHS offers customers a full line supply service for all coolant and lubricant demands.

Included within our metalworking fluid portfolio are innovative solutions to meet the highly sophisticated demands of the aerospace industry, designed with the expertise of our aerospace group and approved by leading manufacturers. To support this, FUCHS carries a full range of lubricants suitable for aerospace applications.

Minimum quantity lubrication (MQL)

MQL was developed by the American aerospace industry and is the process of applying very small quantities of high lubricity oil, mixed with air, at the point of precise contact between the tool and the workpiece.The benefits of such technology can be extensive, especially with a fluid optimised for the operation. The FUCHS range of MQL products, including the aerospace approved ECOCUT MIKRO PLUS 20, can help to deliver the advantages of minimal fluid usage, minimal waste creation, dry swarf for recycling and reduced cycle times.

Electro-discharge machining (EDM)

Used predominantly in engine manufacture, this technique is often applied for fine finishing applications. FUCHS has a range of approved fluids for such applications, designed to offer users assurances over safety in production and accurate machining results.

Full line supplier

According to the Institution of Mechanical Engineers, 80% of all machine lubrication failures are due to incorrect lubrication. FUCHS, through expert lubrication and application knowledge as well as an unsurpassed range of machine lubricants and ancillary products, is able to provide assurances of reliability and performance for your company's primary assets.

Broaching

The Broaching process of aerospace materials creates high demand from the performance of the cutting fluid. In addition, the correct selection of EP additives is important to achieve the necessary surface finish and required tool life. The use of a suitable cutting oil is particularly important for the very difficult-to-machine such as Inconel, Hastelloy and high-alloy steels which are used in the aerospace industry.

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

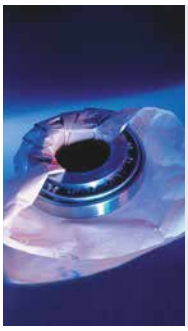
LUBRICATION: GREASES

- 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

Notes

Notes

Notes

Note
The information contained in this brochure is based on the experience and expertise of FUCHS LUBRICANTS GERMANY GmbH in the development and manufacture of lubricants and represents the current state of the art. The performance of our products can be influenced by a series of factors, especially the specific use, the method of application, the operational environment, component pretreatment, possible external contamination, etc. For this reason, it is not possible to make universally valid statements about the function of our products.

Our products may not be used in aircraft or spacecraft. Our products may be used for producing aircraft and spacecraft components if the products are completely removed from the components before they are fitted in the aircraft or spacecraft.

The information given in this product information represents general, non-binding guidelines. No warranty expressed or implied is given concerning the properties of the product or its suitability for any given application. We therefore recommend that you consult a FUCHS LUBRICANTS GERMANY GmbH application engineer to discuss application conditions and the performance criteria of the products before the products are used. It is the responsibility of the user to test the functional suitability of the products and to use them with the corresponding care. Our products are subject to continuous further development. We therefore retain the right to change our product range, the products, and their manufacturing processes as well as all details in this brochure at any time and without warning, provided that no customer-specific agreements exist that require otherwise. With publication of this product information leaflet, all previous editions cease to be valid. Any form of reproduction requires express prior written permission from FUCHS LUBRICANTS GERMANY GmbH.

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.

Contact:

FUCHS LUBRICANTS GERMANY GmbH
Friesenheimer Straße 19
68169 Mannheim/Germany
Phone +49 621 3701-0
Fax +49 621 3701-7000
E-mail zentrale-flg@fuchs.com
www.fuchs.com/de/en

Export Division
Friesenheimer Straße 19
68169 Mannheim/Germany
Phone +49 621 3701-1703
Fax +49 621 3701-7719
E-mail export-flg@fuchs.com
www.fuchs.com/de/en

930160485 04/2024 0.5