



INDUSTRIAL METALWORKING

INTRO

The metalworking industry is complex and challenging: a huge range of modern materials, combined with a multitude of machining operations can make selecting the correct product a daunting task.

Millers Oils produces different types of lubricants and fluids for material removal applications, including both water-soluble fluids and neat oils as well as maintenance lubricants to support manufacturing processes. Once selected, the oil or fluid has to work hard to simultaneously lubricate, cool and flush whilst potentially operating in an open environment - making it susceptible to contamination and degradation.

In addition to this regulatory constraints around health and safety, coupled with improved productivity and a great need for cost efficiencies means that a high quality metalworking lubricant is more important than ever.

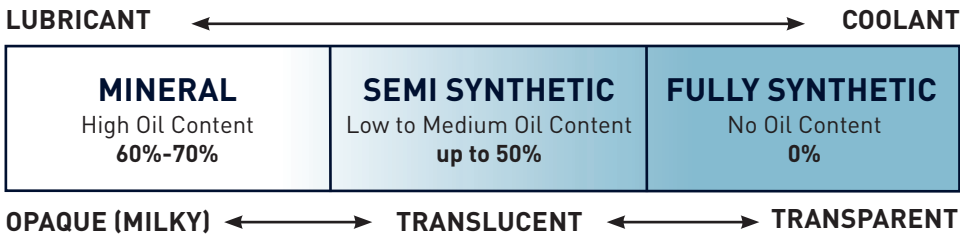
Combining Millers Oils high quality products with industry leading fluid management services, Millers Oils customers benefit from optimal product performance, reduced down time and increased profitability.

Millers Oils - best in class, products, programmes and people.

WATER-SOLUBLE METALWORKING FLUIDS

Millers Oils have a variety of biodegradable water-soluble cutting fluids, with excellent work-piece finish, long sump life, and multi-metal compatibility. Suitable for high pressure systems, extended tool life and formaldehyde-free.

Different types of water-soluble metal working fluids

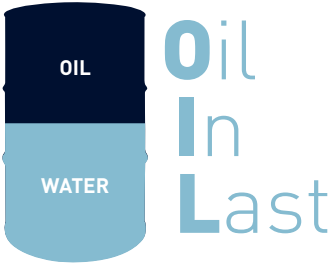


Metalworking applications often require specific types of cutting fluid characteristics in order to suit the operation. Inc. method of material removal, speeds & feed rates, material type, surface finish, tool life & tool piece visibility.

The three main types of water-soluble cutting fluids can be seen above. Higher mineral content cutting fluids provide high levels of lubrication at lower cutting speeds, whereas low or no oil containing fluids (fully synthetic) are exceptional coolants when high speed cutting due to rapid heat dissipation characteristics. Medium oil content cutting fluids (semi synthetic) can offer as a compromise as they can offer both lubrication and cooling properties.

Correct way to mix

To allow the concentrated cutting fluid to properly mix with water, emulsifier additives are used. In order to allow the emulsifiers to work and create a stable emulsion there is only one way the concentrated cutting fluid and water can be mixed - the oil should be added to the water rather than the water mixed into the oil, as this will create an invert emulsion.



Mixing the correct way will ensure that the cutting fluid will provide all the desired performance characteristics including lubrication & cooling properties, chip removal, oxidation and fungus and bacteria control.

Mixed Fluids

When the correct mixing procedure is carried out, the finished fluids will look like the following:



CUTTING FLUID

MILLERSOL

A range of mineral, semi synthetic and fully synthetic cutting fluids for a variety of different applications. The range includes traditional high oil content milky fluids for enhanced lubricity and more modern semi synthetic and fully synthetic fluids with enhanced cooling properties.

Product Name	Product Code	Fluid Type	Material							Chlorine Free	Recommended Concentration	Refractive Index Factor	Max. Water Hardness (ppm)
			Cast Iron	Aluminium	Yellow Metals	Alloy Steel	Mild Steel	Titanium	Cobalt				
Millersol TS	8093	Mineral	●	✓	✓	✓	✓	●	●	✓	3 – 8%	1.0	300
Millersol TS-EP	8112	Mineral	●	✓	✓	✓	✓	●	●	●	3 – 8%	1.0	300
Millersol MP	8059	Semi Synthetic	✓	✓	✓	✓	✓	●	●	✓	3 – 8%	1.4	450
Millersol LF	8060	Semi Synthetic	●	✓	✓	✓	✓	✓	✓	●	3 – 8%	1.0	250
Millersol HW	8061	Semi Synthetic	●	✓	✓	✓	✓	✓	✓	✓	3 – 8%	1.2	450
Millersol EP	8103	Semi Synthetic	●	✓	✓	✓	✓	●	●	✓	3 – 8%	1.1	300
Millersol COB	8132	Fully Synthetic	●	●	●	●	●	●	✓	●	5%	1.7	450

WATER-SOLUBLE CLEANERS & TREATMENTS

Product Name	Product Code	Function
Millercare SC	5561	System Cleaner
Millercare AF	5497	Antifoam Treatment
Acticide 14	8164	Bacteria & Fungus Treatment (Biocide)

✓ Suitable ◯ Potential material ● Not suitable

MILLCOOL

A high performance, semi synthetic and formaldehyde free range.

- Millcool 20: A high performance, semi synthetic, chlorine free, low boron, multi-application metalworking fluid.
- Millcool Cu FF: A versatile, semi synthetic metalworking fluid specifically designed for use on yellow metals.
- Millcool Extra: A high performance, semi synthetic, chlorine free, low boron, multi-application metalworking fluid.
- Millcool BFF: A high performance, semi synthetic, chlorine free, boron free, multi-application metalworking fluid.

Product Name	Product Code	Fluid Type	Material	Chlorine Free	Recommended Concentration	Refractive Index Factor
Millcool 20	7781	Semi Synthetic	Multi Metal/ Alloy	✓	3 – 8%	1.3
Millcool Cu FF	8052	Semi Synthetic	Multi Metal/ Alloy	✓	4 – 7%	1.0
Millcool Extra	8427	Semi Synthetic	Multi Metal/ Alloy	✓	5 – 10%	1.0
Millcool BFF	8440	Semi Synthetic	Multi Metal/ Alloy	✓	4 – 10%	1.4

GRINDING FLUID

Fully synthetic grinding fluids suitable for use in many different applications, as well as many types of materials.

- Millgrind G Syn: Fully synthetic chlorine free grinding fluid concentrate, designed for use on all surfaces, centreless and cylindrical grinding applications. Can be used for the grinding of glass and in mirror production.
- Millcool Synth: Fully synthetic chlorine free metalworking fluid suitable for arduous grinding and cutting.

Product Name	Product Code	Fluid Type	Material	Chlorine Free	Recommended Concentration	Refractometer Factor
Millgrind G Syn	5286	Fully Synthetic	Multi Metal/ Alloy	✓	2 – 5%	2.2
Millcool Synth	7728	Fully Synthetic	Multi Metal/ Alloy	✓	3 – 10%	2.6

✓ Suitable ◯ Potential material ● Not suitable

NEAT METALWORKING OILS

CUTTING OIL

Millers Oils blends its own range of neat cutting and forming fluids that provide excellent surface finish of the work piece and extended tool life across a range of applications and materials.

MILLICUT CHF: CHLORINE FREE

Chlorine free, neat cutting oil formulated using state of the art additive technology.

Product Name	Product Code	Cast Iron	Aluminium	Yellow Metals	Mild Steel	Stainless Steel	Alloy Steel	Tool Steel
Millicut CHF 6	5803	✓	✓	✓	✓	✓	✓	●
Millicut CHF 10	5721	○	●	●	✓	✓	✓	○
Millicut CHF 12	7734	○	●	✓	○	○	○	●
Millicut CHF 22	5769	✓	✓	✓	✓	✓	○	○
Millicut CHF 32	5660	✓	●	✓	✓	✓	○	○

MILLICUT STAR: CHLORINE FREE

Chlorine free neat cutting oil, formulated using state of the art additive technology for high performance machining.

Product Name	Product Code	Cast Iron	Aluminium	Yellow Metals	Mild Steel	Stainless Steel	Alloy Steel	Tool Steel
Millicut Star	5658	○	○	✓	✓	✓	○	○

✓ Suitable ○ Potential material ● Not suitable

MILLICUT CL: CHLORINE CONTAINING

A light coloured neat cutting oil produced from solvent refined base oils. Recommended for use as a general purpose neat cutting oil for grinding, tapping, screwing and gear cutting on alloy steels.

Product Name	Product Code	Cast Iron	Aluminium	Yellow Metals	Mild Steel	Stainless Steel	Alloy Steel	Tool Steel
Millicut CL 20	5602	○	●	✓	✓	✓	○	○

MILLICUT CAS: CHLORINE & SULPHUR CONTAINING

A mineral neat cutting oil produced from solvent refined base oils and two phase extreme pressure additive system.

Product Name	Product Code	Cast Iron	Aluminium	Yellow Metals	Mild Steel	Stainless Steel	Alloy Steel	Tool Steel
Millicut CAS 7	5137	○	●	●	✓	○	○	●
Millicut CAS 10	5123	○	●	●	✓	✓	✓	○
Millicut CAS 11	5605	○	●	●	✓	✓	✓	○
Millicut CAS 14	5084	✓	●	●	✓	✓	✓	○
Millicut CAS 18	5523	✓	●	●	✓	✓	✓	○
Millicut CAS 20	5394	○	●	✓	○	○	○	○
Millicut CAS 27	5293	✓	●	●	✓	✓	✓	○
Millicut CAS 33	5373	✓	●	●	✓	✓	✓	○

MILLCUT GP: GENERAL PURPOSE

A chlorine free range for use on ferrous and non-ferrous materials.

Product Name	Product Code	Material	Chlorine Free
Millicut GP 15	7741	Multi Metal/Alloy	✓
Millicut GP 30	5402	Multi Metal/Alloy	✓

✓ Suitable ○ Potential material ● Not suitable

MILLCUT J40: BIODEGRADABLE ESTER

Biodegradable ester based cutting oil, particularly suited to spray mist machining, total loss applications and sawing operations requiring a high lubricity product.

Product Name	Product Code	Cast Iron	Aluminium	Yellow Metals	Mild Steel	Stainless Steel	Alloy Steel	Tool Steel
Millicut J40	5981	●	○	✓	●	●	●	●

MILLCUT HO 18: HONING OIL

A chlorine free heavy duty honing fluid.

Product Name	Product Code	Material	Chlorine Free
Millicut HO 18	5837	Cast Iron, Mild Steel	✓

FORMING OIL

MILLFORM QD: QUICK DRY

Chlorine free high performance deep drawing oil. For shallow and deep drawing of mild steel and aluminium. Particularly where a fast evaporating product is required.

Product Name	Product Code	Application	Aluminium	Yellow Metals	Mild Steel
Millform QD	7689	Light duty <5 mm	✓	✓	✓

MILLFORM VO: VANISHING OIL

Millform VO consists of a solvent based formulation, and contains lubricity agents which are particularly effective on light pressing, blanking and drawing operations.

Product Name	Product Code	Application	Aluminium
Millform VO	5591	Light duty <5 mm	✓

✓ Suitable ○ Potential material ● Not suitable

MILLFORM CHF: CHLORINE FREE

Millform CHF uses chlorine free forming technology to provide extreme pressure performance for successful material deformation.

Product Name	Product Code	Application	Operation	Material
Millform CHF 46	5798	Light duty <5 mm	Blanking, Punching, Stamping, Forming Drawing	Multi Metal/Alloy
Millform CHF 150	5780	Medium duty 5-10 mm	Blanking, Punching, Stamping, Forming Drawing	Multi Metal/Alloy

MILLFORM CL: CHLORINE CONTAINING

Millform CL is based on solvent refined mineral oil and selected additives to impart extreme pressure performance and provide the basis for the successful change of shape or dimensions with the metal involved.

Product Name	Product Code	Application	Material
Millform CL 70	5376	Light duty <5 mm	Multi Metal/Alloy
Millform CL 150	5313	Medium duty 5-10 mm	Multi Metal/Alloy

MILLFORM HCL: HIGH CHLORINE CONTENT

Millform HCL is based on solvent refined mineral oil and selected performance additives to provide extreme pressure properties.

Product Name	Product Code	Application	Aluminium	Yellow Metals	Mild Steel	Alloy Steel
Millform HCL 140	5564	Medium duty 5-10 mm	✓	✓	✓	✓
Millform HCL 280	5289	Heavy duty >10 mm	✓	✓	✓	✓

✓ Suitable ○ Potential material ● Not suitable

SOLFORM GEL: TUBE BENDING LUBRICANT

Solform Gel is an oil-free, water based tube-bending gel designed to replace conventional oil and soap based lubricants. The product is specifically for the lubrication of severe mandrel tube bending operations on tight radii and on difficult materials.

Product Name	Product Code	Operation	Aluminium	Stainless Steel
Solform Gel	6128	Tube Bending	✓	✓

DRILLING & TAPPING

Product Name	Product Code	Operation
Tapcut Fluid	5639	Drilling, Tapping, Reaming
Tapcut Compound	5647	Drilling, Tapping, Reaming
Cutting Oil 2360	5640	Drilling, Tapping, Reaming, Blanking

QUENCHING OIL

Our Millquench range of oils ensure optimum performance and consistency of operation.

Product Name	Product Code	Max. Cooling Rate (°C/Second)	Max. Temp (°C)
Millquech AC 30	7883	71	539
Millquench 1804	5409	63.5	534
Millquench 96	5069	51.5	525

The application and material table guides throughout this brochure indicate the overall performance of a cutting fluid or oil and typical applications. However the application recommendation can change due to the machining process, machining difficulty, material type and speed of operation etc. A level of expertise is required when adopting the fluid or oil to a specific application.

For specialist products or a product recommendation please contact technical@millersoils.co.uk or +44 (0) 1484 475060.

RUST PREVENTATIVES AND DEWATERING FLUIDS

Millers Oils has a comprehensive range of rust preventative and dewatering fluid that suits your application's requirement.

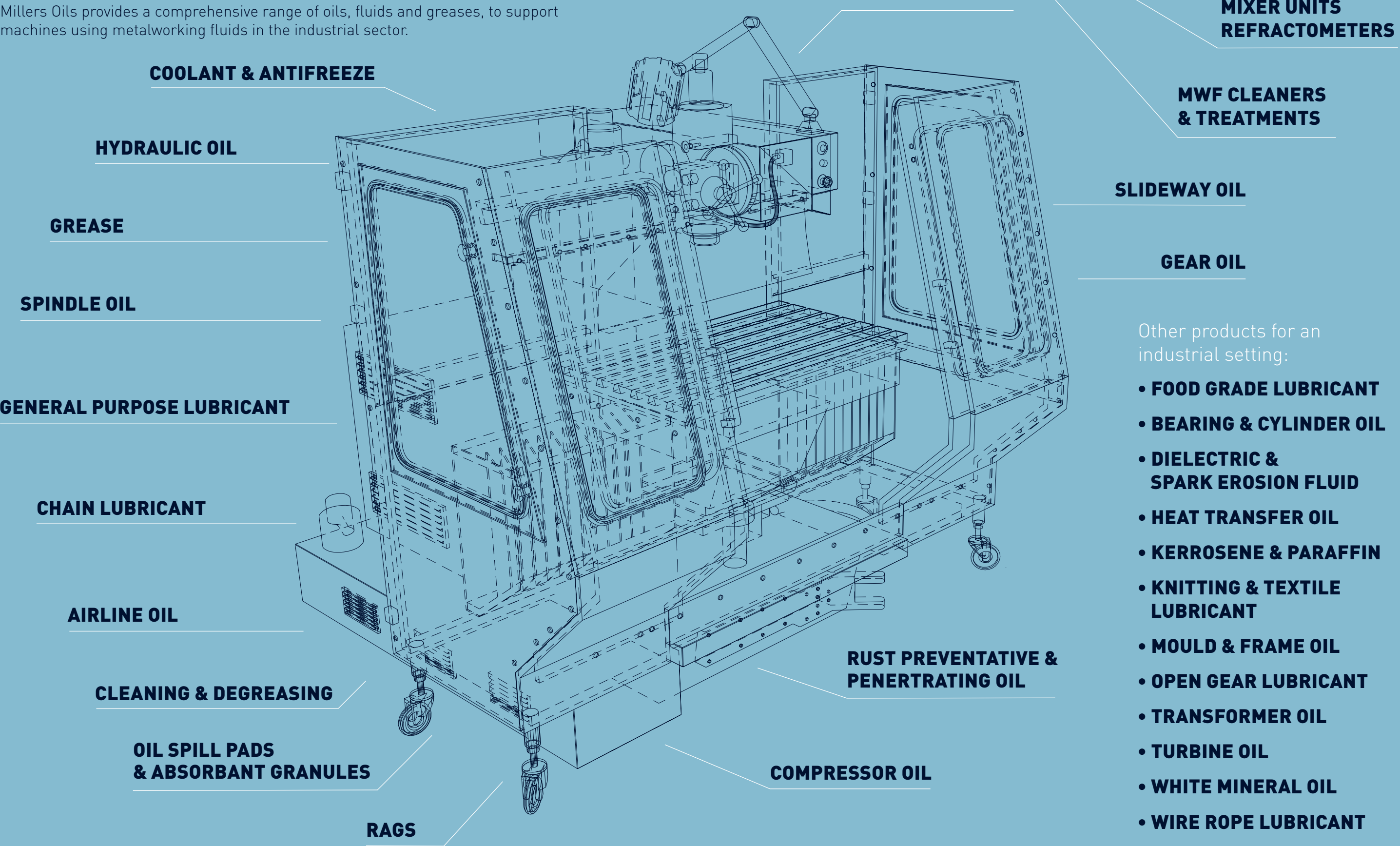
Product Name	Product Code	Description
Rust Preventative 2670	6133	Dewatering fluid with up to 12 months indoor protection, and up to 6 months outdoor protection.
Rust Preventative 2473	5723	Dewatering fluid with more than 2 years indoor protection.
Rust Preventative 1403	5401	Dewatering fluid with up to 3 months indoor protection.
Rust Preventative 1400	5312	Dewatering fluid with up to 6 months indoor protection.
Rust Preventative 184A	5202	Dewatering fluid with more than 12 months indoor protection, and up to 9 months outdoor protection.
Dewatering Fluid 1782	5406	Dewatering fluid with up to 3 months indoor protection.
PW11 Wax Film	5628	Up to 5 years indoor protection, and up to 2 years outdoor protection.

MAINTENANCE LUBRICANTS

Lubricant Type	Product	Description	Viscosity/Thickness
Hydraulic Oil	Millmax	Low foaming oil for protection against corrosion and wear and maximised power transfer.	ISO 2-100
Spindle Oil	Millmax	High speed spindle oil with good oxidation stability and protection against corrosion.	ISO 2, 5, 10
Slideway Oil	Millway	Anti-wear, anti-corrosion and high lubricity, no-drip formulation to prevent stick-slip and protect slideways.	ISO 32-220
Grease	Deltaplex 2EP	Multipurpose, high-load bearing red lithium complex grease.	NLGI 2

INDUSTRIAL FLUID AND LUBRICANT APPLICATIONS

Millers Oils provides a comprehensive range of oils, fluids and greases, to support machines using metalworking fluids in the industrial sector.



Other products for an industrial setting:

- **FOOD GRADE LUBRICANT**
- **BEARING & CYLINDER OIL**
- **DIELECTRIC & SPARK EROSION FLUID**
- **HEAT TRANSFER OIL**
- **KERROSENE & PARAFFIN**
- **KNITTING & TEXTILE LUBRICANT**
- **MOULD & FRAME OIL**
- **OPEN GEAR LUBRICANT**
- **TRANSFORMER OIL**
- **TURBINE OIL**
- **WHITE MINERAL OIL**
- **WIRE ROPE LUBRICANT**

MILLERS OILS - FLUID MANAGEMENT DIVISION

Millers Oils Fluid Management Division is a total preventative maintenance service, developed using 135 years of industry knowledge and tailored to the needs of our customers.

Services include:

Site Surveys

Millers Oils offers a detailed site survey in order to fully understand your manufacturing processes and its requirements. From that, we can then advise the best products and equipment to maximise your operations.

Condition Monitoring

Millers Oils offers condition monitoring including oil sampling, regular concentration and pH checks as well as performing any corrective actions e.g. removal of tramp oil and concentration adjustments to keep metalworking fluids at optimum performance level and in line with the latest HSE guidelines.

Clean-Outs

When products reach the end of their usable life, Millers Oils Fluid Management Technicians can perform full machine clean-outs and flushing services, reducing the risk of contaminations to extend the life of new products.

Advice

Millers Oils has a dedicated team that operates a technical support service during office hours for application advice and troubleshooting.

Training

Millers Oils can provide bespoke training for managers and operators, including best practice for enhance productivity and HSE compliance.

Benefits of training for customers:

- Increased productivity through condition monitoring and planned maintenance
- Improved surface finish and reduce scrap with our high quality products
- Peace of mind: our technicians take away the stress of fluid management, so you can focus on your core business

“Millers Oils’ technical knowledge and experience means we have full confidence in their recommendations, and the training and condition monitoring provided has helped us to both extend coolant life and prevent unplanned down-time. The Fluid Management team has been particularly supportive during the transition to formaldehyde-free product, providing a flexible changeover programme so clean-outs are scheduled with minimal impact on our business. All in all an invaluable service for the metalworking industry.”

Maintenance Manager - Fives Landis

“We have been using Millers Oils for over ten years now and have always found them to be a very reliable and cooperative supplier. They are very helpful with any technical problems we may have and always do their best to assist us in any way they can..”

John Crabtree – Bowers Metrology





MILLERS OILS

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All products and information are reflective of the latest specifications at the time of going to print. The company reserves the right to change formulations and specifications without prior notice. Product images are shown for illustration purposes only.

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