



# **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.

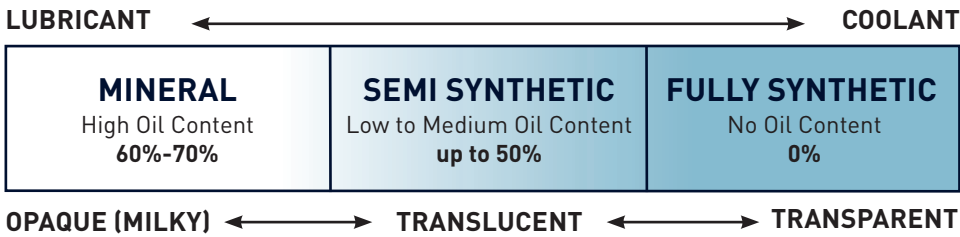
Combining Millers Oils high quality products with industry leading fluid management services, Millers Oils customers benefit from optimal product performance, reduced down time and increased profitability.

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

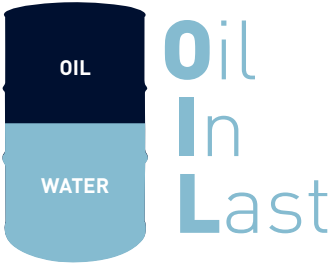


Metalworking applications often require specific types of cutting fluid characteristics in order to suit the operation. Inc. method of material removal, speeds & feed rates, material type, surface finish, tool life & tool piece visibility.

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](mailto: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.

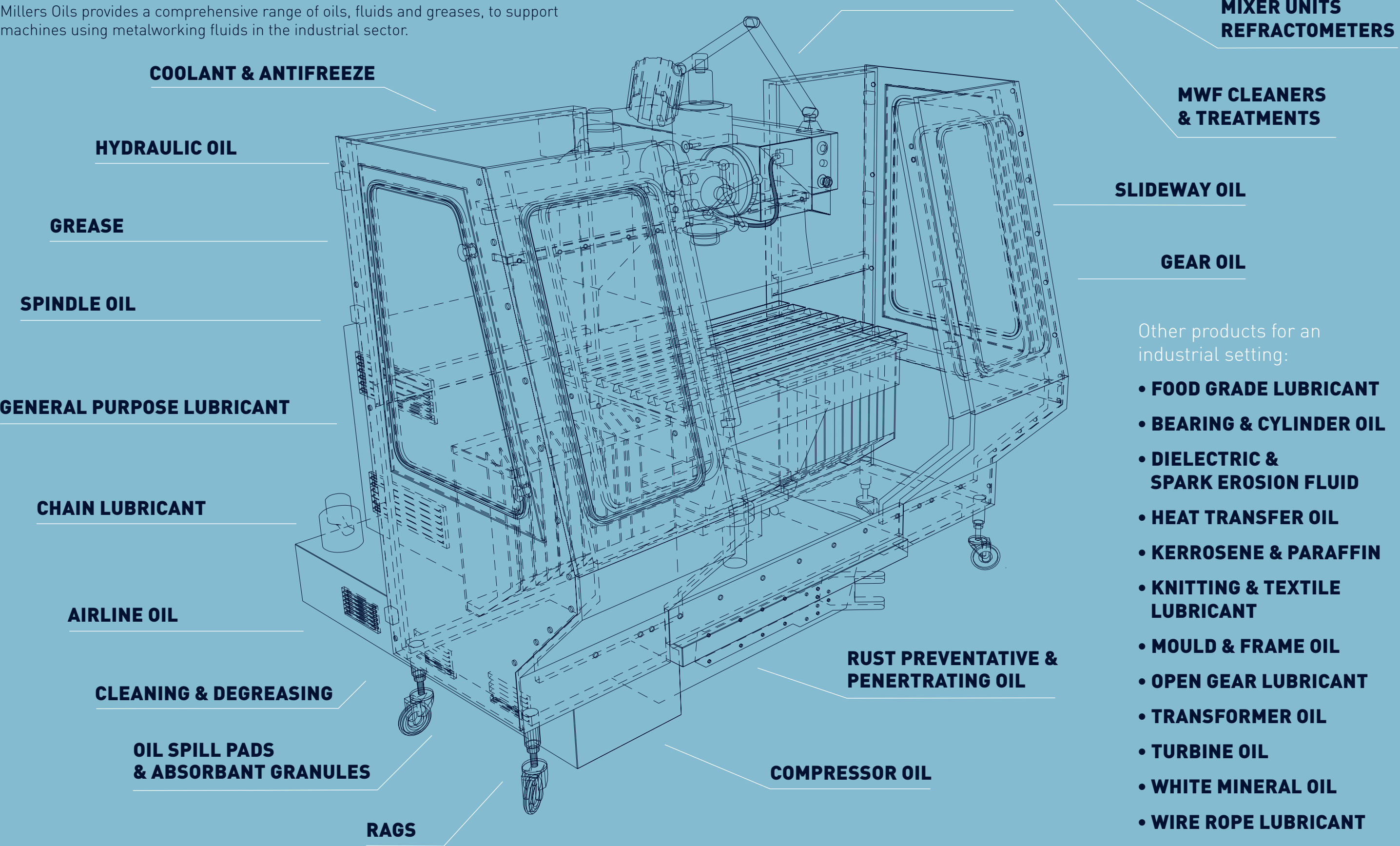
| Product Name           | Product Code | Description   |
|------------------------|--------------|---|
| Rust Preventative 2670 | 6133         | Dewatering fluid with up to 12 months indoor protection, and up to 6 months outdoor protection.     |
| Rust Preventative 2473 | 5723         | Dewatering 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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