

Equipment solutions

productivity through efficiency



Increasing productivity through efficiency

Q8Oils metalworking fluids and equipment solutions



In machining operations, is your choice of metalworking fluid an afterthought?

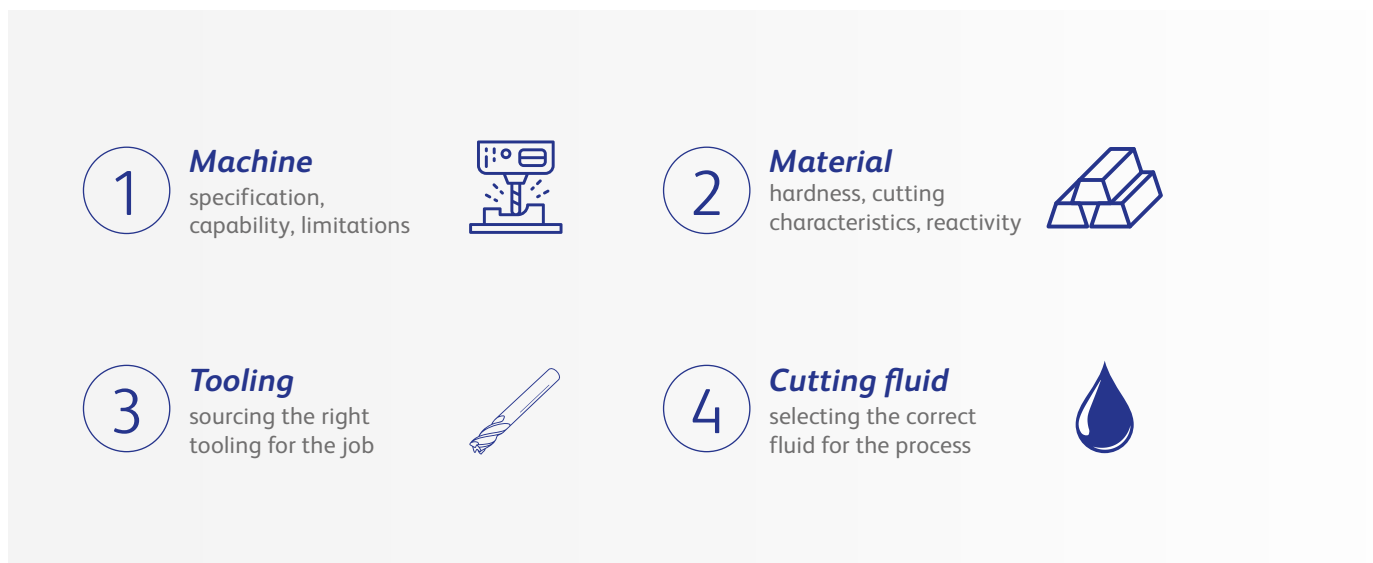
Here we explain why this choice should be at the forefront of your planning, long before you start production.

We also offer advice on how best practice can help you increase productivity.

Q8Oils has vast experience in designing and manufacturing top-quality lubricants for a wide range of applications. We also source carefully selected related equipment from leading suppliers to help you maximise efficiency and reduce costs.

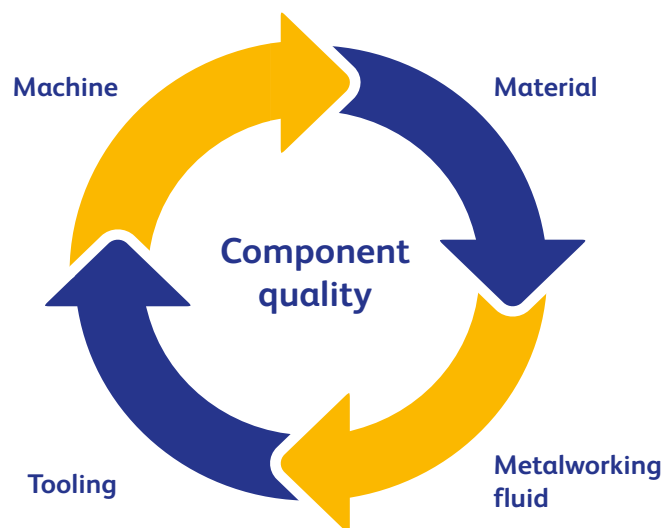
Planning your process: why the right metalworking fluid is vital

When undertaking a machining process, four principles must be considered:



The importance of using the correct fluid for the job is frequently overlooked and typically only questioned when problems arise. Although production runs may be set at acceptable cycle times, the incorrect fluid choice can have a negative impact on tooling fatigue frequencies and eventually result in failure. For example, it is not unheard of for engineers to increase concentration levels excessively during tapping operations on tough materials. Altering the dynamics of the fluid at any stage during the manufacture of a component begs the question: 'is there a detrimental impact on efficiency elsewhere?'

Metalworking fluids require careful thought during the planning process. The wrong choice, poor control or a lack of maintenance will significantly affect every aspect of machining.



The productivity cycle: each element is dependent on the other

Metalworking fluid selection



Metalworking fluids are complex chemical formulations that are designed to perform multiple functions during the machining process. Modern materials and techniques, innovative tooling and pioneering machine technologies place higher demands on cutting fluids than ever before.



Today's machine tools combine a multitude of processes in one cycle and use increasingly faster speeds and feeds, together with high-pressure fluid delivery systems. To cope with these extremes it is important to consider all these factors when selecting the lubricant for the job.

Q8Oils manufactures a comprehensive range of water-miscible machining fluids for many different applications. Each provides a high level of cutting performance, together with excellent chemical and biological stability.

All our lubricants comply with the latest legislation, with no compromise in performance or service life. With more than 35 years' experience, we understand the need to balance capability with safety, efficiency and cost. During the design phase we carefully research applications and materials, selecting the best additives to provide the optimum balance of tool life, product life cycle and safety.

Our engineers can advise the best metalworking fluid for your application and help you get the most out of it, while working as safely as possible.

Understanding the importance of water quality

Water-mix metalworking fluids are, by definition, designed to be diluted in water, and therefore water represents the largest proportion of their volume. The quality of water used is critical. Standard tap water is impure and contains dissolved minerals and microorganisms such as bacteria, yeast and fungi.

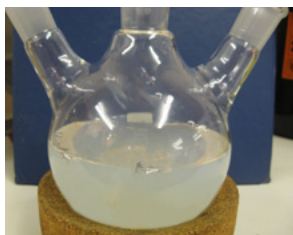
Mineral salts occur naturally in water and commonly include calcium, magnesium, sodium, bicarbonate, sulphate, chloride and nitrates. The amount varies widely depending on the source but, at high levels, any of these can affect the quality of the metalworking fluid by disrupting the emulsion. In extreme cases, or over a period of time, this can result in an unstable emulsion which can split, resulting in higher product usage and poor performance.

A key factor affecting metalworking fluids is the amount of calcium and magnesium carbonates, which dictates the water hardness and varies significantly by region.

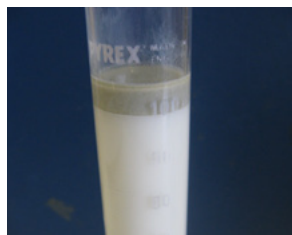
It is important to understand that fluid circulating in a machine sump evaporates water. The mineral salts remain and start to accumulate, which increases their concentration. In addition to the negative impact on emulsion stability, high levels of mineral salts can also lead to machine and component corrosion, sticky residues and elevated levels of bacterial contamination.

Water used for soluble metalworking fluids should be clean and pH neutral. It should not be too hard or too soft (see table below) as this can cause precipitation or foaming.

It is most common to measure water hardness in in ppm (parts per million) CaCO_3/L , but both the French ($^\circ\text{fH}$) and German degree scales ($^\circ\text{dH}$) can also be used.



Intact emulsion



Split emulsion

Classification	hardness in ppm or $\text{mg-CaCO}_3/\text{L}$	hardness in $^\circ\text{fH}$ (French degrees)	hardness in $^\circ\text{dH}$ (German degrees)
Soft	0 – 60	0 – 6	0.30 – 3.37
Moderately hard	60 – 120	6 – 12	3.37 – 6.75
Hard	120 – 180	12 – 18	6.75 – 10.12
Very hard	≥ 180	> 18	≥ 10.12

French scale: 1° hardness = 10 ppm as CaCO_3

German scale: 1° hardness = 17.8 ppm as CaCO_3

Water purity should be a top priority when selecting a metalworking fluid. If a concentrate is not formulated to cope with high levels of hard water contamination, it will fail in use long before the anticipated drain period. Even with fluids that have been designed to operate using impure water, additional treatment makes long-term economic sense. Options include processes such as reverse osmosis, distillation and deionisation.

Testing water quality before recommending a product is standard procedure for Q8Oils industrial representatives, who can also offer advice and guidance on water treatment equipment.

Fluid control

Without correct monitoring and maintenance, the condition of all water-miscible cutting fluids will eventually deteriorate from the initial fill. Adherence to working parameters is essential to achieve the expected level of performance and life cycle. Here, we consider the negative impact caused by a lack of control and maintenance and suggest corrective action, including equipment solutions.

After selecting the most suitable cutting fluid and filling the machine sump at the specified concentration, the first objective is to maintain the status quo. Contaminates such as swarf and tramp oil are generally unavoidable, so it is very important to keep the system free of them, as far as possible. The fluid sump should also, if practical, be kept fully filled during production cycles.

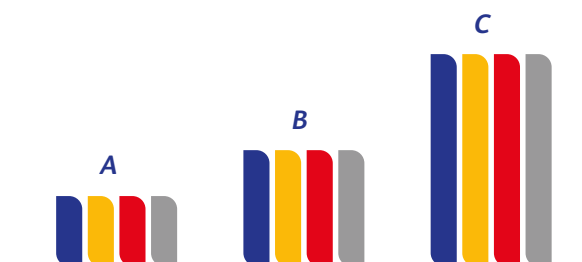
Preventing sump volume fluctuation is key to avoiding an excessively high fluid temperature, which is associated with premature tool fatigue. The cutting fluid provides lubrication at the point of contact and dissipates heat generated from the interaction of the surface areas. Excessive heat also significantly affects the fluid condition and accelerates degradation. Maintaining fluid fill levels and the correct mixture ratio is therefore vital to achieve optimal cutting fluid performance.

Below we describe three typical machine shop scenarios to demonstrate the correlation and negative cycle when the sump volume reduces through a lack of action and/or swarf contamination.

		Sump Status		
Fluid volume level		A 50%	B 100%	C 100%
Swarf %	50		●	
	30	●		
	0			●
Fluid concentration %	Excessive	●	●	
	Concern			●
pH level	Good			●
	Concern	●		
	Poor		●	
Bacteria level	High		●	
	Moderate	●		
	Non-detected			●
Temperature	High	●	●	
	Normal			●

Comparison of scenarios

■	Product performance
■	MWF sump life
■	Reduce safety risk to operator
■	Reduce machining cost



Sump Status

Scenario **A**

This highlights the impact on the cutting fluid when both the fluid volume and concentration level are neglected. The fluid has to work harder to dissipate the generated heat and the resultant increase in evaporation raises the concentration and temperature. Tool life may be reduced and the fluid becomes less resistant to microbial infections. Although it may be tempting to lower the excessive concentration by topping up with water alone, this could exacerbate an already dire situation. In doing this, you may increase the heat dissipation but weaken the fluid's ability to resist bacterial contamination or protect machine components.

A far better solution is to remove the excessive swarf and top up the system with a weaker concentration of the fluid. In some cases, the only option may be to fully drain and clean the system, which involves labour costs and machine downtime. This situation can be avoided by taking proactive preventative measures.

Scenario **B**

Here, the system is being maintained at correct volume levels, but significant swarf contamination has reduced sump capacity. The negative effects are similar to Scenario A, but the low pH of the fluid is an additional concern. This could be caused by bacterial contamination from stagnation, trap points and potential reactive materials. The excessive swarf should be removed and the fluid tested for bacterial contamination using the dip slide method. If high bacterial contamination is confirmed, it can be treated with a biocide and replenished with fresh fluid to improve its condition. In the worst cases, it may be best to fully drain and clean the system.

Scenario **C**

This is typical of a well-maintained system where the sump volume is maximised and provides optimal cooling functionality. The fluid concentration and pH level are within recommended parameters, the flow is unrestricted and there is no evidence of bacterial activity. This greatly increases the fluid's potential to perform optimally, last longer and reduce operator exposure to harmful microbes.

In practice, restricted time and resources in machine shops make it difficult to constantly address fluctuations in fluid concentration and contamination resulting from machining operations. Using dedicated equipment will maintain sump volumes, replenishing them immediately and accurately. Continuous removal of contamination helps to stabilise the concentration peaks and troughs that are typical of poorly managed systems. Maintaining a consistent trend line within set parameters delivers a safer working environment and prevents unnecessary wastage and increased costs.

Monitoring fluid health

Measuring fluid concentration



By applying a small amount of fluid to the prism you can determine the Brix percentage. It is advisable to calibrate the refractometer first by applying water to the prism and adjusting it, if necessary, to zero.

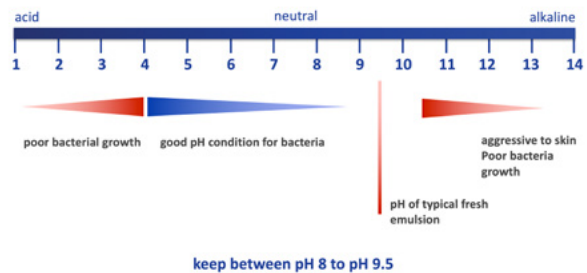


It is especially important to understand the refractometer correction factor. To interpret the correct concentration, multiply the refractometer reading by the product index factor, which can be found on the fluid product data sheet.

Measuring the pH level

The working pH of a metalworking fluid is a key indicator of its health and should typically be within a relatively narrow range. Most metal removal fluids are alkaline, which means that they have a pH above 7.0. All water-miscible metalworking fluids are formulated to operate within a recommended pH level when diluted. For the majority of conventional products, this ranges from 8.5 to 9.8 pH.

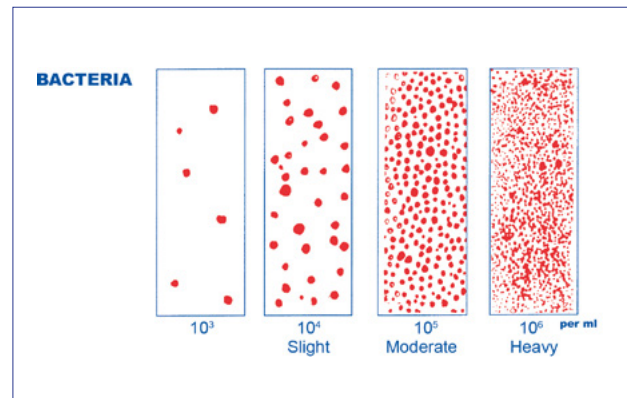
High pH levels can irritate skin and risk material reactions such as surface staining. A reduction in pH, often caused by microbial contamination, affects the stability, performance and overall condition of the fluid.



Measuring microbiological activity

Cutting fluid concentrates made up with water are prone to microbiological growth, which is most commonly monitored and measured by dip slide testing. Dip slides contain a sterile layer of agar on both sides that measures the growth of bacteria, fungi or yeast in terms of colony forming units (cfu/cm³). After taking the fluid sample, the dip slide should be incubated for two to three days at approximately 30°C.

If results indicate levels above 10⁵ cfu/cm³, corrective measures are required. These include adding chemicals to eliminate bacteria or fully cleaning and recharging the system. Before any action is taken, follow good practice in checking the concentration, pH, tramp oil content, metal contamination, operating temperature, agitation and flow.



We recommend a series of checks to ensure the long-term stability of a metalworking fluid and minimise health risks. These are highlighted in the table below:

Measurement	How	Frequency	Comments
Fluid appearance	visual and odour check	Daily	<ul style="list-style-type: none"> Does anything look or smell different?
Concentration	refractometer	Check daily Record at least weekly	<ul style="list-style-type: none"> Check the concentration is within the recommended product use range Always use the refractometer conversion factor when calculating the concentration (reading x factor = concentration)
pH	pH meter pH strips	At least weekly	<ul style="list-style-type: none"> Check the pH value is within the recommended range
Microbiological contamination	dipslide	Weekly unless consistently <10 ⁴ CFU/ml	<ul style="list-style-type: none"> Check bi-weekly or monthly if previous results and other parameters (pH and concentration) indicate the fluid is under control Keep records to demonstrate control
Tramp oil	measuring cylinder or visual check	At least weekly	<ul style="list-style-type: none"> Keep tramp oil to a minimum (<2%) When checking visually, a full layer of oil should indicate >2% Use a tramp oil skimmer and check for oil leaks

Fluid maintenance

Maintaining sump fluid levels

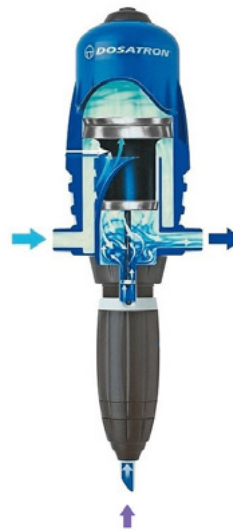
It should be relatively easy to maintain machine sumps at correct levels, but time constraints and the onerous manual handling means this often happens less than desired. As a result, sumps may be left well below recommended volumes during production.

Installing an automated mixing system provides coolant on demand by replenishing systems locally or as a part of a direct feed and also protects operators from contact with fluid concentrate.

Q8Oils offers a range of coolant delivery systems that feed machines with an accurate mix of metalworking fluid. Your Q8Oils representative can give guidance on best practice options for related delivery systems and installation.

The Dosatron range provides accurate and reliable non-electric dosing of liquid additives and stock solutions at a rate directly proportional to water flow. The system maintains a consistent concentration, regardless of fluctuations in water flow rate and pressure.

For smaller machine shops with limited space to install a direct delivery system, the Nimatic emulsion mixer is a good alternative. Designed for mixing category 3 metalworking fluids, it features a built-in double backflow prevention device and vacuum breaker compliant with EN 1717.



Dosatron water powered injector



Nimatic emulsion mixer



Retractable hose reel for machine shop fluid dispensing



In machine shops without a fluid delivery system, the fluid is often transferred manually using buckets or oil drums. This is cumbersome and slow, and increases the risk of injury and spillage. We advise carrying out a risk assessment for such practices and consider the use of a fluid transfer unit instead. A coolant bowser eliminates the risk of strain injuries and significantly cuts the time taken to fill or top up machines, by reducing multiple trips from the mixing point to the machine.

The Freddy coolant bowser is used for transporting fluid safely around a machine shop

Removing swarf contamination



Dedicated vacuum equipment can be used to rapidly remove sump debris and filter coolant

The traditional way to remove swarf accumulated in machine sumps involves stopping the machine to carry out the strenuous task of physical removal. Sometimes the fluid has to be removed and disposed of to gain access to swarf debris in dead areas. The machine downtime, labour and fluid disposal inevitably raise costs. In many cases, the build-up of swarf is ignored, and production continues regardless of the effect on fluid condition and performance.

Specialist vacuum units manufactured by Freddy are designed to address this problem and take a fraction of the time compared to manual methods. Swarf processing vacuum equipment can also filter and reclaim the extracted fluid for reuse, without the need for machine downtime.

Effective filtration



Centrifuge coolant cleaner



Mobile magnetic fluid filtration system



Stationery magnetic filtration systems

It makes sense to filter fluid and in some cases, such as specialist applications for producing high precision components, it is essential to achieve dimensional accuracy. With the exception of most grinding systems, filtration systems supplied with most CNC machine tools are inadequate and often fall far short of achieving the required levels. Fine debris inevitably becomes suspended in the coolant and rapidly builds up. This contamination reduces the performance and potential service life of the fluid.

There are many ways to remove the material contamination generated by machining. Options include utilising magnetic, centrifuge and filter media equipment. Suitable solutions depend on the materials processed, application, access and budget.

Q8Oils has partnered with expert filtration equipment suppliers and can offer advice and support to address all metalworking cleanliness issues.

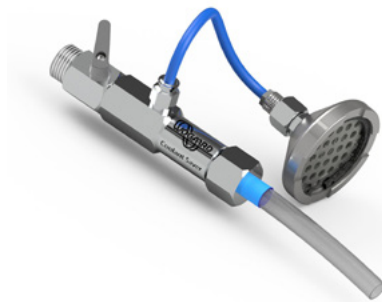
Tackling fluid 'drag out'

It sounds nonsensical to accumulate perfectly good cutting fluid in swarf bins and throw it out with scrap material, but unfortunately this is common. Even with the best intentions, replenishment from the skip back to the main system is thwart with problems. The destabilisation of the fluid concentration and risk of reintroducing a potentially rancid product should be cause for concern.

The large surface area of swarf makes it inevitable that fluid will be present on its journey from removal to extraction. How much remains depends on the fluid's condition and characteristics. It is a sound investment to select a cutting fluid with superior 'rinse off' properties, but without correct fluid management, even a high-quality cutting fluid can become adherent. Foaming, excessively high concentration and hard water instability are all factors that lead to a swarf bin full of cutting fluid.

Before using equipment to address the problem of drag out, it is worth revisiting the fluid selection process. Can the fluid cope with the delivery rate, system layout, speeds and feeds, as well as the quality of make-up water used? Get it wrong and the fluid will perform poorly, become unstable and be unfit for purpose.

After choosing the best cutting fluid for your application, we strongly recommend achieving further efficiencies by reclaiming spent fluid. The Wogaard Coolant Saver is a simple device that has a big impact on fluid efficiency and condition. The unit runs off existing machine pump systems and instantly returns any lost fluid from the swarf bin back to the main sump. The immediacy of the process makes the concentration less prone to extreme fluctuations and the fluid no longer builds up, only to stagnate in the swarf bin.



Wogaard coolant saver

Removing tramp oil and aerating fluids

For many years, total loss lubrication systems have been used to lubricate machine tool slideways. This method has become less common with the advent of modern technologies and materials, but where it is still used, it is essential to remove the contamination to avoid spoiling the coolant.

Tramp oil adversely affects the fluid condition and can lead to health risks for operators. Disproportionate levels of oil contamination prevent the coolant from accessing oxygen and create an ideal environment for anaerobic bacteria to multiply. It is especially important to be aware of this for machines that do not run day to day. The UK Health and Safety Executive (HSE) advises that tramp oil contamination levels of 2% and higher require immediate removal action.

Whether you need a localised unit or a mobile system to serve the entire machine shop, Q8Oils offers demonstrations and advice on the best equipment to suit your needs.



Tramp oil skimmers in various formats to suit differing situations



Purifying device

While removing unwanted oils from coolant sumps, it is also good practice to introduce oxygen, especially when the coolant is not in use. This is easily achieved by installing a simple purifying device.

Preventing harmful exposure to fluid mist

Exposure to metalworking fluids, either in liquid or mist form, can cause a range of health risks, including respiratory diseases such as occupational asthma, hypersensitivity pneumonitis (previously known as extrinsic allergic alveolitis) and COPD.

Many metalworking applications, including machining and grinding, generate oil mist which can lead to these diseases, create slip and fire hazards, and damage sensitive electrical equipment.

The HSE recommends Local Exhaust Ventilation (LEV) as the most effective way to remove oil and soluble coolant mist from workshop air. An oil mist filter installed on machine tools captures contaminated air before it can escape into the atmosphere.

Working in partnership with Filtermist Systems, Q8Oils can supply atmospheric testing and extraction equipment that protects operators and creates a cleaner, safer and more productive working environment. Your Q8 representative can arrange COSHH compliance monitoring and installation of related LEV extraction systems.



Oil mist filters

Adding value through swarf processing



Briquettes produced from swarf



Metal chip compacting machine



Manual swarf centrifuge

At the end of the production cycle, if you have introduced all the control measures suggested, you will have prevented waste, reduced energy consumption and increased efficiency. But you do not have to stop there! You can add significant value late in the process by compacting swarf into briquettes or reclaiming cutting fluid, using a centrifuge system.

Swarf is the by-product of removing material. Its volume makes disposal costly and it takes up valuable space in the workshop.

Investment in swarf processing equipment has many benefits. It compacts material under pressure into briquettes and, depending on the material, can reduce the volume by more than 20:1. The dramatic reduction of waste material for disposal is good for the environment and company profile. Materials in briquette form yield a significantly higher return value and reclaimed metalworking fluids can be re-used in production.

Briquetting presses and centrifugal separators are a major long-term investment, but the savings and environmental benefits speak for themselves. With foresight and accurate planning, the cost of these systems can break even in a relatively short time and start to add real value.

In partnership with Q8Oils



- Q8Oils has close partnerships with many equipment suppliers. We have gained vast experience over many years in facilitating process-improving solutions for our industrial customers.
- To discuss any equipment related matters for any application, please contact your Q8Oils representative for expert advice and competitive quotations.

What our customers say

Operations Manager - Cambridge Precision

"We invested in a Freddy Midi as recommended by Q8Oils. This has helped us to reduce downtime and reduce costs by allowing us to recycle our coolant as well as reducing waste in line with our ISO14001 environmental accreditation."

SHEQ & Manufacturing Sustainment Manager - DIBA Industries

"The radius skimmer has performed above expectations, constantly removing tramp oil and ensuring the quality of the coolant is sustained for longer periods. Both of these items have contributed to cost savings within the business."

Machine Shop Manager - Maycast Nokes

"We purchased a coolant recycling unit as a part of strategy supporting accreditation to ISO14001 - Environmental Management System. The Freddy Ecovac has helped extend fluid life and cleanliness."

Maintenance & Service Engineer - Twiflex

"We tried the Eclipse magnetic filter on a demo for a month on our surface grinding machine and found it to be so effective that we decided to purchase it. We can see a difference with tool life and coolant life is much longer. This machine doesn't have any other filters on it so we can really see the benefits."

Technical services and support for metalworking fluids & industrial lubricants

QCare - expert technical support from Q8Oils

Q8Oils offers a range of world-class metalworking fluids which are designed to meet the high demands of modern machining operations and deliver top performance, while protecting the environment and operators' health.

To help you get the most out of these products, Q8Oils provides comprehensive technical support through our QCare service. This includes the following:

Application Specialists

Our experienced Application Specialists are on hand to offer you advice and guidance. They help you select the most appropriate metalworking fluid for your application, which balances efficiency and safety. Using our Fluid M8 programme they can help you optimise performance through condition monitoring of the fluid in the machine and recommend any corrective actions. They also offer advice on working safely with metalworking fluids and complying fully with local and international health and safety regulations.

With their support, you can increase the life of your fluid, optimise performance, minimise unscheduled maintenance and reduce machine downtime.

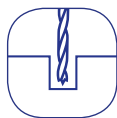
The combination of highly trained Q8Oils Application Specialists and Fluid M8 will enable you to:



streamline your metalworking operation



significantly reduce operating costs



increase tool life



improve production rates



reduce coolant usage



improve operator acceptability

Fluid Management

Choosing the correct metalworking fluid with the right balance of safety and performance is an important step in improving productivity and protecting employees. It is vital to appreciate that the composition of a metalworking fluid changes in use. Changes include both chemical deterioration and contamination, such as tramp oil, and also microbiological contamination.

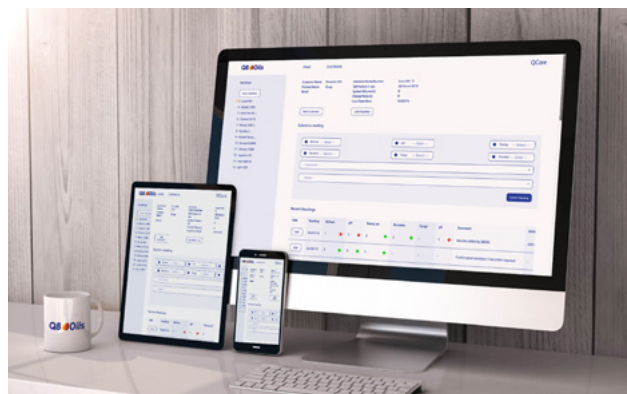
It is therefore crucial to monitor metalworking fluids to maximise product performance and meet health and safety requirements. A full fluid condition monitoring programme is the best way to achieve this.

Q8Oils can advise you on the best way to set up an efficient fluid monitoring programme. This will help minimise unscheduled maintenance, increase coolant life and optimise performance, resulting in improved productivity and reduced machine downtime.

Fluid M8

Our experts use Fluid M8 to monitor fluids, complete audits and deliver the results while on site. They can assist you in identifying any problems and help to correct them.

Fluid M8 is a user-friendly, fully automated system that uses graphical charts and reports to show the full history of each metalworking fluid system. When the checks are completed, a report shows the current condition of the fluid in each machine. Results are displayed using a simple traffic light system: green (fluid within acceptable parameters), amber (caution – further monitoring and possible action is needed) and red (action required). You can log on to Fluid M8 using your own smart phone, tablet or desktop computer and view a full historical report at any time and share it with colleagues.





Training seminars

Q8Oils offers a range of training seminars, each run by an experienced Q8Oils technical specialist, to help you work safely and efficiently with metalworking fluids. Our seminars include:

- Technologically advanced soluble and neat products
- Powerful lubricity to reduce operating costs and increase tool life
- Advanced safety profile and full compliance with the latest legislation

Engineers guidebook

Metalworking fluids are some of the most complex products in terms of chemistry and are designed to work in demanding working environments.

To help users understand this, Q8Oils has published a useful pocket sized 'engineers guide to using both soluble and neat metalworking fluids.

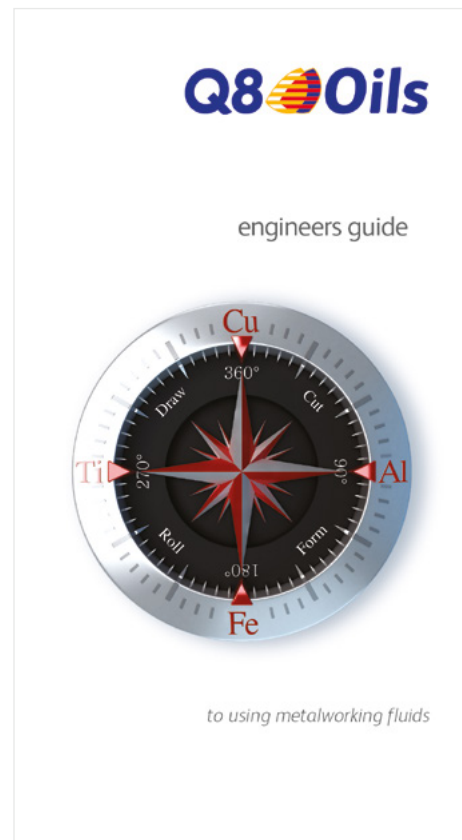
With this guide our objective is to provide our customers with practical guidance and useful tips on how to manage metalworking fluids both efficiently and safely.

This will help reduce unscheduled maintenance and provide a safe and productive working environment for your employees.

Managing metalworking fluids

The Q8Oils engineers guide book informs users on how to manage metalworking fluids at every stage, from 'cradle to grave'. The pocket guide concentrates on giving practical advice and working instructions on the following aspects:

- Ensuring compliance to health & safety law when using metalworking fluids
- Handling and operator exposure precautions
- What are metalworking fluids ?
- Engineering controls and system design
- Good practice and maintenance of metalworking fluids
- System cleaning and disposal
- Trouble shooting guide



Metal manufacturing solutions

Our metalworking fluids are the result of more than 35 years of product development and application experience. We create smart products that extend tool life and reduce operating costs, while staying a step ahead of the increasing demands arising from increased operating pressures, faster cutting speeds, new materials, advanced tool technologies and future legislation.



Metalworking fluids

- Technologically advanced soluble and neat products
- Increase performance and reduce operating costs
- Advanced safety profile and fully compliant with the latest legislation



Wire & tube drawing oils

- Lubricants for all applications such as bar, rod, wire, tube, strip and profiles
- Balanced lubrication and exceptional cleanliness for optimum performance
- Long life products and excellent surface finishes



Cold rolling oils

- Technologically advanced products suitable for all types of mills
- Reduced VOC emission and higher flashpoints
- High-quality surface finishes



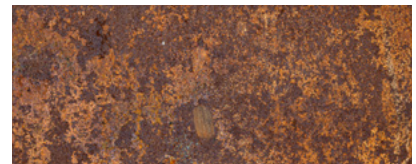
Forming oils

- High-performance products for a multitude of metal forming processes
- Neat and soluble product ranges
- Minimum quantity lubrication (MQL) and vanishing oils



Quenching oils

- Advanced quenching fluids
- Suitable for a wide range of quenching applications
- High oxidation stability and long lasting quenching performance



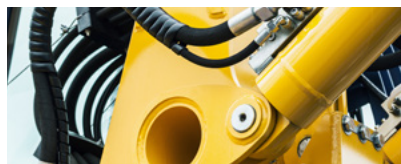
Anti corrosion fluids

- High-performing corrosion protection fluids for ferrous and non-ferrous metals
- Easy to apply by brushing or spraying
- Excellent water separation when applied by immersion



Greases

- High-performing range of products for various applications
- Designed for ease of application
- Able to operate in harsh environments



Hydraulic oils

- Highly efficient power transfer and pressure resistant
- High and low temperature resistant
- Prevent wear



QCare

- Experienced and knowledgeable technical support
- Dedicated to problem solving and knowledge sharing
- Health & safety, productivity and equipment solutions



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