Q8Oils

engineers guide

to using soluble metal manufacturing fluids

contents

introduction

This guide is intended to provide users with information and advice on how to manage water miscible and neat metal working fluids at every stage from ''cradle to grave". It aims to give a broad understanding of cutting fluids, wire drawing and rolling emulsion management rather than attempting to cover every smallest detail. It concentrates on giving practical advice to users on how to get the best from their systems and how to avoid the mistakes which can be caused during the system design and product selection.

The guide also covers the essentials of maintenance and the monitoring of emulsions as well as giving you advice on what to do when things go wrong. You will also find recommended procedures for the safe waste disposal of water miscible metal working fluid at the end of its useful life.

If you have any questions regarding any point in this guide, then please contact your local Q8Oils representative.

terminology

This guide to metal working fluids is written to be understood by everyone involved in the use, maintenance and management of neat and soluble metalworking fluids, wire drawing and rolling emulsions. For those people with limited knowledge of these products and industry terminology, the following definitions may be helpful:

Emulsifier
Additive used to bond water and oil molecules together by polar attraction.

Surfactant
A detergent additive to maintain system cleanliness.

Corrosion Inhibitor
Chemical additive to keep metal surfaces bright and clean.

Extreme Pressure Additive
Commonly known as EP, provides a chemical, friction reducing film.

Bactericide/Biocide
Chemical additive for killing bacteria.

terminology

Fungicide
Chemical additive for killing fungal spores.

Biostable / Biostability
The control of bacterial contamination.

Emulsion
Oil mixed evenly in water at the correct particle size.

Tramp Oil
Any leaking or lost oil (slide way, hydraulic or gearbox) present in a metal working fluid.

pH
The measurement of acidity and alkalinity.

Refractometer
Scientific instrument for checking the concentration or dilution of a metal working fluid by light refraction.

Conductivity
The measurement of a solutions ability to conduct electricity.

Dip Slide
A test that contains nutrient surfaces to develop and measure bacteria, fungi and yeast infection in metal working fluids.

What are emulsions and fluids for metal working, drawing and rolling?

Metalworking The most important functions of a metalworking fluid are to reduce the friction between the part being cut and the machine tool, to extend the life of the tool, cooling and to transport the chips and swarf away from the cutting zone.

Drawing Emulsion The most important functions of a drawing emulsion are to lubricate between the metal and die. also the metal and capstan, to extend the life of the die, protect the capstan, cool surfaces and to keep the drawing machine clean by carrying fines to the filtration system.

Rolling Emulsion The most important functions of a rolling emulsion are to cool the metal and work rolls whilst providing the required lubrication to the roll bite to enable the reductions required also to protect the work rolls and mill surfaces from corrosion.

The more you understand about soluble oils the better able you will be to manage them effectively and appreciate why precautions should be taken and procedures followed.

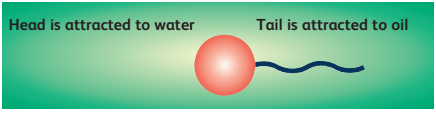
A water miscible metal working fluid can be any of 3 basic types:

1. Conventional oil in water (milky type)
   Mineral oil which is finely dispersed into water by use of emulsifiers.
2. Semi synthetic or micro emulsions (semi-transparent)
   Mineral oil and synthetic components very finely dispersed into water.
3. Synthetics or chemical solutions (transparent)
   A true solution of water and water mixable materials.

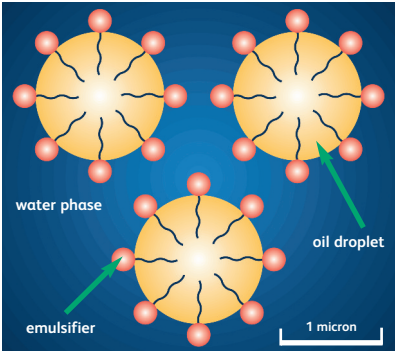
emulsifiers

Emulsifier Additives

These enable water and oil to interact by polar interaction



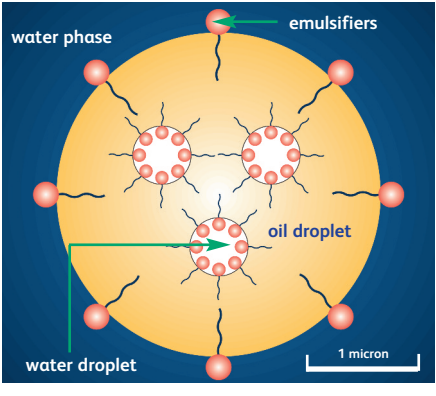
Typical oil in water emulsion in schematic format



This type of emulsion is formed when concentrate is added to water & mixed correctly. Typically the smaller the oil droplet the more translucent the emulsion appearance and generally more stable.

emulsifiers

Typical water in oil (invert emulsion)



This is the type of emulsion formed when water is added to oil rather than following the recommended procedure. Note how water droplets are inside the oil droplet yet the water is still the continuous phase surrounding the oil. The final emulsion particle size is much larger and takes on a vastly different appearance and behaviour i.e. it will not perform the same as an oil in water emulsion.

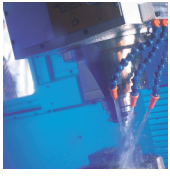
soluble metal working fluids typically contain

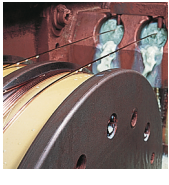
- **Mineral and/or synthetic oil (1-80%)**
- **Emulsifiers**
- **Surfactants**
- **Corrosion Inhibitors**
- **Lubricity additives**
- **Extreme Pressure additives (EP)**
- **Bactericides**
- **Biocide**
- **Fungicide**
- **pH buffers**
- **Antifoams**
- **Metal Protectives**

Any one component can run out before the other causing an imbalance.

neat metal working fluids typically contain

- **Mineral and/or synthetic oil**
- **Corrosion Inhibitors**
- **Lubricity additives**
- **Extreme Pressure additives (EP)**
- **Anti-oxidising agent/anti-oxidant**
- **Antifoam**
- **Anti mist agent**

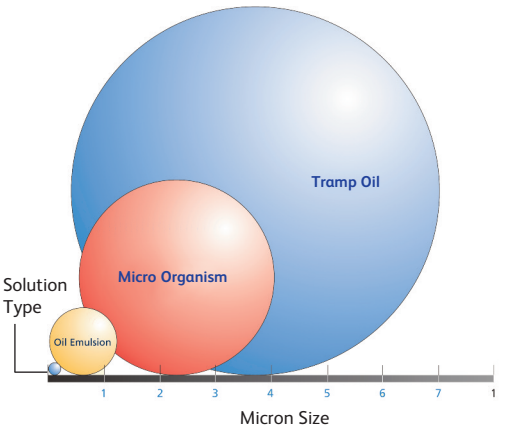




the importance of droplet size

Water miscible metal working fluids work more effectively when droplet sizes fall within the range 0.2 to 1.5 microns. The diagram shows the relative sizes of solution type and oil emulsion type fluid at one end of the scale, compared to an emulsion infected with micro organisms and tramp oil. This illustrates the need for regular monitoring and maintenance.

Comparative Sizes



storage of metal working fluids

Neat metal working fluids should be stored in an environment where there is no contact with water or any other contaminant. When drums are stored outside they should be placed horizontally to avoid water or contaminant seeping into them.

Soluble Metalworking concentrates contain a small percentage of water, this is because certain additives are only soluble in water. As a result of the product containing water the concentrate needs to be protected against freezing otherwise the freeze / thaw cycle will separate the component parts and cause problems. If the ambient temperature drops below 0°C, the concentrate should be stirred and heated-up prior to use. A quick test with 95 ml water and 5 ml concentrate in a glass can show you if the product is still miscible in water and gives a stable emulsion.

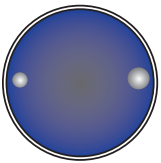
The water miscible concentrates should also be protected against excessive heat, direct sunlight and should be stored indoors.

storage of metal working fluids

Recommendations

As a rule of thumb Q8Oils recommend that you always store soluble oil concentrate and neat metal working fluids indoors at a temperature above freezing. It is essential to protect concentrates:

- from **frost**
- from **water contamination**
- from **any other potential contaminant**
- from **heat or direct sunlight**



Always store barrels on their side with bung holes at the horizontal position as shown. This will maximise storage life by avoiding water contamination.

Storage tanks should be inspected regularly for contamination. If the emulsions are stored in tanks we advise you to perform bacteriological examinations every 6 months. If any bacteriological activity is observed, the tank and any connected equipment should be disinfected with a biocide.

mixing of metal working fluids

The mixing process can affect the long term stability of a metal working fluid emulsion

- Always add concentrate to water to avoid instability
- Never add water to concentrate, as this can cause gels and lumps
- Refer to Q8 Technical Data sheets for manual mixing instructions

It is recommended that you use a soluble oil mixer or dosing unit

The Dosatron type is a water pressure powered model, which stops when demand is zero. It is positive displacement, which gives a constant mixture over a wide temperature range and flow rate and is easily adjustable. Venturi mixers are much less expensive but are not as reliable and in the long run positive dosing types are the most cost effective.

water

The water quality should be known in order to avoid problems such as fungal & bacteria growth, extreme pH & high mineral salt content. Local water companies can supply further details.

The water used for water miscible metal working fluids should be clean and pH neutral. Water should not be too hard ($CaCO_3$ > 440 mg/kg) or too soft ($CaCO_3$ < 175 mg/kg) as this can cause precipitation or foaming. Too soft water can be hardened with additives and too hard water should be demineralised prior to mixing.

1 Degree Hardness French Scale =
10 ppm as $CaCO_3$

1 Degree Hardness German Scale =
17.8 ppm as $CaCO_3$

maintenance of metal working fluids

Neat metal working fluids

In general, neat metalworking and drawing oils are easier to maintain than water miscible fluids. Neat metal working fluids should be free of solids and maintained at the original viscosity. Contamination with ''tramp oils'' like hydraulic oils should be avoided. These contaminants can influence the viscosity and additive level to such a degree that the performance of the neat metal working fluid can disappear. Q8Oils has neat metal working fluids which are dual-purpose e.g. metal working fluid and hydraulic fluid. For these products contamination will not change the metal working performance.

Water miscible metal working fluids

Water miscible metal working fluids are prone to infection such as bacteria, fungi or yeast.
They can go sour, causing them to smell, split and separate.
To protect YOU and your metal working fluid preventative measures are required.

THIS WILL SAVE MONEY AND CREATE A SAFER WORKING ENVIRONMENT

maintenance of metal working fluids

- Remove tramp oil or other contaminants as soon as possible, ensuring workers understand that the sump must be a waste food and urine free zone
- Keep within the specified recommendations for the concentration
  - Too low concentration promotes:
    i. Microbiological growth
    ii. Lower emulsion stability
    iii. Lower cutting performance
    iv. Accelerates corrosion problems on machine and part
  - Too high concentration can cause:
    i. Foaming
    ii. Less cooling
    iii. Poor tool performance
- Sterilise the system using System Cleaner before introducing fresh emulsion
- Avoid using contaminated water
- Select biostable fluids
- Use Biocide where appropriate (as a preventive measure), Q8Oils can advise
- pH value is very important.
  - A fall of the pH value can be caused by a bacteriological attack. Unpleasant odour will be noticed and the emulsion will become unstable.
  - A rise in the pH can be caused by presence of alkaline or system cleaners.

Approximate Guide to Concentrations

Mineral 5-20 %
Semi-synthetic 2-10 %
Synthetic 1.5-10 %

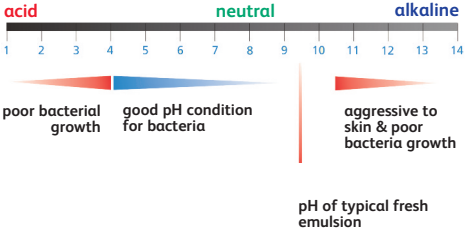
introduction to basic practices

- High temperatures can cause evaporation of the water, so that the concentration of the salts will increase and emulsion stability will be influenced. Hence it is important to control emulsion operating temperatures.

- When there is no metal working operation, keep your circulation pumps running as it has been noticed that bacteria will multiply more rapidly when the air supply is shut off.

- Use condition monitoring techniques

the pH scale



keep between pH 8 to pH 9.5

condition monitoring techniques

Neat oil condition monitoring

Normally, the monitoring of neat metal working fluids is simple, as microbiological growth is low and the fluid life time is long.

Neat metal working fluids should be monitored on:

- Viscosity
- Contamination
- Additive concentration
- Oxidation

Water miscible condition monitoring

Water miscible fluids however need more monitoring, e.g.

- Visual check of oil float, surface creaming & watery layers
- pH value check
- Conductivity value check
- Check for micro-organisms
- Concentration check by Refractometer
- Smell

For more specific monitoring techniques or complex testing you can contact Q8Oils or a specialised laboratory.

maintenance of metal working fluids

Instruments required for maintaining metalworking fluids

- Refractormeter

- pH meter.
- Clean pH probes.
- Conductivity meter.
- pH papers.
- Water hardness kit.
- Water hardness papers.
- Nitrite test papers.
- Dip slides/incubator.
- Biocide test kit.

- Wire Drawing Co-Efficient of Friction
- Rolling Emulsion Quench Characteristics

instructions for use

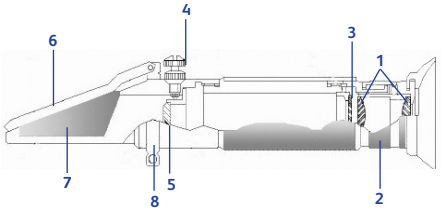


Figure 1. Refractometer Schematic

1. Eyepiece
2. Scale focusing knob
3. Scale
4. Scale calibrating knob
5. Lens
6. Plastic cover
7. Prism
8. Frame for plastic cover

A refractometer is a handheld optical instrument that can be used to measure the mixed concentration of soluble metalworking fluids. The refractometer gives a number by measuring the refractive index of the fluid mixture. The operator can then monitor the concentration of the soluble metalworking fluid.

Calibration

Calibration of the refractometer is necessary to obtain an accurate refractive index measurement. Before calibrating the instrument, ensure that the temperatures of the refractometer, water and soluble metalworking fluid sample are at ambient temperature, as accurate calibration is temperature dependent.

Proceed as follows:

Place a few drops of water (used for the mixture) between the plastic cover (6) and the prism (7). Hold the refractometer horizontally and point it at a light source. Look into the eyepiece (1) and adjust the scale calibrating knob (4) until the boundary line which separates the light and dark areas of the scale is aligned with the zero line on the scale. Figure 2 depicts a typical refractometer scale.

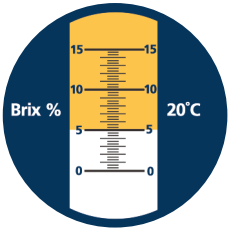


Figure 2. A Typical Refractometer Scale

Instructions for use

1. Lift the plastic cover and dry the prism with a clean, dry cloth. Place one or two drops of the fluid on the prism and close the plastic cover.

2. Note the refractometer scale reading at the point where the boundary line separates the light and the dark areas on the scale. Determine the concentration by multiplying the refractometer scale reading by the refractometer factor of your soluble metalworking fluid (see note & example)

3. Clean the refractometer prism and plastic cover with a dry, clean cloth before storing the refractometer in the carrying case.

Note:

Soluble metalworking fluid concentration (%) = refractometer X factor

Example:

The refractometer factor for Q8 Beethoven XM = 0.9
A 5.0 reading on the refractometer scale, as seen in Figure 2, multiplied by the refractometer factor of 0.9 yields a 4.5 % mix concentration

maintenance

To ensure the accuracy of results the following information and test methods must be followed:

Cleaning pH probes

Purpose

To clean and regenerate the pH probe sensor.

Reason

To remove tramp oil and other contamination from the pH probe sensor.

Equipment

pH probe(s), distilled water, 0.1m hydrochloric acid.

Method

At the specified intervals, the pH probe(s) should be soaked in 0.1m hydrochloric acid.

Rinse

The probe should be rinsed in the normal manner with distilled water and dried.

Placement

Place the probe in the acid and leave to soak for 2 to 3 minutes for routine contamination, or 5 minutes for heavy contamination.

Thoroughly Rinse

Thoroughly rinse the probe to remove all traces of acid and dry the sensor.

Soak

Soak the probe in pH 7 buffer solution for a minimum of 2 minutes and then calibrate according to the equipment instructions.

maintenance

Intervals

For probes in regular use the cleaning should be carried out every 2 weeks or more if required. For the spare probe, the cleaning should be carried out every 6 weeks.

Safety

As acid is corrosive every precaution must be taken to eliminate spillages. It is important to keep the acid stored well away from children, pets, foodstuffs etc.

Wear suitable eye protection and disposable gloves when cleaning probes using this method.

Whatman pH papers

General method of use

Dip the indicator strip into the liquid to be tested for a few seconds.

Remove the strip from the test solution and compare the resultant colour with the colour segments printed on the strip.

Important

Do not store indicator papers where they are liable to be exposed to acid or alkaline gasses or vapours.

maintenance

Water Hardness Tester

Completely fill the test tube with the water to be tested and pour it into the mixing bottle

Add one level measuring spoon of UNIVER III Hardness Reagent.

Using the dropper provided add Titrant Solution, Hardness 3, to the mixing bottle a drop at a time. While swirling the bottle, and counting the drops, continue the dropwise addition of Titrant until the colour changes from pink to blue.

The total hardness of the water in ppm as calcium carbonate (CaCO3) is equal to the number of drops of liquid chemical used.

NOTE: if one drop produces colour change, the actual hardness may be less than 18ppm.

Warning
Titrant Solution, Hardness 3 contains Propylene Glycol
MAY CAUSE EYE IRRITATION, DO NOT INGEST.

Wash thoroughly after handling. Avoid contact with eyes. Wear eye protection. Keep closed in a cool place.

IN CASE OF CONTACT - immediately flush eyes with water for 15 minutes. Visit the emergency department at your local hospital

Water Hardness Papers

Papers are also very effective to measure the hardness of water.

maintenance

Conductivity

This indicates the electrical potential of an emulsion and when used in conjunction with other data can indicate the emulsion age measured in microsiemens
It is a useful test in hard water areas to indicate hard water salt build up, where problems can be encountered above 3,000 microsiemens.
It can also indicate potential corrosion problems.

Biocide Concentration

Certain tankside biocides can be measured by analysis to determine the concentration added, it is important to know, record and measure correctly any biocide addition as overdose can lead to skin complaints. Biocides can be added either as a routine maintenance dose or a shock dose to any emulsion system to reduce bacterial growth.

Please consult your Q8Oils representative if in any doubt to have the correct procedure according to the Biocides Product Directive, BPD.

Bioburden

Indicates the level of microbial activity.
A sample of emulsion is placed on a special nutrient which stain the microbes as they grow.
The resultant colonies that grow are a measure of the number of organism per ml of MWF.
Regular Testing is recommended to minimise health risks and maintain good emulsion condition.
Action is recommended at bacteria counts of 10^5/ml and greater.

handling precautions for metal working fluids

Contact with metal working fluids is in many cases unavoidable. All metal working fluids can cause skin irritation or sensitisation but in many circumstances the risk of a skin irritation or sensitisation can be minimized. After working with metal working fluids, wash your hands with a disinfecting soap and use a hydrating cream.

Skin irritation

Operating soluble products at too high a concentration often causes many skin complaints. It is a known fact that at high concentration levels the water miscible metal working fluid will de-fat the skin causing dryness and irritation. High levels of fine particulate swarf will abrade the skin leaving it more susceptible to irritation and infection. Ensure adequate filtration of the coolants.

Skin sensitisation

A serious condition where the skin becomes very sensitive to a chemical and the condition becomes worse. In the future even small traces of the chemical will cause an allergic reaction and sensitisation is often permanent. Skin sensitisers are identifed by law on the SDS and hazard label, these can include certain types of biocides. The correct PPE should always be advised and any known operators known to be previously sensitised should avoid close contact with the chemical. If an outbreak occurs contact a hygiene specialist whom will carry out skin allergy tests to identify the chemical causing the problem.

handling precautions for metal working fluids

Some precautions can be taken:

- Avoid contact with metal working fluids
- Avoid using compressed air
- Wear oil-resistant protective gloves & clothing
- Wear eye protection
- Good ventilation
- Offer skin protection advice
- Do not clean oily hands in metal working fluids
- Seal off machines

Follow the HSE guidelines
www.hse.gov.uk/metalworking

treatment of infections

Bacteria & fungal infections

The vast majority of bacteria and fungal infections which occur in coolant systems are non-pathogenic (not harmful to man). However it has been demonstrated that aerosol mists of coolant contaminated with such organisms can cause respiratory reactions from the by-product produced from the organisms. Adequate control is therefore necessary.

The use of controlled dosing of biocides is one of the most effective methods should a system become infected.

Alternative methods such as Ultra Violet treatment of the coolants appear to provide an answer, but practical experience has shown these methods are less effective due to poor light penetration as the coolants age or tramp oil contaminates the circulation tubes.

Fungal infections once established are difficult to eradicate. One-off treatments are often unsuccessful as the fungal spores lie dormant waiting to re-infect. The regular use of an effective fungicide is normally required after the physical removal of all slimes and growths from all parts of the system.

disposal

At the end of its useful life a metal working fluid requires careful handling. Use only licensed or registered waste disposal organisations.
All disposal should be carried out in accordance with your local and country legislation.

Consider the likely toxic metals that may have accumulated.

Several methods are available. Traditional methods use acid treatment to destroy the emulsifier systems to cause the oil and water to split or evaporation techniques.
Modern methods use Ultra-filtration techniques to significantly reduce the volume of waste, typically by up to 90%. Consult your local water authority as there are regional variations on the limits of certain waste materials. For synthetic solutions a combination of Ultra-filtration and Nano-filtration is required.

There are also other methods which are very successful for the disposal of metalworking fluid, this is vacuum distillation. For any advice about any particular disposal system please consult our technical department.

cleaning procedure for machine coolant systems

Disposal of Metal Working Fluids

Even when the metal working fluids are well maintained there will be a point when they must be replaced. The metal working fluid should be changed when the specific values cannot be reached anymore.

At the end of its useful life a metal working fluid requires careful handling as there is a possibility that toxic metals may have accumulated.

A neat metal working fluid should be changed if:

- Contaminants cannot be removed
- Tool life drops
- Filtering becomes difficult
- Odour problems arise
- Fluid ages excessively

A water miscible metal working fluid should be changed if:

- An unpleasant odour is detected
- The fluid is causing gumming
- Deposits in the machine
- pH drops or rises
- If soaps are formed
- Excess solids or contaminants are found
- Tool life falls
- Filterability deteriorates

This procedure should be carried out on existing machines with water miscible metal working fluids to prevent bacterial infection and metal fines contaminating the fluid.

The procedure, when followed, will provide a clean system enabling you to see the best performance from your fresh fluid. If the system is badly infected and a SYSTEM CLEANER is being used, add a kill dose of an effective broad spectrum biocide directly into the sump. This can be added 48 hours prior to the machine cleanout taking place.

1. Add the recommended percentage of SYSTEM CLEANER to the previous fluid 48 hours before disposal and cleaning of the machine - please make sure that the fluid is circulating around the machine even when the machine is not being used.

2. After the 48 hours remove the fluid and thoroughly clean out the machine, making sure that all areas of the machine are cleaned, including the removal of all swarf or fines.

3. Put enough water into the system to enable pumping and circulate the water for a few minutes, this will flush out all residual SYSTEM CLEANER This water must also be treated as waste. The system will now be clean and ready for recharge.

Please note that if all the cleaner is not removed, foaming may be evident during start up.

4 Before you start refilling the system you can pre-check the cleanliness of the system by pumping a small amount of fresh, cold water to the sump and check to see how clean it is and pH neutral.

5 Recharge the system with new coolant at the required concentration/dilution and measure with a refractometer to confirm concentration. Fresh emulsions are preferably made with harder water, as it will avoid foaming.

6 Try not to fill the sump up to the top level, but leave some space for any alteration in the concentration.

For systems which contain neat metal working fluids the procedure of cleaning the system is easier than the cleaning of the water miscible fluids as the addition of the SYSTEM CLEANER is not required.

1 Dispose the old fluid correctly.

2 Clean all pipelines, tanks, nozzles, etc. thoroughly.

If you are in any doubt, contact your Q8Oils Representative. Q8Oils has a more detailed cleaning procedure available for you.

security, safety, health and environment

Q8Oils is committed to Security, Safety, Health and the Environment. We conduct our business so that the safety and health of our employees, contractors, suppliers, customers and the community are assured. We measure and review our SSHE performance and set objectives and targets for continuous improvement.

Specifically, we work with the environment agencies to ensure full environmental protection at all our production facilities.

At Q8Oils we believe that;

- All occupational injuries and illnesses can be prevented
- All operating exposures can be controlled
- Training employees to work safely is essential
- People are the most important element of the Safety, Health and Environmental programme

We believe that it is good business to comply with best industry practice, and we operate a world class Security, Safety, Health and Environmental Management System (SSHEMS).

HSE Guidelines for Metalworking Systems & Products

We recommend that you keep up to date with the latest HSE, Health & Safety Executive publications. If you have any queries regarding these publications please contact the Q8Oils Sales Manager, Local Contact or Q8Oils Technical Help Line.

Metal Working Fluid - Trouble Shooting Guide

Corrosion	Concentration too weak	*Adjust and maintain concentration at recommended strength. Use Refractometer to measure concentration.*
	Poor water quality. Corrosive ion build up from water	*Use better quality water. Consider deionised water.*
	High temperature/ humidity environment	*Reduce temperature and humidity and/or use a rust preventive such as Q8 Ravel range on finished parts.*
	Contamination	*Identify and eliminate contaminants that promote corrosion, such as heat treating salts, floor cleaners, bacteria (see Rancidity), etc.*
	Corrosive atmos-phere	*Identify and vent corrosive fumes out of problem area.*
	Low pH metalworking fluid	*Boost pH with small additions of Q8 Brytoklean pH Buffer.*
	Part handling/ storage	*Use clean, plastic dividers to allow parts to dry and remain separate. For extended storage, use a rust preventative such as Q8 Ravel on finished parts.*

For Wire Drawing and Rolling Applications please consult Q8Oils

Metal Working Fluid - Trouble Shooting Guide

Foam	Concentration too strong	*Adjust and maintain concentration at recommended strength. Use Refractometer to measure concentration.*
	Contamination	*Identify and eliminate contaminants that promote foam, such as system cleaner residue, floor cleaners, phosphate parts cleaner etc.*
	Water Quality	*Soft water (less than 100 ppm Total Hardness) can promote foam in some metalworking fluids. Use tank side additions of anti-foam (with care) such as Q8 Antifoam EWD5.*
	Type of Operation	*Some operations, such as surface grinding, can promote foam. Operation should be considered when selecting a metalworking fluid.*
	Fluid level low	*Keep the sump full in order to maximise fluid retention time in sump and allow the air to be released out of the mix.*
	Mechanical Problems	*Check the filtration system, fluid delivery, and fluid return systems for mechanical problems or leaks and repair. Avoid return fluid to input side of pump.*

For Wire Drawing and Rolling Applications please consult Q8Oils

Metal Working Fluid - Trouble Shooting Guide

Mix Instability	Too Weak Concentration	*Adjust and maintain concentration at recommended strength. Use Refractometer to measure concentration.*
	Contamination	*Identify and eliminate contaminants that promote mix instability, such as tramp oils, floor cleaners etc.*
	Water Quality	*Hard water (greater than 200 ppm Total Hardness) can promote mix instability in some metalworking fluids. Consider using soft or deionised water. Alternatively use a hard water tolerant metalworking fluid.*
Poor Surface Finish	Too Weak Concentration	*Adjust and maintain concentration at recommended strength. Use Refractometer to measure concentration.*
	Water Quality	*Hard water (greater than 200 ppm Total Hardness) can promote mix instability in some metalworking fluids and lead to poor surface finish. Consider using soft or deionised water.*
	Mix Instability	*When mixes become unstable, the lubricants can be preferentially depleted and lead to loss of tool/wheel life.*

For Wire Drawing and Rolling Applications please consult Q8Oils

Metal Working Fluid - Trouble Shooting Guide

Poor Surface Finish	Poor Coolant Flow	*Clear any blockages within the metalworking fluid delivery system. Consider treating with system cleaner to remove detritus and biomass.*
	Wrong tool/wheel for the operation or material or wrong process parameters	*Check with grinding wheel supplier for correct type.*
	Change in material	*Check material to see if it has changed.*
Poor Tool/ Wheel Life	Too Weak Concentration	*Adjust and maintain concentration at recommended strength. Use Refractometer to measure concentration.*
	Contamination	*Identify and eliminate/ minimise contaminants that promote loss of tool/wheel life, such as high levels of tramp oils, floor cleaners etc.*
	Water Quality	*Hard water (greater than 200 ppm Total Hardness) can promote mix instability in some metalworking fluids and lead to loss of tool/wheel life. Consider using soft or deionised water. Alternatively use a hard water tolerant metalworking fluid.*

For Wire Drawing and Rolling Applications please consult Q8Oils

Metal Working Fluid - Trouble Shooting Guide

Poor Tool/Wheel Life	Mix Instability	*When mixes become unstable, the lubricants can be preferentially depleted and lead to loss of tool/wheel life. Mix metalworking fluid correctly as instructed by the supplier.*
	Wrong tool/wheel for the operation or material or wrong process parameters	*Check with grinding wheel supplier for correct type. Alternatively use a more appropriate metalworking fluid for operation/material.*
	Change in material	*Check material to see if it has changed. Consider using alternative metalworking fluid.*
Rancidity	Too Weak Concentration	*Adjust and maintain concentration at recommended strength. Use Refractometer to measure concentration. Check for bacteria ingress and treat with tank side additions of biocide as a precaution.*
	Tramp Oil	*Tramp oil can promote microbial growth. Maintain the machines and assorted items so as to minimise/eliminate tramp oil contamination. Remove tramp oil daily from coolant using a skimmer, vacuum or wier system.*

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Metal Working Fluid - Trouble Shooting Guide

Rancidity	Contamination	*Identify and eliminate contaminants that promote microbal growth, such as food, tramp oil, phosphated parts cleaner, etc.*
	Fluid Circulation	*Keep the mix circulating to prevent anaerobic bacteria.*
	Significant Bacteria or Mold Growth	*Treat the mix with the recommended anti-microbial agent. If high levels of bacteria are present, use a system cleaner before recharging system with fresh coolant. All fungal growths/mats should be physically removed.*
Residue	Too Strong or Weak Concentration	*Adjust and maintain concentration at recommended strength. Use Refractometer to measure concentration.*
	Contamination	*Identify and eliminate/ minimise contaminants that promote residue, such as tramp oils, floor cleaners, fungal growth, etc.*
	Water Quality	*Hard water (greater than 200 ppm Total Hardness) can promote residue in metalworking fluids. Consider using soft or deionised water or alternatively use a hard water tolerant metalworking fluid.*
	Type of Operation	*Some operations, such as turning centres, can promote residue in low/splatter areas. Wash down these areas with the metalworking fluid daily.*

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The Q8 family of brands

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