

Guidelines For The Safe Handling Of Metalworking Fluid

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Tony Joynston
General Sales Manager Magnetic Filtration
Eclipse Magnetics
0114 2550614
ajohnston@eclipsemagnetics.com

Guidelines for the Safe Handling & Disposal of Metalworking Fluid

The United Kingdom Lubricants Association (UKLA) has introduced a good practice guide for the safe handling and disposal of metal working fluid.

The maintenance of metalworking fluid (MWF) is absolutely essential to prevent ill health in machine workshops. The guide has, therefore, been compiled in conjunction with the Metalworking Fluid Product Stewardship Group (MWFPSG) and the Health and Safety Executive (HSE), as well as advice from experienced workshop managers and medical experts.

The UKLA and HSE has recognised the need for workshops to take guidelines more seriously to manage metalworking fluid in order to reduce increasing risk of ill health in operators.

What are the risks associated with metalworking fluids?

The incorrect maintenance of water-mix metalworking fluids can cause ill health in operators working in machine workshops. For example, skin diseases (such as dermatitis) and lung disease (such as occupational asthma and occupational hypersensitivity pneumonitis) can occur, either as a result of their skin regularly coming into contact with metalworking fluids, or because they inhale metal working fluid mist and fumes.

Health risks rapidly increase when the composition of the metalworking fluid deteriorates in-use and becomes contaminated by tramp oil, soluble metals, metal fines, and microorganisms (bacteria, yeast and fungi). The overuse of biocides used to inhibit the growth of microorganisms in metalworking fluids also presents health risks to operators.

The Law

There is legislation regarding the maintenance of metalworking fluid, which is covered under The Control of Substances Hazardous to Health Regulations 2002 (COSHH). The law requires employers to carry out a suitable and sufficient risk assessment for those exposed to metalworking fluid, which must identify the measures required to ensure that exposure is either prevented or adequately controlled (i.e., kept to a minimum).

ADDED VALUE

With 100 years of experience in the design and manufacture of high performance magnetic systems, we supply critical equipment to some of the leading names in the most demanding industries.

EVIDENCE

Dermatitis

Dermatitis occurs usually on the hand and forearms of employees who are exposed to contaminated or unclean metal working fluids.



How can I ensure compliance with the new guidelines for the safe handling and disposal of metalworking fluid?

- Reducing skin contact with metalworking fluid
- Reducing the inhalation of metalworking fluid mist to levels that are “as low as reasonably practicable” (ALARP)
- Applying The Control of Substances Hazardous to Health Regulations 2002 (COSHH) principles of good control practice by:
 - Designing and operating procedures and activities to minimise emissions and contact with metalworking fluid.
 - Choosing control measures that are proportionate to the risk and are the most reliable in minimising the escape and spread of metalworking fluid mist.
 - Checking and reviewing all control measures to ensure their continuing effectiveness e.g. the performance of Local Exhaust Ventilation (LEV) to minimise exposure to metalworking fluid mist.
 - If exposure to metalworking fluid (either by mist or contact with skin) cannot be adequately controlled, suitable Personal Protective Equipment (PPE) including Respiratory Protective Equipment (RPE) should be provided in combination with other control measures.
 - Informing and training all employees about the hazards and risks to health, and the use of control measures required to minimise exposure to metalworking fluid.

ADDED VALUE

Eclipse Magnetics are fully ISO 9001 and ISO 14001 compliant.

This ensures all of our products and services meet the high standards our customers expect our continued efforts to ensure environmental commitments to waste minimisation and energy conservation are maintained

Factors affecting the quality of water mix metalworking fluids

The concentration of the metal working fluid

Over time, it is common for metalworking fluid to increase in concentration and foam due to evaporative loss of water. There may also be an increased risk of misting. This can be harmful for operators regularly exposed to the fluid and the fumes it gives off. However, diluting the metalworking fluid below the recommended concentrations may increase the risk of bacterial contamination and corrosion, which in turn causes further problems resulting in poor cutting performance, shorter sump life, and increased costs.

The pH of metal working fluid

The pH should be strictly maintained within the suppliers recommended range. Corrosion and microbial growth can occur when the pH of a metalworking fluid drops below the recommended operating range (i.e., becomes more acidic). If the metalworking fluid pH increases too much there is an increased risk of skin irritation.

Tramp oil

Contamination of the metalworking fluid with tramp oil above a 2% concentration may increase the risk for dermatitis in operators and encourage microbial growth in the metalworking fluid. It will cause the emulsion to become discoloured and to separate and foam which may increase the release of mist. An increase in the suspension of solids may also occur, which reduces filtration efficiency and tool life.

Metal contamination

Allowing the concentration of metal contaminants to increase causes poor cutting performance, reduces sump volume, promotes microbial growth and also increases disposal costs. Metal fines and swarf increase skin abrasion and cuts, and increase the risk of dermatitis.

EVIDENCE

Contamination can build up quickly if not filtered out of the metal working fluid.

This increases the risk of microbial growth and will greatly increase the disposal costs of fluid



Contaminated cutting Fluid

Operating temperature

Water-mix metalworking fluids

Operating metalworking fluids at temperature above 30 °C creates optimal conditions for microbial growth and increases their concentration through evaporation.

Neat oil

The operating temperature can affect the viscosity and cooling properties. Consult the metalworking fluid supplier about the appropriate temperature range for their product.

Agitation and flow

Maintain agitation and flow of metalworking fluid to prevent stagnation. This discourages the growth of anaerobic microorganisms and the formation of noxious gases and volatile compounds.

Biocides

In some circumstances, biocides are needed to prevent microbial growth. The incorrect use of biocides may lead to the development of biocide resistant organisms, and may also be harmful to the operator.

Cleaning Metalworking Fluid Systems

The guidelines recommend undertaking a system clean when changing metalworking fluid. There are specific risks to health that may occur when cleaning out used fluid and supply systems, including the exposure to mist, sprays, and fumes from vigorous cleaning methods (such as compressed airlines and hoses) and exposure to chemicals used to clean and decontaminate the supply system. For large supply systems there may also be a risk of operators working in a confined space.

What are the risks associated with cleaning out a metalworking fluid system?

- Inhalation of contaminated metalworking fluid mist when cleaning out biofilm and metal fines from filters.
- Hazardous substances in system cleaning fluids, and use of biocidal products may cause skin disease and asthma.
- Work in a confined space should be considered if the space is substantially or totally enclosed and there is a risk of loss of consciousness or asphyxiation arising from gas, fume, vapour or a lack of oxygen.

Recommendations for removing metal waste

- Use suitable tools e.g. brushes and shovels to remove swarf and wear suitable cut resistant protective gloves to prevent injury when handling swarf.
- Be aware of the potential for emission of noxious gases from certain metals.

How can magnetic filtration help you stay compliant with the safe handling of metalworking fluid guidelines?

Metal contamination has been identified by The United Kingdom Lubricants Association (UKLA), the Metalworking Fluid Product Stewardship Group (MWFPSG), and the Health and Safety Executive (HSE), as a major factor affecting the quality of metalworking fluids. In order to ensure compliance with the safe handling and disposal of metalworking fluid guidelines, the fluid needs to be correctly maintained with regard to the concentration of metal contaminants in the fluid. Not only do metal fines and swarf increase skin abrasion, cuts, and the risk of dermatitis for operators, an increase in the concentration of metal contaminants causes a variety of other problems including:

- Poor cutting performance
- Reduction in sump volume
- Microbial growth
- Increased disposal costs

Using magnetic filtration to maintain the quality of metal working fluids

Including a magnetic filter into your metalworking fluid system is an extremely effective way of ensuring that your business is compliant with the new safe handling and disposal of metal working fluid guidelines. Magnetic filtration can have the following positive effects on maintaining the quality of the metalworking fluids:

Reduce contamination

Magnetic filtration is the most effective means of removing problem ferrous particles from metalworking fluids, therefore reducing the concentration of metal contaminants in the fluid. In fact, magnetic filtration systems have the ability to remove almost 100% of ferrous contamination, including sub-micron particles. There is no need to replace consumable filter items, and the key properties of the metalworking fluid will not be affected.

With a sub-micron filtration capability, magnetic filtration ensures metalworking fluids are cleaner and run for longer periods. In many cases this results in huge fluid, coolants, or oil purchase, and disposal savings.

Increase agitation and flow of metalworking fluids

As identified in the Good Practice Guide for the Safe Handling and Disposal of Metalworking Fluid, stagnation of the fluid is one of the factors that can affect its quality. This is because fluid stagnation greatly encourages anaerobic microorganism growth.

Checking for the accumulation of swarf, deposits, and biofilms in the sump and supply systems, as well as checking for blockages, is key to ensuring that the metalworking fluid keeps circulating. Blockages increase the supply pressure of the metalworking fluid, therefore increasing the risk of foaming and misting, as well as reducing the performance.

Magnetic filters help to maintain the agitation and flow of the metalworking fluid in order to prevent this stagnation, therefore discouraging the growth of microorganisms and the subsequent formation of noxious gases and volatile compounds.

EVIDENCE

Magnetic Filtration is one of the most effective methods to remove ferrous contamination from metal working fluids

Read our case study on OSL Cutting Technologies to find out how Eclipse Magnetics Removed contamination from there production process

<https://www.eclipsemagnetics.com/row/case-studies/>



OSL cutting Technology Magnetic Filtration

Using a magnetic filter ensures that the fluid does not flow through a barrier as with traditional filter media. So not only is the flow uninterrupted, high flow rates can be maintained without affecting filtration efficiency. Eclipse Magnetics' filtration systems have been designed and developed to optimise the fluid flow, thereby maximising contamination exposure to the magnet and ensuring almost 100% collection rates, without interrupting or reducing the fluid rates. The advanced magnetic core design creates a magnetic field pattern which ensures that the filters do not block even in high contamination applications.

The agitation and flow of metalworking fluids, therefore, is effectively ensured by the magnetic filter, helping to meet the guidelines for maintenance of metalworking fluid.

Minimise microbial growth

Another critical action for maintaining metalworking fluid quality is the close monitoring of microbial growth. Keeping metal fines and swarf to a minimum reduces their accumulation, therefore minimising the microbial growth that occurs as a result. The Good Practice Guide for Safe Handling and Disposal of Metalworking Fluid recommends continuously removing metal fines from the fluid using "filtration units or a vacuum line."

Magnetic filtration effectively removes problem ferrous particles from metalworking fluids, therefore reducing the accumulation of metal fines and swarf. Magnetic filtration systems can remove almost 100% of ferrous contamination, therefore reducing the risk of microbial growth.

Decrease the need for biocides

Biocides are often needed to prevent microbial growth in metalworking fluids when corrective actions have been taken but microbial growth continues. The incorrect use of biocides may lead to the development of biocide resistant organisms, and overuse may be harmful to the operator by causing dermatitis and asthma.

The addition of a magnetic filter will reduce the build-up of contaminants, therefore reducing the microbial growth, and in turn, decrease the need for harmful biocides.

Reduce cleaning risks

As outlined in the Good Practice Guide for the Safe Handling and Disposal of Metalworking Fluid, there are several risks associated with cleaning metalworking fluid systems. These risks include the inhalation of contaminated mist when cleaning out biofilm and metal fines from filters, hazardous substances in

system cleaning fluids, and use of biocidal products that may cause skin disease and asthma.

During magnetic filtration, fluid flows around a magnetic rod or core which attracts ferrous particles, removing them from the fluid and ensuring that clean fluids are returned to the contact area. When the magnetic core on smaller units becomes saturated with ferrous contamination they can be cleaned manually using specially designed tools to minimise operator contact. In larger magnetic filtration systems, the cleaning process is automatic, further minimising health risks to operators.

What about traditional filtration systems?

Traditional filtration systems typically leave ferrous particles smaller than 5-10 microns circulating in the fluid. Not only does this cause damage to process equipment and finished products, it also significantly increases the risk of operator health problems that are associated with metal fines and swarf. Therefore, a business using a traditional filtration system will be much less likely to be compliant with the metalworking fluid guidelines.