

Copper and Copper Alloys

These are generally soft, 'draggy' metals which are difficult to machine.

Fluids should therefore contain some form of extreme pressure additive together with a passivator.

Insoluble copper soaps can be formed during the process, which will turn the fluid green and could exacerbate the tendency to staining.

Titanium

Titanium can tend to work harden, and is usually cut at low speeds. Often used in aerospace work along with aluminium alloys and therefore an aluminium coolant is often used a rationalisation product. Chlorine and sulphur extreme pressure agents should generally be avoided due to the potential for stress crack corrosion.

Magnesium

Magnesium exhibits excellent machining properties, and a good surface finish can be readily obtained.

Care must be taken as magnesium swarf can react exothermically (generating heat) with water.

The use of sulphurised additives must be avoided otherwise staining can occur.

Nickel

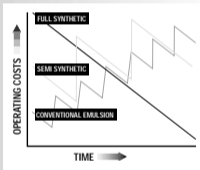
Nickel and its alloys are prone to work-hardening so low cutting speeds are essential.

Extreme pressure additives are necessary to ensure adequate machining performance.

The use of sulphurised additives must be avoided otherwise staining can occur.

OVERALL OPERATING COSTS

The metalworking fluid functions as one component of the production process. Its cost, although significant, is relatively low compared with the other costs of product support and maintenance. Even so, it can be false economy to focus on lower priced metalworking fluids, since the extended working life of a synthetic fluid for example can result in lower overall operating costs, as the example shown below demonstrates.



FLUID CARE

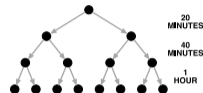
The two key factors involved in fluid maintenance are dilution and contamination.

If the fluid concentration is too low then corrosion and bacterial contamination can occur, along with poor machining performance.

If the fluid concentration is too high, the potential for skin irritation, foaming, sticky deposits and paint removal can increase.

In ideal conditions, bacteria can multiply

every 20 minutes - which means that in 8 hours one single bacteria can produce a colony of 8,000,000.



FLUID DISPOSAL

Unless specific agreement has been granted by the local water authority, and this is strictly controlled, disposal to drain (either foul or rainwater) is not an option.

Fluids should normally be stored pending collection with disposal arranged via an authorised waste contractor. The fluids are normally disposed of by splitting where possible to separate the aqueous component, which is then further treated, whilst the oil component is normally incinerated.

The quantity of waste fluid, together with the associated disposal costs, can be minimised by the use of a high quality long life fluid coupled with good fluid management.

Useful Reference Literature

Metalworking Fluids: The cost benefit of a healthy approach ISBN 0 7176 0875 1

Metalworking Fluids: Health Precautions ISBN 0 11 885667 7

This contains a comprehensive list of other documents giving greater detail on related matters

The carcinogenicity of mineral oils ISBN 0 11 885581 6

Nitrosamines in synthetic metal cutting and grinding fluids ISBN 0 11 883953 5

Management of metalworking fluids - A guide to good practice for minimising risks to health IND(G) 168L 1994

Health surveillance programmes for employees exposed to metalworking fluids - guidance to the responsible person IND(G) 165L 1994

Health surveillance of occupational skin disease ISBN 0 11 885583 2

Metalworking fluids and you IND(G) 169L 1994

Health risks of metalworking fluids - aspects of good machine design IND(G) 167L 1994
A guide to good practice

Management of metalworking fluids (wallchart) IND(G) 166L 1994

Skin creams and skin protection in the engineering sector NIS/10/14 1994

All the above are HSE publications which may be obtained by mail order from HSE Books. PO Box 1999, Sudbury, Suffolk CO10 6FS

Code of Practice for Metalworking Fluids Institute of Petroleum, 61 New Cavendish Street, London W1M 6AR

The Good Practice Guide - Optimising the use of Metalworking Fluids (GG199)

Benchmarking the Consumption of Metal Cutting Fluids (EG179)

Improved Management of Metalworking Fluids Increases Profits (GS199)

Copies are available via The Envirowise Programme (formerly ETBPP) www.envirowise.gov.uk

Helpline: 0800 585794

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Lubrication

Water-Mix
Metalworking
Fluids

Fact Sheet

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