

MW1

COSHH essentials for
machining with metalworking
fluids

CNC machining

Control approach 2 Engineering control

The Control of Substances Hazardous to Health Regulations 2002 (COSHH) require employers to ensure that exposure is prevented or, where this is not reasonably practicable, adequately controlled. This guidance gives practical advice on how this can be achieved by applying the principles of good practice for the control of exposure to substances hazardous to health, as required by COSHH.

It is aimed at people whose responsibilities include the management of substances hazardous to health at work (eg. occupational health specialists, anyone undertaking COSHH assessments and supervisors). It is also useful for trade union and employee safety representatives. It will help you carry out COSHH assessments, review existing assessments, deliver training and supervise activities involving substances hazardous to health.

This guidance is issued by the Health and Safety Executive. Following the guidance is not compulsory, unless specifically stated, and you are free to take other action. But if you do follow the guidance you will normally be doing enough to comply with the law. Health and safety inspectors seek to secure compliance with the law and may refer to this guidance.

See Essential information near the end of the sheet.

What this sheet covers

This sheet describes good control practice using engineering controls to reduce exposure to metalworking fluid (MWF) mists during computer numerically controlled (CNC) machining.

It is important to follow all the points, or use equally effective measures.

Hazards

- ✓ MWF mist is produced inside the CNC enclosure during machining. This can escape through gaps in the enclosure and when the enclosure doors are opened shortly after machining stops.
- ✓ The use of hand-held compressed air guns to clean components and machine surfaces generates mist.
- ✓ Inhalation of MWF mist can cause lung diseases, such as occupational asthma and occupational hypersensitivity pneumonitis.
- ✓ Skin exposure to MWF can cause dermatitis. For guidance on skin risks see MW2 Control of skin risks during machining.

Access to work area

- ✓ Allow access to authorised and appropriately trained persons only.

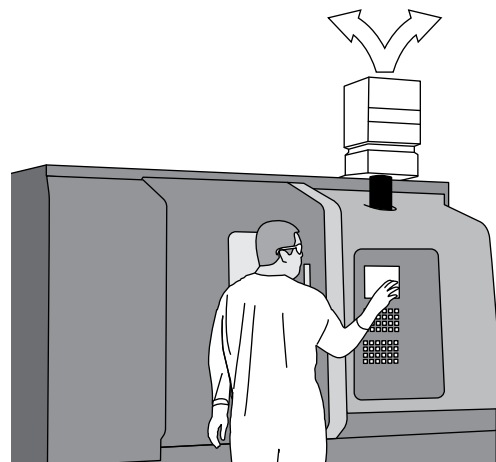
Equipment and procedures

MWF Delivery

- ✓ Apply MWF at the lowest possible pressure and flow volume consistent with adequate lubrication, cooling and swarf removal.
- ✓ Apply MWF at the point where the tool and workpiece make contact to minimise mist generation from contact with other rotating parts.
- ✓ Stop MWF delivery when not machining. You will still need to maintain fluid circulation to prevent stagnation (see MW5 Managing fluid quality).

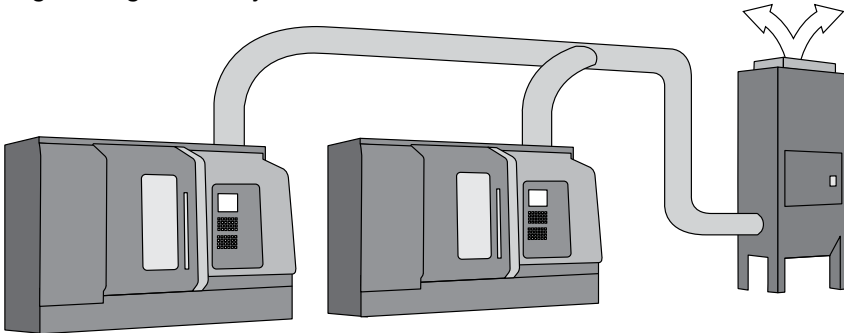
LEV Design and Use

- ✓ Enclose machines as much as possible eg. retrofitting roof panels.



CNC machine with a standalone LEV fitted

- ✓ Provide local exhaust ventilation (LEV) to the enclosure. This can either be as a standalone unit or a centralised system linking two or more machines.
- ✓ Design considerations should include the volume flow rate, location of the extraction point(s), volume and dimensions of the enclosure and the level of mist generated from machining. These will affect the time taken for the mist to be extracted. See G406 New and existing engineering control systems.



CNC machines connected to a centralised LEV system

- ✓ Discharge extracted air to a safe place outside the building, away from doors, windows and air inlets.
- ✓ If the extracted air is recirculated back into the workshop, ensure a suitable high efficiency air cleaning device is in place.
- ✓ Provide an easy way of checking the LEV is working, eg. airflow indicator or equivalent.

Time Delay

- ✓ Observe a time delay between the machine stopping and opening the enclosure doors, to ensure when the operator opens the doors, no mist is present in their breathing zone (the area within 20-30 cm of the nose and mouth).
- ✓ The time delay can be established by filling the enclosure with smoke or using a dust lamp to observe fine mist. You can implement the time delay by including it in the machine programme or using a timer.

Compressed Air Guns and Alternative Methods

- ✓ You should consider using alternative methods to clean away excess fluid and swarf/chips from machined parts during machining eg. vacuum guns, absorbent materials, low pressure coolant guns, spindle mounted fans or automatic compressed air hoses (operated with CNC enclosure doors shut).
- ✓ Where there is no practical alternative:
 - Reduce the exit pressure of the compressed air to as low a level as practicable (as a guide 30psi/2.1bar is effective at cleaning).
 - Different nozzle designs allow guns to be operated at a lower pressure. This will reduce risks from MWF, ejected swarf and noise.
 - Blow down components inside the CNC machine with the LEV operating.
 - Consider using compressed air guns with longer lances (eg. 30 cm).
- ✓ Finished components can be cleaned in industrial washing/degreasing machines (see www.hse.gov.uk/metalworking/water.htm).

- ✓ Suitable swarf vacuums should be used to remove wet swarf/chips from machine surfaces.

Caution: Never allow the use of compressed air for cleaning skin and clothing.

Respiratory protective equipment (RPE)

- ✓ RPE is normally not needed.

Personal protective equipment (PPE)

- ✓ Prevent skin contact with MWF but where this is not practicable, wear suitable PPE (see MW2 Control of skin risks during machining).

Maintenance, examination and testing

- ✓ Keep equipment in effective and efficient working order. Maintain it as advised by the supplier or installer.
- ✓ Carry out checks before you start work for swarf/chips accumulating around the extraction point and check the airflow indicators are showing the correct airflow.
- ✓ Carry out weekly checks to look for signs of damage to flexible ducts and the filter housing.
- ✓ Repair faulty extraction systems promptly.
- ✓ Your LEV supplier should have provided a user manual that includes how to use the system, how to maintain it, the spares available and a list of things that can go wrong.
- ✓ You should have an LEV system logbook that contains schedules and records of regular checking, maintenance and repair.
- ✓ For LEV systems with no logbook, user manual or commissioning report, you may need help from the supplier or from a competent person, eg. a consultant engineer or occupational hygienist specialising in LEV to prepare suitable documentation.
- ✓ LEV systems require a statutory 'thorough examination and test' (TExT).
- ✓ Get a competent person to perform the TExT at least every 14 months.
- ✓ Carry out all remedial actions arising from the TExT.
- ✓ Keep records of all examinations and tests for at least 5 years.
- ✓ Controlling airborne contaminants at work: A guide to local exhaust ventilation (LEV) (HSG258) provides more detailed information on LEV systems and legal and competency requirements.
- ✓ Several measures are available to check the effectiveness of controls eg. use of a dust lamp or direct reading aerosol monitors. These techniques can be used to identify leaks and areas of high mist concentration.
- ✓ Monitor fluid quality and maintain the fluid appropriately (see MW5 Managing fluid quality).

Cleaning and housekeeping

- ✓ Dispose of spilt fluid safely. Returning it to the machine contaminates the system and reduces the operational life of the fluid.
- ✓ Provide clean facilities for washing and taking refreshment, away from all machining activities.
- ✓ For cleaning water-mix fluid sumps see sheet MW3 Sump cleaning: water-mix fluids.
- ✓ For cleaning neat oil sumps see sheet MW4 Sump cleaning: neat oils.

Health surveillance

- ✓ Provide health surveillance where there is the potential for workers to regularly inhale MWF mists and there is a reasonable likelihood that asthma may develop (see sheet G402 Health surveillance for occupational asthma, for further advice).
- ✓ Provide health surveillance for dermatitis where there is a reasonable likelihood that dermatitis may occur in your workplace (see sheet G403 Health surveillance for occupational dermatitis, for further advice).

Training and supervision

- ✓ Tell workers about the hazards associated with their work and how to recognise the early signs of asthma, occupational hypersensitivity pneumonitis and dermatitis.
- ✓ Provide workers with training on:
 - working safely with hazardous substances;
 - when and how to use controls;
 - how the LEV system works;
 - how to check that the LEV is working;
 - when to use alternatives to compressed air guns;
 - how to use compressed air guns to minimise exposure; and
 - what to do if something goes wrong.
- ✓ Provide supervision – ensure that safe work procedures are followed.
- ✓ Training records are helpful to demonstrate training has taken place.
- ✓ Involve managers and supervisors in health and safety training.

Essential information

MW0	Advice for managers
MW2	Control of skin risks during machining
MW3	Sump cleaning: water-mix fluids
MW4	Sump cleaning: neat oils
MW5	Managing fluid quality
G402	Health surveillance for occupational asthma
G403	Health surveillance for occupational dermatitis
G406	New and existing engineering control systems

Further information

Good practice guide for safe handling and disposal of metalworking fluids UKLA 2020 www.ukla.org.uk/wp-content/uploads/UKLA-HSE-Good-Practice-Guide-for-Safe-Handling-and-Disposal-of-Metalworking-Fluids.pdf

Working safely with metalworking fluids: A guide for employees INDG365 HSE 2011 www.hse.gov.uk/pubns/indg365.pdf

See www.hse.gov.uk/metalworking/index.htm

Controlling airborne contaminants at work: A guide to local exhaust ventilation (LEV) HSG258 (Third edition) HSE 2017 www.hse.gov.uk/pubns/priced/hsg258.pdf

See www.hse.gov.uk/health-surveillance/index.htm

Employee checklist

- ☐ Do you understand the health hazards associated with your work?
- ☐ Always follow the standard operating procedure.
- ☐ If you notice an unusual odour or appearance to the MWF inform your supervisor.
- ☐ Is the LEV switched on and working properly?
- ☐ Look for signs of leaks, wear and damage to LEV systems.
- ☐ If you find any problems tell your supervisor. Don't just carry on working.
- ☐ Co-operate with health surveillance.
- ☐ Use, maintain and store your PPE in accordance with instructions.
- ☐ Wash your hands before eating, drinking, smoking or using the toilet.

You can find the full COSHH essentials series at
www.hse.gov.uk/coshh/essentials/

British Occupational Hygiene Society (BOHS)
<https://www.bohs.org/information-guidance/guidance-for-employers/>

Occupational Safety and Health Consultants Register www.oshcr.org/

For information about health and safety visit <https://books.hse.gov.uk>
or <http://www.hse.gov.uk>.

You can view HSE guidance online and order priced publications from
the website. HSE priced publications are also available from bookshops.

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