

The inspection and maintenance of work equipment

This document details the standards for inspection and maintenance that should be achieved for all work equipment owned and operated by the University. The requirements are based on best practice and when met will ensure the University meets its legal obligations to provide and maintain safe equipment.

Summary of requirements

- Every piece of work equipment that has safety critical features is identified and both maintenance and inspection schedules developed and implemented.
- The competencies necessary to carry out required maintenance and inspections are identified.
- Competent people are identified to carry out the maintenance and inspection of work equipment.
- Work equipment is maintained in an efficient state, in efficient working order and in good repair.
- The results of all maintenance and inspection are recorded and the records kept in accordance with the H&S document retention schedule (see intranet for more details).

Related legislation

The Provision and Use of Work Equipment Regulations 1998

The Lifting Operations and Lifting Equipment Regulations 1998

The Management of Health and Safety at Work Regulations 1999

Supply of Machinery (Safety) Regulations 1992

Related H&S Standards

The safe use of transportable and portable electrical appliances.

Working at height

Control of contractors

Introduction

1. **It is not the purpose of this Standard to introduce unnecessary or onerous systems for the maintenance and inspection of work equipment.**
2. All maintenance and inspection should be based on risk assessments for the use of equipment. Most work equipment owned and operated by the University will require little or no maintenance or inspection (see tables 3&4 below for examples). The only equipment that will require frequent maintenance and inspection is that for which there is a significant risk to the operator or others in the workplace if the equipment is damaged, mis-used or wrongly installed.

This document is in two parts, Inspection and Maintenance.

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Inspection of work equipment

When should an inspection be undertaken?

3. The Health and Safety Executive(HSE) identifies that health and safety inspections of workplace equipment should be carried out when there is a **significant risk** to the operator of the equipment or others as a result of:
 - The incorrect installation or re-installation of the equipment.
 - Damage, misuse or direct interference with safety features for example removing guards.
 - Wear and tear of the equipment.
 - As a result of exceptional circumstances.

Therefore inspections should be completed:

- When equipment is installed, or moved and re-installed either in a different location or returned to its original location.
- At regular intervals during the time the equipment is in use.
- After an accident that has the potential to affect safety critical systems or brings into question the thoroughness of health and safety inspections.
- Before being sold or otherwise made over to another person or organisation for use elsewhere.

What equipment should be inspected?

4. Every piece of equipment that has safety critical features must be inspected regularly. The frequency of inspection, the 'inspection schedule', should be based on the risk assessment for the operation and use of the equipment.
5. The HSE identifies the purpose of an inspection in the following way:

'The purpose of an inspection is to identify whether the equipment can be operated, adjusted and maintained safely and that any deterioration (for example, damage, defect, wear) can be detected and remedied before it results in unacceptable risk'

What parts of the equipment should be inspected?

6. Having identified what equipment requires inspection it is important to identify what aspects of the equipment should be checked and after that how frequently these checks should be carried out.
7. The purpose of a health and safety inspection is to identify any problems or potential problems that are, or could, affect the safety critical systems. It may be advantageous to incorporate non-safety related checks into an inspection but for the purposes of this document only the parts of the equipment that maintain safety are being considered.

8. There are several sources of information to help determine what should be included in an inspection:
- **Manufacturer's and/or supplier's handbooks, manuals and any other information supplied with the equipment.** This information should form the basis of any inspection schedule. If this documentation isn't available it may be possible to get copies from the manufacturer or supplier or download information from the internet. If doing the latter it is important to use a reliable source.
 - **The Health and Safety Executive website (www.hse.gov.uk).** The site has lots of information about general machinery safety as well as industry specific guidance. The standards set by the HSE would be used as evidence of best practice if the University had to defend a criminal or civil claim. It is recommended that this information is referred to as well as manufacturer's guidance and if there is a significant difference the higher standard should be followed.
 - **Expert guidance.** If there is no information from manufacturers, suppliers or the HSE it may be necessary to contract an expert to advice about both inspection and maintenance schedules. It may also be advisable to get advice if the equipment is being used in a way or in an environment not covered by the information provided by manufacturers, suppliers or the HSE, all of whose advice is likely to be written for industrial or commercial settings.
 - **Professional knowledge and expertise.** The in-house knowledge and understanding of workplace equipment, how it is used and the demands placed on the equipment should always be used when deciding how to deciding on inspection regimes.
9. Each piece of equipment will have its own safety critical elements that must be checked, is not practical to provide detailed advice for every type of equipment used within the University. An example is given below to indicate the detail of checks that should be carried out.
10. Unless it is known that deterioration of any safety system is unlikely to occur during a day, or session of use, then each safeguard must be inspected daily, or, for less frequently used equipment, at the beginning of the session in which it is going to be used.
11. As a general rule of thumb, when designing a safety inspection checklist the following elements, when present, should always be checked.
- All guarding including fixed, moveable, interlocked and distance guards
 - Any element of a machine the correct fitting of which is integral to safety; for example, blades and abrasive wheels.
 - Supports and any other element of a structure or piece of furniture integral to structural safety.
 - Safety signage and instructions providing safety critical information.
 - Any markings indicating safe working limits or loads.
 - Warning indicators.
 - Braking devices.
 - Emergency stops.

Table 1 Examples of checklists for a safety inspection
Safety inspection checklist for a circular or bench saw (HSE Woodwork Information Sheet 16)
Is a suitable top guard fitted?
Is the top guard secure and free from damage?
Can the top guard be easily adjusted?
Is the machine fully enclosed beneath the table?
Does the braking device bring the blade to rest in 10 seconds?
Is the blade in good condition, not dull or badly ground?
Is the blade set properly?
Are there any deposits of gum or resin on the blade?
Is the diameter of the smallest blade that can be safely used clearly marked on the machine?
Is the local exhaust ventilation in good working order, effectively controlling dust from the saw?
Is the rip fence/cross cut fence in good condition and secure?
Are push sticks available?
Are push sticks at least 450mm long with a 'birds mouth'?
Is there adequate work piece support?
Is the work piece support in good condition and stable?

How frequently should equipment be inspected?

12. Schedules for inspections are based on several factors; the type of equipment, where it is used, how and by whom it is used. Frequency of inspection should be reasonable, if inspections are too frequent they are unlikely to be done well and things will be missed. Inspections must be carried out regularly and at intervals that will identify failures, or the warning signs indicating potential failures in safety critical systems.
13. However, as indicated in paragraph 10 unless it is known that deterioration of any safety system is unlikely to occur during a day, or session of use then each safeguard must be inspected daily, or for less frequently used equipment, at the beginning of the day in which it going to be used.

Type of equipment

14. Equipment that should be subject to a regular H&S inspection are those that have the following significant risk of injury or damage. Note this is not an exhaustive list.

Table 2 Types of hazard	
Crushing	Tables, work surfaces and supports for heavy objects; lighting rigs, AV equipment and laying out tables for circular and bench saws, racking, shelving and surfaces. Pulleys and hoists, flying equipment (theatre).
Cutting	Guillotines, powered saws, lathes.
Drawing in	Equipment with rotating parts such as abrasive wheels, polishers, lathes, drills, bench & circular saws and washing machines. Equipment with moving parts such as conveyor belts for example, linishers and sanding machines, where the moving surface goes under a barrier or guard that restricts the ability to remove the hand or other body part if caught.
Impact due to objects being thrown out	Lathes, abrasive wheels, polishers, knitting machines, circular and bench saws.
Impact due to moving parts of machinery	Shoe making equipment.
Damage to eyes	Equipment with lasers.
Damage to hearing	Noisy equipment with noise dampening.
Burns and scalds	Kilns, ovens, steamers and heat presses
Explosion	LEV ducting
Fire	Gas soldering torches

Where equipment is in use

15. Where equipment is used will affect both the likelihood of damage to safety critical systems and the possible impact of the failure of a safety system.
16. Studios are generally less controlled and supervised than workshops. Students are less likely to report damage unless it has an impact on their work or comfort. Damage to equipment is likely to go unnoticed unless inspections are carried out regularly. However, because studios are a less controlled environment than

workshops there should be no machinery or equipment in a studio that poses a sudden, significant risk. The equipment is likely to be limited to storage, tables, racking and shelving. Routine inspection of this equipment, for example once a term, should be sufficient to identify damage and wear & tear that increases the risk of significant damage or a major injury.

17. Some workshops are more crowded than others and some equipment is more heavily used. This must be considered when deciding on the inspection schedule for a piece of equipment.
18. The most likely outcome of a more crowded or well used workshop is an increase in damage to equipment but there are other, less obvious things to consider such as the number of people affected by the failure of a safety system or, for equipment in high demand, the increased likelihood that safety systems will be by-passed or dis-engaged to speed up a process. All of these factors will be identified by a well-designed inspection schedule and maintenance regime.

How equipment is used and by whom.

19. Different skill levels and the motivations of those using machinery will affect the likelihood that safety critical systems will fail, be damaged or by-passed. This must be taken into account when designing inspection schedules.

What does this mean in practice?

20. There are thousands of pieces of work equipment owned and operated by the University. Most equipment has limited or no safety critical features and there is no need to carry out frequent inspections and often no need to inspect equipment at all (see tables 3 & 4 below, note these lists are not exhaustive).

Table 3 Examples of equipment that is unlikely to require inspection	
Desk top stationary items such as staplers, hole-punches, desk top furniture	Kitchen equipment such as crockery, cutlery and glassware
Seasonal decorations (non electrical)	Manually operated binding machines.
Incidental furniture such as office waste bins, coat stands, plant pots, art work.	Lifting accessories such as chains or slings will not normally require an inspection as long as they receive a thorough examination at the appropriate interval and a proper pre-use check.

Table 4 Examples of equipment that requires infrequent inspection, no more than annual, six monthly or termly inspection.	
Furniture that is unlikely to be damaged but if damaged could result in a major injury. For example, large filing cabinets and tambour cupboards, kick steps and sets of steps,	Six monthly
Office chairs, desks and other office furniture	Six monthly
Mobile raked seating. For example lecture and theatre seating that can be moved to create additional floor space.	Six monthly
Cleaning equipment	Annually
Electrical equipment that is not likely to be damaged e.g. computer equipment, laminators, printers, fax machines, domestic refrigerators, freezers, washing machines and dishwashers.	Annually
Furniture that may be damaged and if damaged may result in a minor injury; for example, seminar and meeting room chairs, non-moveable lecture theatre seating, tables and desks.	Annually
Electrical seasonal decorations	Annually
Hand tools that are unlikely to be damaged but if damaged could result in a minor injury and hand tools that are subject to wear and tear which if unnoticed could result in a minor injury. For example, screwdrivers, files, pliers, scalpels, clicking knives, scissors & spanners.	Termly

What records should be kept?

21. All equipment that requires inspection to ensure it can be operated, adjusted and maintained safely and any deterioration will be detected and remedied before it results in unacceptable risk must have a written schedule of inspection.
 - Information on the type and model of equipment.
 - Any identification mark or number it has on it.
 - Its normal location.
 - The date the inspection was carried out.
 - Any faults, who the faults have been reported to and actions taken.
 - The date the repairs or any other necessary actions were carried out.

22. Records should be available for inspection and kept in accordance with the H&S document retention schedule (see intranet for more details) and should include the information given in paragraph 21 above. Records should be specific to a particular piece of equipment and provide sufficient detail to be used as evidence

that all reasonably practicable steps have been taken to ensure the HSE definition of a purpose of inspection has been fulfilled:

'The purpose of an inspection is to identify whether the equipment can be operated, adjusted and maintained safely and that any deterioration (for example, damage, defect, wear) can be detected and remedied before it results in unacceptable risk'

Maintenance of work equipment

The purpose of maintenance

23. The Provision and Use of Work Equipment Regulations 1998 requires that all work equipment must be kept in an efficient state, in efficient working order and in good repair. To achieve this most work equipment will require some level of on-going maintenance in addition to inspection and the thorough inspection and testing required for some work equipment (lifting equipment, pressure vessels and LEV are examples of this).
24. The type and frequency of maintenance should be decided by risk assessments completed for the use of each piece or type of equipment.
25. Maintenance is sometimes a hazardous activity, for example changing a band saw blade or replacing metal working fluid, and all maintenance activities should be risk assessed and safe systems of work put in place.

Types of maintenance

Planned Preventive	Replacing parts and consumables or making necessary adjustments at pre-set intervals so that risks do not occur as a result of the deterioration or failure of the equipment.
Condition Based	Monitoring the condition of safety critical parts and carrying out maintenance only after faults or failures have occurred and carrying out maintenance whenever necessary to avoid hazards which could otherwise occur. The conditions that will trigger maintenance should be defined in the maintenance schedule, for example <i>'top up lubricant when gauge is indicating 1/3 full'</i> .
Breakdown	Carrying out maintenance only after faults or failures have occurred. This maintenance regime is appropriate only if the failure does not present an immediate risk and can be corrected before risks occur, for example through effective fault reporting and maintenance schemes.

A maintenance schedule for a particular piece of equipment is likely to be a combination of these three methods

However where safety critical parts could fail and cause the equipment, guards or other protection devices to fail and lead to immediate or hidden potential risks, a formal system of **planned preventative** or **condition-based** maintenance should be in place.

Breakdown maintenance will only be appropriate as the only method of maintenance for equipment with few safety features and where a failure of the safety features will not result in a serious incident.

Competent person?

Maintenance should only be carried out by a competent person. For some tasks it will be necessary to engage an external contractor to carry out maintenance but for most tasks it should be possible for the work to be carried out in-house, although additional training may be required. The level of competency and the training required should be identified when assessing the maintenance tasks required.

Frequency of maintenance

26. The frequency of maintenance should be set to ensure all safety related features are functioning correctly taking into account:
- Risk to health and safety from malfunction or failure.
 - Intensity of use, frequency and maximum working limits;
 - Operating environment, for example outdoors, studio, workshop;
 - Skill level and motivation of users.
 - Variety of operations – is the equipment performing the same task all the time or does it change?

What should be included in a maintenance regime?

27. Maintenance is needed to ensure equipment is kept in an efficient state, in efficient working order and in good repair. These three requirements have slightly different meanings.

Efficient state	General safe condition of the equipment.
Efficient working order	Everything that might have a bearing on safety is working as it should.
Good repair	Appropriate repairs and maintenance have been done when they should and to the correct standard.

28. A well-designed maintenance schedule should ensure work equipment is safe to use and minimise the likelihood of any faults occurring that will compromise the health and safety of the operator or others. There are several sources of information to help determine the most appropriate maintenance regime:
- **Manufacturer's and/or supplier's handbooks, manuals and any other information supplied with the equipment.** This information should form the basis of any maintenance schedule. The maintenance activities and frequencies advised in manufacturers/suppliers manuals should always be followed unless risk assessment of the particular circumstances of use indicate a different approach would be more appropriate. For example maintenance activities are usually based on the amount of use a piece of equipment is used. If equipment in a workshop is used a lot less frequently than indicated in the user manual some maintenance activities could be less frequent.

If this documentation isn't available it may be possible to get copies from the manufacturer or supplier or download information from the internet. If doing the latter it is important to use a reliable source.

- **Professional knowledge and expertise.** Employee knowledge and understanding of workplace equipment, how it is used and the demands placed on the equipment should always be used in conjunction with the manufacturer's/ suppliers documentation when developing a maintenance regime for any workplace equipment.
- **Expert guidance.** If there is no information from manufacturers or suppliers it may be necessary to contract an expert to advice about both inspection and maintenance schedules. It may also be advisable to get advice if the equipment is being used in a way or in an environment not covered by the information provided by manufacturers, suppliers or the HSE, all of whose advice is likely to be written for industrial or commercial settings.
- **The Health and Safety Executive website (www.hse.gov.uk).** The site has lots of information about general machinery safety as well as industry specific guidance. The documentation supplied by manufacturers or suppliers should reflect the advice given by the HSE and is likely to be more detailed; however, as guidance given by the HSE would be used as evidence of best practice if the University had to defend a criminal or civil claim it is always advisable to refer to HSE guidance where it exists.

What records should be kept?

29. Records of all maintenance, the activity and any findings and actions taken should be kept for the period equipment is owned and operated by the University + seven years. They should be specific to a particular piece of equipment and provide sufficient detail to be used as evidence that all reasonably practicable steps have been taken to ensure equipment has been maintained in an efficient state, in efficient working order and good repair.
30. Maintenance records should include the following information:

- Name and model of equipment.
- Where equipment is usually kept.
- Unique identifier.
- Each task on the maintenance schedule.
- Frequency of each task.
- What is involved in each task.
- Result of maintenance and any actions resulting from the maintenance.
- Sign off by the person carrying out the maintenance.

The following three forms are examples of the type of records that should be kept. They can be used as templates but are not mandatory, alternatives can be used if they capture all necessary information.

Example of inspection sheet for a week of daily inspections of a single piece of workshop equipment

Equipment			Frequency												
Model		Serial number			Location										
Name of inspector		Period of inspections			Any issues found?		Yes	No							
Checklist	Monday		Tuesday		Wednesday		Thursday		Friday		Saturday		Sunday		
Check 1	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	
Check 2	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	
Check 3	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	
...continue to enter checks required to ensure the equipment is safe to use.	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	
Signature															
Comments (please date and initial comments)					Actions (please date and initial actions)										

Example of weekly sheet for the daily inspections of a circular or bench saw.

Equipment	Bench Saw				Frequency				Daily								
Model		Serial number							Location								
Name of inspector		Period of inspections							Any issues found?				Yes	No			
Checklist		Monday		Tuesday		Wednesday		Thursday		Friday		Saturday		Sunday			
Is the top guard in good condition, free from damage?		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No		
Can the top guard be easily adjusted?		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No		
Are all the adjustable fixings for the top guard in place?		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No		
Once adjusted can the top guard be firmly secured during work?		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No		
Is the blade in good condition, clean, not dull or badly ground?		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No		
Is the blade set properly?		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No		
Is the area around the equipment clean, free from build-up of dust?		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No		
Are push sticks available; are they in good condition, strong enough to move work and at least 450mm long with a 'birds mouth' at the end?		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No		
Signature																	
Comments (please date and initial comments)						Actions (please date and initial actions)											

Example of inspection sheet for several pieces of similar equipment

Equipment		Frequency							Location							
Name of inspector		Date of inspection							Any issues found?						Yes	No
Unique identifier for each piece of equipment		Unit 1		Unit 2		Unit 3		Unit 4		Unit 5		Unit 6		Unit 7		
Checklist																
Check 1		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	
Check 2		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	
Check 3		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	
...continue to enter checks required to ensure the equipment is safe to use.		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	
Signature																
Comments (please date and initial comments and specify unit)								Actions (please date and initial actions and specify unit)								