

The manager's role in **safe maintenance of equipment**

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Principles

What is this guidance about?

This guidance document is intended to help managers responsible for plant equipment (including machinery) understand their role in facilitating safe maintenance. Attention is drawn to the need for adequate isolation from energy sources when maintenance is carried out so as to reduce the risk of uncontrolled hazardous work; and the need to ensure that employees and contractors working on site are aware of site safe systems of work. Inevitably issues regarding safe equipment operation also get mentioned

Context

Safe maintenance, interruptions to plant operations, machine set-up and adjustment, and blockage clearance ultimately rely upon adequate training and expertise (competence) of the people assigned the tasks to ensure that they are undertaken without incident. It is the responsibility of the manager to ensure that those undertaking maintenance (and operation) tasks have the necessary skills and expertise, (even if that person is them personally). The incidents that do occur give clear evidence that serious injury with work equipment (crushing, entrapment, and electric shock) is all too often due to failure to properly isolate sources of energy before undertaking maintenance tasks. A strict safe management system to isolate energy sources before work commences reduces the risks and helps instil in personnel confidence that hazardous work can be undertaken safely with due attention. Great care is required with automated machinery, particularly with linked machines such as those found in robot cells.

Guidance on managing safe maintenance is clearly dependent upon the business function. For example, consider the differing requirements between a small machine shop business, a food processing plant, and a nuclear power station. Each has its specific risks and needs for safe maintenance but the communication and documentation levels will inevitably differ greatly. That said they each need to be a safe working environment in which harm is avoided commensurate with reasonable practicability.

Health and safety at work is the responsibility of everyone. If an incident occurs and someone is harmed their manager will be one of the first people to be interviewed. Any available documentation which shows that due process and adherence to the spirit of providing a safe place to work has been carried out can only help. This briefing sets-out guidance which can be adapted as fits the business. The documentation must be 'fit for purpose'. Succinct statements of what needs to be done are more likely to be read (and understood), than copious prose. The vital points need to be accurate, simple, unambiguous and prominent so that they are read and absorbed.

The Manager's Obligations

In summary a manager (commensurate with their position in the organisation) will need to ensure that:

- Safe site working practices exist
- The risks of maintaining (and operating) equipment under their supervision have been mitigated
- Contractors are afforded the same level of safety when on site as permanent personnel, and that they know their obligations to work safely
- That good safety communications exist through the operational hierarchy, and supervised staff know how to safely undertake their tasks, and how to report any safety concerns or improvement suggestions
- Personnel are trained to safely undertake the duties they are required to fulfil
- Necessary personal protective clothing and equipment is provided for personnel within their supervision
- That where and when necessary a permit to work process is in existence
- A culture of mutual safety awareness permeates the organisation
- Safety leadership is exhibited (not just talked about)
- The development of a good safety culture is encouraged
- An appropriate level of health and safety documentation is kept commensurate with business needs and regulator (HSE) requirements
- Safety is never compromised because of commercial pressures

When and Where to Start

Each new piece of equipment needs to be assessed for any hazard(s) it introduces and a risk assessment carried out by a team of people (stakeholders) who will operate, maintain, clean, or otherwise come in contact with it, or its work area. The process may well start before the equipment is installed e.g. whilst staff are being trained at the manufacturer's site, and certainly be in hand by the time it is commissioned on-site. During commissioning the risk assessment should be completed so that by the time trained maintenance staff, and operators, access and use the equipment the risks have been mitigated to the lowest Reasonably Practicable.

If the equipment is the subject of a location/ logistical/ or business acquisition transfer then the principles set out above will equally apply as fits the case. Legacy documentation (inherited with activity/equipment transfer) will be of value but should not be solely relied upon.

Identify Equipment that poses a hazard

A manager must know what equipment within their area of responsibility poses a risk e.g. any plant or equipment with permanently wired electrical feeds, independent energy sources such as internal combustion engines, hydraulic pumps and moving parts, liquid/gas powered boilers and pressure systems, ionizing radiation sources, and chemical systems. Associated facilities that possess a hazard such as fuel tanks and systems, towers, hoppers, confined spaces/pits/silos/tanks/ manholes, large/heavy moving parts should be clearly marked, be behind a barrier, and managed by a safe system of work. Industrial robots require special consideration and protection means. A master record of all such identified and documented hazardous equipment and resources on the site should be kept.

Portable and transportable equipment that is subject to a Portable Appliance Test (PAT test) can be dealt with outside of a documented isolation system, so long as it is not essential to an aspect of a system subject to a documented isolation procedure.

A risk assessment should be carried out and documented for identified equipment that possesses a hazard. By this means determination should be made as whether isolation is required for maintenance purposes.

Hazards come in a variety of forms which may include:

Asbestos	Biological materials
Chemical/toxic/gaseous/corrosive substances COSHH	Confined spaces
Electricity	Excess Heat
Extreme Cold	Hydraulic and pneumatic pressure systems
Moving machinery [including industrial robots]	Over-ground/under-ground service
Stored or potential energy	Working at height

In the interests of safety a good manager will seek competent advice about equipment risks, and be prepared to have independent reviews of risk assessments that are carried out, using specialists if necessary.

Carrying out a risk assessment

A manager's specific responsibilities and obligations for the provision of a safe working environment will vary between business functions, organisational size, and their position in the hierarchy. However, fundamental to providing a safe work environment is assessing risk. To help identify the precautions that are necessary for maintenance (or operation) of equipment a risk assessment should firstly be performed by a team of competent personnel who will have cause to work with the equipment.

The risk assessment process is shown in Figure 1, targeting to achieve the lowest Reasonably Practicable risk. More details can be found on the Health and Safety Executive website: <http://www.hse.gov.uk/risk/>

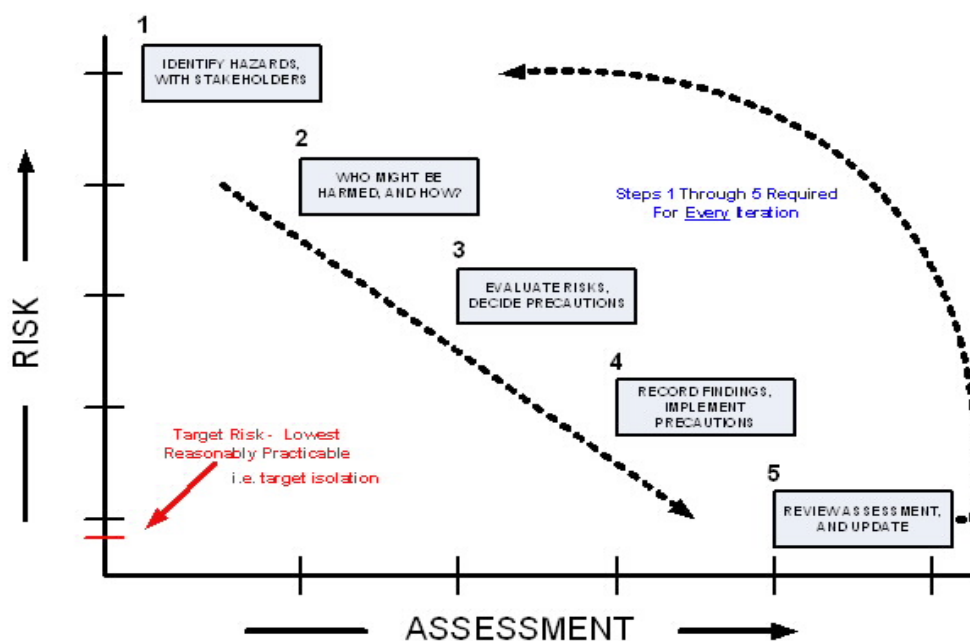


Figure 1. Risk Assessment Steps

When carrying out the risk assessment, in the case of maintenance, ask yourself the following questions:

- Can the work be done while the equipment is de-energised (i.e. with all sources of energy dead, isolated and discharged)?
- Does somebody have to enter the danger area?
- How often is the procedure necessary?
- What safeguards are built in?
- Are there any formal procedures?
- Is the worker trained to recognise the risks?
- Is there competent supervision?

Documentation

Depending upon the size, and nature, of a business a written site manager’s guide may exist which sets out company health and safety policies and their implementation practices such that all processes and facilities can be safely managed operated and maintained by the assigned staff. Aspects of such guidance are given below. An Introduction to health and safety in a small business can be found in the Health & Safety Executive’s booklet INDG259: <http://www.hse.gov.uk/Simple-health-safety/index.htm> which will assist identifying the level of documentation to be held.

Energy Isolation Considerations

To help provide a safe system of work when authorised employees or contractors work on high risk equipment the following should be in place:

- The isolation point for all energy sources used on equipment should be recorded and clearly identified
- Energy source isolation points should be capable of being kept in a given status by physical locks
- Authorised people required to perform the isolation should be trained to carryout the required actions and accredited under any documented safe isolation system
- Dependent upon the organisation written procedures for performing the isolation should exist and be adhered to, along with documented risk assessment(s) and isolation history records
- People authorised to work on isolated equipment should be made aware of the isolation system and any energy sources not deactivated

Energy Isolation Controls

Isolation of the energy may involve:

Electrical isolators	Disabling chemical feeds
Disabling combustion engines	Disconnection pneumatic, or hydraulic, feeds
Draining of fluids	Operation and locking of isolation covers
Physical isolation of potential energy (chocking)	Pinning moving parts
Prevention of steam generation	

Carrying-out Energy Isolation

Isolation should only be undertaken by trained people familiar with the specific equipment. This person should be safety competent and have a good understanding of the local, and site, situation. The person should also be competent regarding the energy sources involved. Although in some cases the device that isolates the equipment may also be used for emergency switching off and/or emergency stopping, these operations are not the same as the process of performing isolation.

Necessary personal protection equipment to safely undertake the work must be provided.

Isolation status locks must be unique (i.e. not replicated on a site) and be labelled in a rugged manner to indicate that the isolation point must not be interfered with. The person carrying out, say, maintenance on the equipment should have personal control of, and responsibility for, the keys to the isolation status locks. This will also allow the re-commissioning of the equipment after completion of the work.

Draining, venting, and pinning of moving parts must be undertaken in line with site procedures, where they exist. Drained materials must be dealt with in a manner commensurate with legislation and with due environmental considerations.

Electrical circuits should be tested by a competent person with suitable test equipment to ensure that the circuit is dead before the maintenance work per se commences

Isolation Documentation

Dependent upon the business function a documented safe system should be used with ideally a written permit document issued to allow work to be carried out on the equipment. The use of a permit system will be greatly influenced by the number of personnel involved, the organisation structure, and the severity of residual risks.

Any specific Precaution/ Do Not during the work must be communicated to the people involved, in accord with any site standards, this may include them being documented. It is normal that any written permit and any associated documentation should be signed for by the recipient on issue, and on return after completion of the work. The level of administration being adapted dependent upon the business needs.

Competence is Key

Safe incident free working with hazardous equipment is ultimately down to the quality and competence of the people involved. A manager is reliant upon these people. Equally the people are reliant upon the manager having fulfilled their responsibilities to ensure they have a safe working situation. The manager must have the competence and professionalism to inform their judgements by seeking advice from greater authorities.

UK Legislation and Implementation

Whilst the HSE is committed to “reducing paperwork not protection”, see: <http://www.hse.gov.uk/simplification/simplification08.pdf> any available documentation which shows that due process and adherence to the spirit of providing a safe place to work has been carried out can only help.

References [including IET Briefing Notes]

- BS EN ISO 10218-1:2008 British Standards Institution Robots for industrial environments. Safety Requirements. Robot: <http://shop.bsigroup.com/en/ProductDetail/?pid=000000000030197757>
- Safety culture - <http://www.theiet.org/factfiles/health/hsb07-page.cfm>
- Safe systems of work - <http://www.theiet.org/factfiles/health/hsb32-page.cfm>
- Portable Appliance Testing - <http://www.theiet.org/factfiles/health/hsb34c-page.cfm>
- Asbestos including asbestos surveys - <http://www.theiet.org/factfiles/health/hsb40-page.cfm>
- Electrical Safety - <http://www.theiet.org/factfiles/health/elec-safety-page.cfm>
- Experience with the supply of machinery safety regulations 1992 - <http://www.theiet.org/factfiles/health/hsb15-page.cfm>
- Safe Maintenance of Equipment (including Machinery) - <http://www.theiet.org/factfiles/health/hsb58a-page.cfm>

Further information

Isolation, Permits to work and Personal Protection Equipment; Health and Safety Executive guidance:

- The safe isolation of plant and equipment, HSG253, ISBN 0717661718 <http://books.hse.gov.uk/hse/public/saleproduct.jsf?catalogueCode=9780717661718>
- Guidance on permit-to-work systems, HSG250, ISBN 0717629435 <http://www.hse.gov.uk/pubns/priced/hsg250.pdf>
- A short guide to Personal Protection Equipment, INDG174, ISBN 0717661415 <http://www.hse.gov.uk/pubns/indg174.pdf>
- Electricity at work: - Safe Working Practices, HSG85, ISBN 9780717621644 <http://www.hse.gov.uk/pubns/priced/hsg85.pdf>
- Memorandum of Guidance on the Electricity at Work Regulations 1989. HSR25, ISBN 9780717662289 <http://www.hse.gov.uk/pubns/priced/hsr25.pdf>

HSE's Infoline

Email: hseinfo@connaught.plc.uk

HSE Books
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For further information about the IET's Health and Safety Policy Advisory Group only, please contact:

Health and Safety Policy Advisory Group Secretary
Policy Department
IET,
Michael Faraday House,
Six Hills Way,
Stevenage.
SG1 2AY
01438 765690
email: policy@theiet.org
www.theiet.org/policy
<http://www.theiet.org/factfiles/>



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