

Pearson BTEC Levels 4 Higher Nationals in Engineering (RQF)

Unit 18: Maintenance Engineering

Unit Workbook 3

in a series of 4 for this unit

Learning Outcome 3

Hazards in Maintenance

INTRODUCTION

LO3 Illustrate competence in working safely by correctly identifying the hazards and risks associated with maintenance techniques

Working safely:

Life-saving rules for employee safety, such as safety devices and guards, lock out, tag out, electrical work, arc flash, fall protection and permit required confined space working

Development and implementation of safe schemes of work

Lone working

Permit to work (PTW)

Emergency Procedures

Hazard identification and assessment of risk associated with identified hazard

Use of control measures (ERIC SP)

Production of a Risk Assessment & Method Statement for a maintenance procedure

SAMPLE

Contents

INTRODUCTION	2
Working safely.....	4
Life-saving rules for employee safety	4
Safety devices and guards.....	5
Lock out/Tag out	7
Electrical work.....	8
Arc flash.....	10
Fall protection	11
Permit required and Permit to Work (PTW)	12
Confined space working.....	15
Development and implementation of safe schemes of work.....	15
Lone working.....	16
Emergency Procedures	16
Hazard identification and assessment of risk associated with identified hazard.....	17
Use of control measures (ERIC SP).....	18
Production of a Risk Assessment & Method Statement for a maintenance procedure	18

SAMPLE

- safe for any work that has to be done when setting up, during normal use, when clearing blockages, when carrying out repairs for breakdowns, and during planned maintenance
- properly switched off, isolated or locked-off before taking any action to remove blockages, clean or adjust the machine

Also, make sure you identify and deal with the risks from:

- electrical, hydraulic or pneumatic power supplies
- badly designed safeguards. These may be inconvenient to use or easily overridden, which could encourage your workers to risk injury and break the law. If they are, find out why they are doing it and take appropriate action to deal with the reasons/causes

Preventing access to dangerous parts

Think about how you can make a machine safe. The measures you use to prevent access to dangerous parts should be in the following order. In some cases it may be necessary to use a combination of these measures:

- Use fixed guards (eg secured with screws or nuts and bolts) to enclose the dangerous parts, whenever practical. Use the best material for these guards – plastic may be easy to see through but may easily be damaged. Where you use wire mesh or similar materials, make sure the holes are not large enough to allow access to moving parts
- If fixed guards are not practical, use other methods, eg interlock the guard so that the machine cannot start before the guard is closed and cannot be opened while the machine is still moving. In some cases, trip systems such as photoelectric devices, pressure-sensitive mats or automatic guards may be used if other guards are not practical
- Where guards cannot give full protection, use jigs, holders, push sticks etc if it is practical to do so
- Control any remaining risk by providing the operator with the necessary information, instruction, training, supervision and appropriate safety equipment

Other things you should consider

- If machines are controlled by programmable electronic systems, changes to any programmes should be carried out by a competent person (someone who has the necessary skills, knowledge and experience to carry out the work safely). Keep a record of such changes and check they have been made properly
- Ensure control switches are clearly marked to show what they do
- Have emergency stop controls where necessary, eg mushroom-head push buttons within easy reach
- Make sure operating controls are designed and placed to avoid accidental operation and injury, use two-hand controls where necessary and shroud start buttons and pedals
- Do not let unauthorised, unqualified or untrained people use machinery – never allow children to operate or help at machines. Some workers, eg new starters, young people or those with disabilities, may be particularly at risk and need instruction, training and supervision

Actions

- Simply turning off the machine, equipment or processes is not enough
- You may be working out of site of the on/off switch or isolator
- In this case, another worker might inadvertently switch the machine back on.

Electrical work

Electricity can kill or severely injure people and cause damage to property. However, you can take simple precautions when working with or near electricity and electrical equipment to significantly reduce the risk of injury to you, your workers and others around you. This section provides a summary of those precautions.

What are the hazards?

The main hazards of working with electricity are:

- electric shock and burns from contact with live parts
- injury from exposure to arcing, fire from faulty electrical equipment or installations
- explosion caused by unsuitable electrical apparatus or static electricity igniting flammable vapours or dusts, for example in a spray paint booth

Electric shocks can also lead to other types of injury, for example by causing a fall from ladders or scaffolds etc.

What do I have to do?

You must ensure an assessment has been made of any electrical hazards, which covers:

- who could be harmed by them
- how the level of risk has been established
- the precautions taken to control that risk

The risk assessment should take into consideration the type of electrical equipment used, the way in which it is used and the environment that it is used in.

You must make sure that the electrical installation and the electrical equipment is:

- suitable for its intended use and the conditions in which it is operated
- only used for its intended purpose

In wet surroundings, unsuitable equipment can become live and make its surroundings live too. Fuses, circuit-breakers and other devices must be correctly rated for the circuit they protect. Isolators and fuse-box cases should be kept closed and, if possible, locked.

Key points to remember

- Ensure that workers know how to use the electrical equipment safely
- Make sure enough sockets are available. Check that socket outlets are not overloaded by using unfused adaptors as this can cause fires
- Ensure there are no trailing cables that can cause people to trip or fall
- Switch off and unplug appliances before cleaning or adjusting them
- Ensure everyone looks for electrical wires, cables or equipment near where they are going to work and check for signs warning of dangers from electricity, or any other hazard. Checks should be made around the job, and remember that electrical cables may be within walls, floors and ceilings (especially when drilling into these locations) etc
- Make sure anyone working with electricity has sufficient skills, knowledge and experience to do so. Incorrectly wiring a plug can be dangerous and lead to fatal accidents or fires
- Stop using equipment immediately if it appears to be faulty – have it checked by a competent person
- Ensure any electrical equipment brought to work by employees, or any hired or borrowed, is suitable for use before using it and remains suitable by being maintained as necessary
- Consider using a residual current device (RCD) between the electrical supply and the equipment, especially when working outdoors, or within a wet or confined place (see HSE's electrical safety at work site)

Overhead electric lines

- Be aware of the dangers of working near or underneath overhead power lines. Electricity can flash over from them, even though machinery or equipment may not touch them
- Don't work under them when equipment (eg ladders, a crane jib, a tipper-lorry body or a scaffold pole) could come within a minimum of six metres of a power line without getting advice. Speak to the line owner, eg the electricity company, railway company or tram operator, before any work begins
- Underground cables
- Always assume cables will be present when digging in the street, pavement and/or near buildings
- Consult local electricity companies and service plans to identify where cables are located

Arc flash

“injury” means death or personal injury from electric shock, electric burn, electrical explosion or **arcing**, or from fire or explosion initiated by electrical energy, where any such death or injury is associated with the generation, provision, transmission, transformation, rectification, conversion, conduction, distribution, control, storage, measurement or use of electrical energy;

Electric burns are different from burns due to fire, arcing or explosion. They are due to the heating effect caused by the passage of electric current through body tissues. They are most commonly associated with