nebosh

INTERNATIONAL HEALTH AND SAFETY

A course book for the NEBOSH International General Certificate in Occupational Health and Safety

Series Editor:
Paul Randall

Authors:
Dr Luise Vassie
Tony Morriss
Dr Mark Cooper
Caroline Copson
Dr David Towlson

CONTENTS

ELEMENT 2

HOW HEALTH AND SAFETY MANAGEMENT SYSTEMS WORK AND WHAT THEY LOOK LIKE

2.1: Key components of health and safety management systems

Introduction

A health and safety management system is a set of interrelated components/ elements that allow an organisation to manage health and safety in a structured way to achieve its objectives. Formal systems are built on the elements of Plan, Do Check, Act (PDCA), capturing the principle of continuous improvement.

The main components of the system are a policy, which sets out a mission statement for health and safety and mechanisms for management control and accountability, and arrangements for implementing, monitoring, auditing and continuously improving. A formal system develops consistency and supports a culture that can involve everyone.

Organisations need to:

- work out the issues to be addressed;
- set the direction;
- plan what needs to be done and organise who will do it;
- set them up to do so;
- carry out the plan;
- check completion and efficacy; and
- take on board any learning so that they can continually improve.

Organisations are being encouraged to adopt management systems through their supply chains and in some cases through legal requirements. There are generic and sector-specific approaches as well as approaches for which independent third-party certification can be obtained.

Organisations generally have freedom to choose the approach they want to follow and can decide whether they want to work towards a verifiable standard. However, in some regions government guidance or legal requirements may dictate the approach.

2.1.1 The structure of a health and safety management system: the Plan, Do, Check, Act model (see ISO 45001[1] and ILO-OSH 2001[2])

ISO 45001

ISO 45001 is the first truly international certifiable occupational health and safety management system standard. The development of the standard has drawn on

experience gained with OSHSAS 18001 (replaced by ISO 45001 in 2015) and other national approaches. As a result, the new standard is enhanced and more comprehensive, reflecting the approaches of organisations that strive for and succeed at health and safety management. Figure 1 shows elements of the standard.

The management system uses the PDCA cycle.

- **Plan** – assess occupational safety and health (OSH) risks and opportunities, taking into account the organisation's operating environment, and set out OHS objectives and delivery plans in line with the organisation's policy.
- **Do** – implementation of the processes.
- **Check** – monitor and measure OHS processes and report results.
- **Act** – take action to continually improve OHS performance and achieve intended outcomes of the system.

APPLICATION

Think about your organisation. Can you identify examples of how the PDCA approach is used in practice?

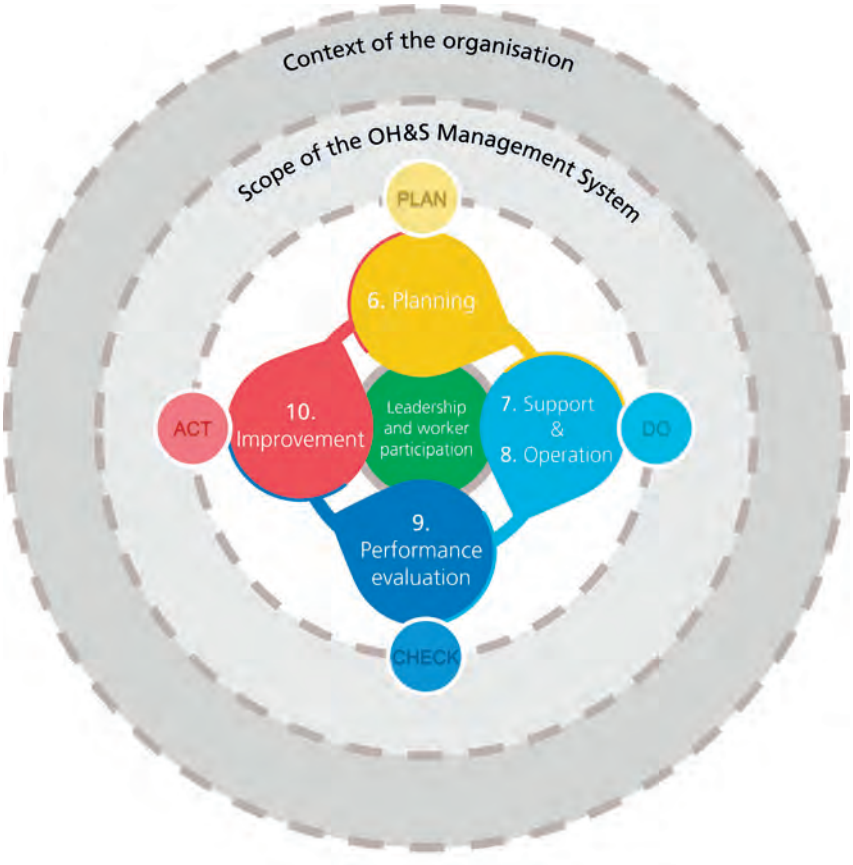

Figure 1: Elements of ISO 45001[3]

Let us look at the key clauses in the ISO 45001 standard and what they mean for organisations.

Context of the organisation (clause 4)

Establishing the organisation's context is a major building block that underpins the rest of the standard. This is about identifying and understanding the internal and external environments in which the organisation operates and the influence they exert. Influences may be positive or negative. The scope of the management system

must be set out, taking account of these. Setting the scope will determine the boundaries of the system – this is particularly important if the organisation is part of a larger organisation.

External aspects could include cultural, social, political, legal, financial, technological, economic and natural surroundings, and market conditions and key drivers and trends relevant to the industry or sector. Internal considerations could include: the organisational structure, roles and accountabilities and culture; policies, objectives and strategies; capabilities and decision-making processes.

There are various tools that can be used to gain an understanding of these external elements. One of these is STEEPLE (see Figure 2). Other models include PEST (Political, Economic, Social, Technological) or PESTEL (Political, Economic, Social, Technological, Environment and Legal).

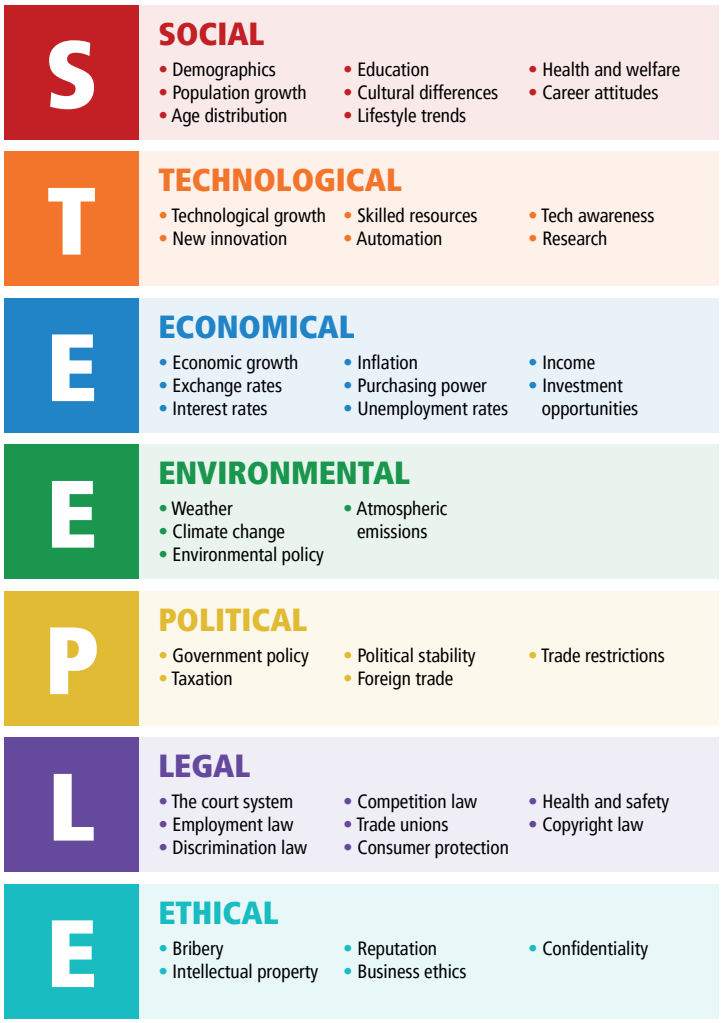

Figure 2: The STEEPLE model

There is also a requirement to consider relationships with external interested parties, such as shareholders, customers, suppliers and visitors.

Leadership and worker involvement (clause 5)

There is a requirement for responsibility and accountability of top management to be defined and visibly demonstrated. They must develop, lead and promote a culture that supports the management system. This means ensuring that the management system requirements are integrated into business processes and the health and safety policy, and that objectives align with the strategic direction of the organisation. That way health and safety becomes integrated. They must also help

ELEMENT 4

HEALTH AND SAFETY MONITORING AND MEASURING

4.1: Investigating and reporting incidents

Introduction

The objective of health and safety management is to prevent, or at least minimise, incidents that cause occupational injury or ill-health to workers. This is what we must strive to achieve. However, incidents happen and ill-health occurs, so we need to have systems in place to learn lessons and introduce measures to help prevent such events occurring again.

We will start by providing some important definitions, then move on to examining the four basic incident investigation stages in considerable detail.

We have featured a case study to illustrate these four stages.

Finally, we will provide an overview of how to record and notify occupational accidents and diseases.

We will start by defining some terms you may come across in incident investigation.

DEFINITIONS

*An **accident** is an unplanned event that results in personal injury or ill-health.*

*A **dangerous occurrence** is a specified adverse event that will need to be reported to the competent authority of the country in which it occurred. There is the potential for personal injury, although none occurred.*

*A **damage-only incident** is an event that damages equipment, property or materials but does not result in personal injury.*

*An **incident** is an event that happens in the workplace that causes (or has the potential to cause) harm, injury, ill-health or damage.*

(Note: you may occasionally see the term 'dangerous incident'. This is similar to a dangerous occurrence, where no injury occurred, although a potentially serious injury outcome was possible. The term 'accident' implies injury and/or ill-health has resulted.)

4.1.1 The different levels of investigations

Now we examine the level of investigation required for incidents presenting different levels of risk and their likelihood of recurrence.

Incidents with minor consequences occur much more frequently than those with more serious consequences. Table 1 demonstrates different combinations of frequency, level of risk and level of investigation.

Likelihood of recurrence	Minor consequences	Serious consequences	Major consequences	Fatal consequences
Certain	Low	Medium	High	High
Likely	Low	Medium	High	High
Possible	Low	Medium	High	High
Unlikely	Minimal	Low	Medium	High
Rare	Minimal	Low	Medium	High

Table 1: Different levels of risk and likelihood

At minimal-level investigation, the supervisor will review the circumstances of the incident and try to put in measures to prevent a recurrence.

At low-level investigation, the relevant supervisor will carry out a short investigation with the worker and the worker representative to investigate the circumstances of the incident and try to agree on measures to prevent a recurrence.

A medium-level investigation will involve the supervisor, worker, worker representative, safety adviser and possibly a senior manager in identifying all causes of the incident and drawing up a formal plan to prevent a recurrence.

A high-level investigation includes everyone involved with a medium-level investigation, is supervised by senior management and is a thorough, formal investigation. A timetable of immediate and longer-term actions will be agreed and a formal record made. It may well be that an external enforcing officer will become involved at an early stage, and the officer will probably identify certain actions to be carried out. In an extreme case, for example a fatality, the enforcing officer may require work that led to the fatality to stop until certain actions are carried out.

Any investigation will need to answer six basic questions, sometimes known as '5 Ws and a how', as shown in Figure 1.

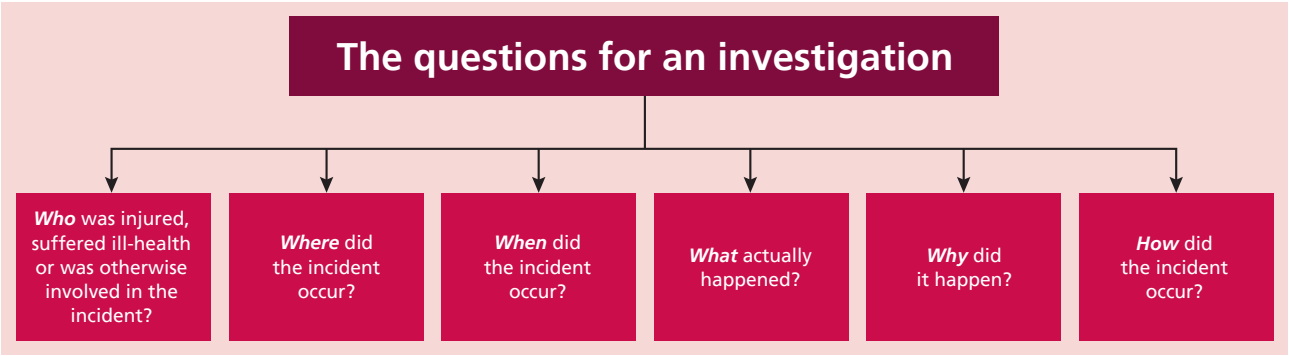

Figure 1: Questions for an investigation

CASE STUDY 1

The form below is an example of part of a report from an inspection carried out in a manufacturing area.

Observation	Recommended actions	Person(s) responsible for action	Action completion date	Comments
Pothole in floor on forklift truck vehicle route Risk of truck overturning	**Short term:** place warning notice and diversion sign **Medium term:** repair hole **Long term:** review traffic route, with a view to directing traffic on a more resilient surface	Area supervisor Maintenance manager Transport manager	Immediately Within 1 week Presentation to be made within 4 months	Done
High level of noise in machine area – complaints from workers; risk of hearing damage	**Short term:** Provide earmuffs and instruct workers to wear them **Medium term:** Arrange for noise assessment to be carried out by competent person **Long term:** Investigate the possibility of providing a noise enclosure	Supervisor Safety adviser Safety adviser/ engineering manager/external supplier	Within 2 days Within 2 months Viability study to be completed within 6 months	Delivery of earmuffs expected in 24 hours Meeting has been arranged with competent consultant in 10 days
Examination of machine guarding – all guarding found to be properly in place. Maintenance records to check guarding found to be up to date	**Short term:** None **Medium term:** Continue maintenance activities **Long term:** Review at next inspection	Maintenance engineers Inspectors	Ongoing 2–3 months	Praise communicated to maintenance department Observation of good practice
Worker noted to be using portable electric drill with badly damaged insulation Risk of electrocution	**Short term:** Take drill out of service **Medium term:** Provide training on electrical hazards to all workers, in particular, the importance of a visual check of portable electrical equipment before every use **Long term:** Review the system of portable appliance testing (PAT) within the organisation	Supervisor Safety adviser/ engineering manager Engineering manager	Immediately Within 2 weeks Within 2 months	Done – safe, checked drill provided for work to continue. Worker advised on visual checking immediately

Notes

1 Short-, medium- and long-term measures need to be identified, not just short-term measures. Short-term measures can usually be put in place very quickly at fairly low cost, whereas long-term measures require more resources in terms of cost and time. However, long-term measures tend to be far more effective over time. A good action programme will include both types of measure and, where possible, medium-term measures too.

2 Machine guarding was satisfactory at the time of the inspection and those responsible were praised for this. It is helpful to identify good practice and to praise those responsible. It increases morale and motivation.

Not all organisations are large; smaller organisations may also contain hazards and Case study 2 shows an example of part of a report that might apply to an office.

CASE STUDY 2

The following inspection was carried out in the general office of a small publishing company.

Observation	Recommended actions	Person(s) responsible for action	Action completion date	Comments
Trailing cables found across floor – risk of tripping	**Short term:** Place warning signs by cables **Medium term:** Place rubber covers over cables **Long term:** Re-route cables	Supervisor Maintenance manager Safety adviser/ maintenance manager	Immediate Within 1 week Within 3 months	Done
Fire extinguisher used to prop door open – incorrect use of fire extinguisher. Extinguisher not in correct place if needed to fight fire	**Short term:** Remove fire extinguisher and relocate it to its proper position **Medium term:** Provide training on use of fire extinguishers **Long term:** None	Supervisor Safety adviser None	Immediate Within 1 month	Done
Computer work; all workers noted to have good posture at desk; chair in good condition; no reports of any health problems; display screen equipment assessments carried out	**Short term:** None **Medium term:** Review risk assessments at appropriate time **Long term:** Review at next inspection	Safety adviser Inspectors	Ongoing 3 months	Good practice Praise DSE assessor

We have reviewed safety inspections in significant detail.

In summary, an inspection consists of a physical inspection of the workplace, looking for unsafe acts and conditions. It is carried out by a competent person, who could use a checklist. A report will be issued after the inspection that will include opportunities for improvement, such as remedial measures for hazards identified.

There are other active monitoring techniques that we will now discuss.

9.3: Machinery hazards

Introduction

ISO 12100:2010 Safety of machinery – General principles for design – Risk assessment and risk reduction is an internationally recognised standard relating to machinery safety. It looks at specific machinery hazards and the potential consequences if the hazard is realised. In addition, some machinery may present non-mechanical hazards, which may not at first sight be so obvious; we will discuss these non-mechanical hazards later. It is important to understand that many of the consequences will not happen in isolation but could happen in combination. For example, should a car fall from lifting equipment during maintenance it could crush and trap anyone who was underneath.

DEFINITION

*A **machine or machinery** can be defined as an 'assembly, fitted with or intended to be fitted with, a drive system consisting of linked parts or components, at least one of which moves, and which are joined together for a specific application'.*[1]

We will first look at three types of motion that can be used to describe all possible machinery movements and then hazards presented by the various movements of machinery.

Movement of machinery parts can be classified as one or more of the following:

- rotary motion;
- sliding (linear) motion; or
- reciprocating motion – forwards and backwards (can be classified as a form of linear motion).

These forms of motion will generate the mechanical hazards as defined in ISO 12100:2010.

We will now look at each of the consequences from mechanical hazards from ISO 12100:2010.

9.3.1 The potential consequences of mechanical hazards

Being run over

This is one of the less common consequences but it still needs to be considered. The most common occurrences of this happen when a worker is operating moving machinery. For example, paving machines laying asphalt are slow moving and may need adjusting during the operation. If the activity is not done correctly, there is a risk that a worker could be run over during the process (see Case Study). This is especially relevant where the machine moves forwards and backwards to complete an operation.

CASE STUDY

A nine-man crew was working with an asphalt road-widening machine. A member of the crew, who had only been on the job 4 days, was tasked with adjusting the machine's side-mounted spreader arm by walking alongside and to the rear of the paver. In this particular application, the paver laid down two layers of asphalt. The first layer was paved with the machine going forward. Then, the operator reversed the machine to the starting point and put down the second layer while the first was still hot. After the paver had made a long forward pass, the new worker decided to hitch a ride on the machine as it was backing up for the second pass. When they jumped up on the machine, their foot slipped, which resulted in them being run over by the right front tyre. Incident investigators speculated that fresh, wet asphalt on the bottom of the worker's boots may have caused the slip. The machine operator had told the new worker not to ride on the side of the machine, but to climb on top if they wanted a ride. Also, co-workers indicated that the victim might have been fatigued or suffering from heat stress. The paver weighed 40 tonnes and amputated the victim's left leg and crushed their pelvis, with substantial damage to the thigh and groin areas. The worker later died in hospital.[2]

Being thrown

Again, this is not a common consequence but needs to be considered. This involves a person being thrown from a machine rather than materials or parts being thrown from a machine. For example, any rider-operated equipment could result in the driver and/or passenger being thrown during acceleration or deceleration if they are not properly restrained.

Crushing

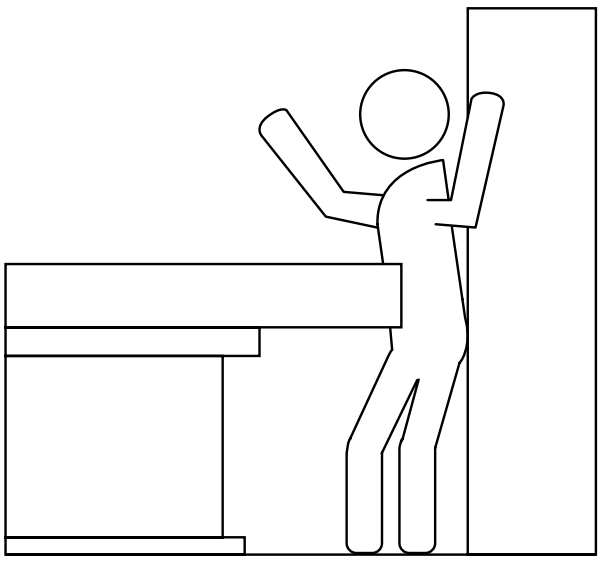

Figure 1: An example of a crushing hazard[3]

Crushing occurs when one part of machinery moves against a part of the body, which is in some way trapped against a fixed object such as a wall or another part of the machine.