OSH Management System:

A **tool** for continual improvement

WORLD DAY FOR SAFETY AND HEALTH AT WORK

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A TOOL FOR CONTINUAL IMPROVEMENT

International Labour Organization

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Introduction

Occupational safety and health (OSH) is a discipline dealing with the prevention of work-related injuries and diseases as well as the protection and promotion of the health of workers. It aims at the improvement of working conditions and environment. Occupational health entails the promotion and maintenance of the highest degree of physical and mental health and social well-being of workers in all occupations. In this context, the **anticipation, recognition, evaluation and control** of hazards arising in or from the workplace that could impair the health and well-being of workers are the fundamental principles of the process governing occupational risk assessment and management. The possible impact on the surrounding communities and the general environment should also be taken into account.

The basic learning process about hazard and risk reduction is at the root of the more sophisticated principles governing today's OSH. In present times, the need to master a galloping industrialization and its demand for highly and inherently dangerous energy sources, such as the use of nuclear energy, transport systems and increasingly complex technologies has led to the development of much more sophisticated risk assessment and management methods.

For all areas of human activity, a balance has to be made between benefits and costs of risk taking. In the case of OSH, this complex balance is influenced by many factors such as rapid scientific and technological progress, a very diverse and continuously changing world of work, and economics. The fact that the application of the OSH principles implies the mobilization of all social and scientific disciplines is a clear measure of the complexity of this field.

Risk assessment and management

The concepts of hazard and risk and their relationship can easily lead to confusion. A hazard is the intrinsic property or potential of a product, process or situation to cause harm, adverse health effects on someone or damage to something. It can come from a chemical (intrinsic properties), working on a ladder (situation), electricity, a compressed gas cylinder (potential energy), a fire source or more simply a slippery floor. Risk is the likelihood or probability that a person will be harmed or experience adverse health effects if exposed to a hazard or that property will be damaged or lost. The relationship between hazard and risk is exposure, whether immediate or long term, and is illustrated by a simple equation:

$$\text{HAZARD} \times \text{EXPOSURE} = \text{RISK}$$

As described before, the essential purpose of OSH is the management of occupational risks. In order to do that, hazard and risk assessments have to be carried out to identify what could cause harm to workers as well as property so that appropriate preventive and protective

measures can be developed and implemented. The five step risk assessment method shown below was developed by the Health and Safety Executive in the United Kingdom as a simple approach to manage risks, particularly in small scale enterprises (SMEs) and has been endorsed globally:

Table 1

STEP 1	**Identify the hazards**
STEP 2	**Decide who might be harmed and how**
STEP 3	**Evaluate the risks and decide on precautions**
STEP 4	**Record your findings and implement them**
STEP 5	**Review your assessment and update if necessary**

A risk assessment procedure can be easily tailored to the size and activity of the enterprise, as well as to the available resources and skills. A major hazard installation, such as a petrochemical plant will require highly complex risk assessment evaluations and mobilize a high level of resources and skills. Many countries develop their own risk assessment guidelines which are often used for regulatory purposes or to develop internationally agreed standards.

Two risk assessment processes which are essential for the management of occupational risks are the determination of occupational exposure limits (OEL) and the establishment of lists of occupational diseases. Most of the industrialized countries establish and maintain OEL lists. These limits cover chemical, physical (heat, noise, ionizing and non ionizing radiation, cold), and biological hazards. One list that is outstanding in terms of coverage and strong scientific peer-review process, and therefore used as a reference by other countries, is the List of Threshold Limit Values (TLVs) of the American Conference of Governmental Industrial Hygienists (ACGIH).

The incorporation of occupational diseases in national lists is also based on hazard and risk assessment procedures for the identification and recognition of occupational diseases for compensation purposes. These range from illnesses such as respiratory and skin diseases, musculoskeletal disorders and occupational cancer to mental and behavioural disorders. The ILO *List of occupational diseases (revised in 2010)* assists countries in the design of their own national lists, in prevention, recording, notification and, when applicable, compensation of diseases caused by workplace exposure.

What is an Occupational Safety and Health Management System (OSHMS)?

The notion of management systems is used often in the decision making processes in business and unknowingly also in daily life, whether it is in the purchase of equipment, the extension of business or more simply the selection of new furniture. The application of Occupational Safety and Health Management Systems (OSHMS) is based on relevant OSH criteria, standards and performance. It aims at providing a method to assess and improve performance in the prevention of workplace incidents and accidents via the effective management of hazards and risks in the workplace. It is a logical, stepwise method to decide what needs to be done, how best to do it, monitor progress toward the established goals, evaluate how well it is done and identify areas for improvement. It is and must be capable of being adapted to changes in the business of the organisation and to legislative requirements.

Figure 1: The Deming Cycle[1]
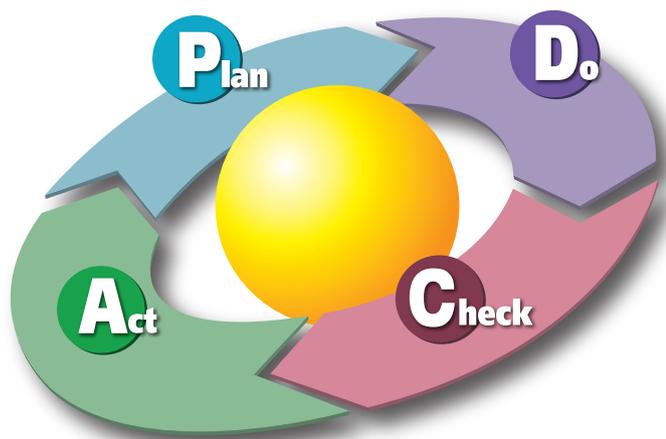
This concept of a process is based on the principle of the "Plan-Do-Check-Act" Deming Cycle (PDCA), designed in the 1950s to monitor business performance on a continual basis. When applied to OSH, **"Plan"** involves the setting of an OSH policy, planning including the allocation of resources, provision of skills and organisation of the system, hazard identification and risk assessment. The **"Do"** step refers to actual implementation and operation of the OSH programme. The **"Check"** step is devoted to measuring both the active and reactive performance of the programme. Finally the **"Act"** step closes the cycle with a review of the system in the context of continual improvement and the priming of the system for the next cycle.

An OSHMS is a logical toolbox that is flexible and can be tailored to the size and activity of the organisation and be focused on general or specific hazards and risks associated with such activity. Its complexity can range from the simple needs of a small enterprise running a single

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1 Diagram by Karn G. Bulsuk:
   (http://blog.bulsuk.com/2009/02/taking-first-step-with-pdca.html#axzz1GBg5Y7Fn)

product process where hazards and risks are easy to identify, to multiple hazard industries such as mining, nuclear power, chemical manufacturing, or construction.

The OSHMS approach ensures that:

- the implementation of preventive and protective measures is carried out in an efficient and coherent manner;

- pertinent policies are established;

- commitments are made;

- all the workplace elements to assess hazards and risks are considered, and

- management and workers are involved in the process at their level of responsibility.

The path to OSHMS

The report of Great Britain's Committee on Safety and Health at Work on the state of occupational safety and health presented in 1972 (Robens Report, UK), announced a shift from industry-specific regulations to framework legislation covering all industries and workers. It was the beginning of a trend toward a more systemic approach to OSH. This paradigm shift was embodied in the 1974 OHS Act in the United Kingdom, as well as in the national legislations of other industrialized countries. At the international level, the ILO Occupational Safety and Health Convention, 1981, (No. 155) and its accompanying Recommendation (No. 164) emphasized the fundamental importance of tripartite participation in the implementation of OSH both at national and enterprise level. After a few years, it was felt that the increasing complexity and fast changing nature of the world of work called for new approaches to maintain safe and healthy working conditions and environment. Business management models designed to ensure rapid response to business fluctuations through continuous performance evaluation were rapidly identified as possible models to develop a systems' approach to the management of OSH. This approach was rapidly endorsed as an effective way to ensure a coherent implementation of OSH measures focusing on the continuous assessment and improvement of performance and self-regulation.

In response to the need to continue reducing occupational injury, illness, fatalities and their associated costs, strategies for augmenting traditional command-and-control regulatory and management approaches have been explored to further improve performance. Some examples are: behaviour-based-safety techniques, improved health and safety risk assessment and auditing methods, as well as management systems' schemes. In recent years, the application of systems models to OSH, now referred to as the OSH management systems approach, has retained the attention of enterprises, governments and international organizations as a promising strategy to harmonize OSH and business requirements, and ensure more effective participation of workers in implementing the preventive measures.

It has been over a decade now that the concept of OSHMS is being promoted as an effective way to improve the implementation of OSH in the workplace by ensuring the integration of its requirements into business planning and development processes. A significant number of OSHMS standards and guidelines have been developed since by professional, government

and international bodies with responsibilities or interests in the area of OSH. Many countries have formulated national OSH strategies that also integrate the management systems approach. At the international level, the ILO published in 2001 *Guidelines on occupational safety and health management systems (ILO-OSH 2001)* which because of their tripartite approach have become a widely used model for developing national standards in this area.

The ILO and OSHMS

The OSHMS' approach gained support following the wide endorsement and success of the ISO standards for quality (ISO 9000 series) and later for the environment (ISO 14000 series). This model is based on systems theories developed primarily in the natural and social sciences, but is also similar to business management mechanisms. Four elements common to general systems theories are: input, process, output, and feedback.

Following the adoption of the ISO 9000 quality and 14000 environmental management technical standards in the early 1990s, the possibility of developing an ISO standard on OSH Management Systems was discussed at an ISO International Workshop in 1996. It became rapidly evident that as safety and health was about the protection of the health and life of human beings, it was already stated as an obligation for the employer in national legislation. There were also issues related to ethics, rights and duties and the participation of social partners which also called for consideration in this context. A management standard in this area had to be rooted in the principles of ILO OSH standards such as the Convention on Occupational Safety and Health, 1981 (No. 155) and could not be treated in the same way as other quality and environmental matters. This became a major issue for debate and it was eventually agreed that, with its tripartite structure and its standard-setting role, the ILO was the most appropriate body to develop international OSHMS guidelines. An attempt in 1999 by the British Standards Institution (BSI) to develop an OSH management standard under the umbrella of ISO was again met by strong international opposition resulting in shelving the proposal. BSI developed later OSHMS guidelines in the form of private technical standards (OHSAS) but ISO did not.

After two years of development and international peer review, the *ILO Guidelines on occupational safety and health management systems (ILO-OSH 2001)* were finally adopted at a tripartite Meeting of experts in April 2001 and published in December 2001 following the approval of the Governing Body of the ILO. In 2007, the Governing Body reaffirmed the ILO's mandate in the matter of OSH, asking the ISO to refrain from developing an international standard on OSHMS. The ILO-OSH 2001 Guidelines provide a unique international model, compatible with other management system standards and guides. They reflect ILO's tripartite approach and the principles defined in its international OSH instruments, particularly the Occupational Safety and Health Convention, 1981 (No. 155). Their guidance provides for the
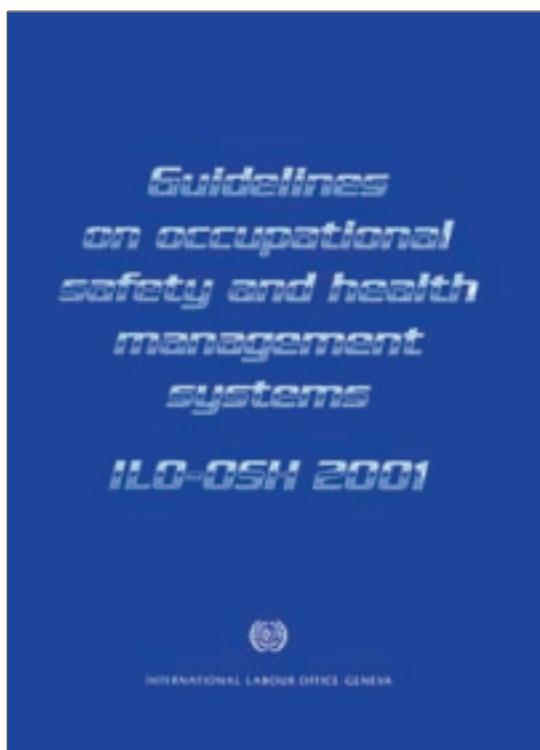
systematic management of OSH both at the national and organization's levels. The following diagram summarizes effectively the management steps defined in the guidelines.

The ILO Guidelines on OSHMS: The continual improvement cycle

Policy
OSH policy
Worker participation

Organizing
Responsibility & accountability
Competence & training
OSH documentation
Communication

Action for improvement
Preventive and corrective action
Continual improvement

Planning & implementaion
Initial review
System planning, development and implementation
OSH objectives
Hazard prevention

Evaluation
Performance monitoring and measurement
Investigation
Audit Management review

OSHMS for national systems

Occupational safety and health is a complex field calling for the intervention of multiple disciplines and the involvement of all stakeholders. The corresponding institutional arrangements to transpose the national OSH policy into action inevitably reflect this complexity. As a result, their infrastructures provide for much slower communication and decision making mechanisms and thus an inherent difficulty in continuously accommodating the world of work changes at an adequate pace. Since both national OSH systems which regulate OSH requirements and enterprises which have to apply these requirements have to address this continuous and fast pace of change, the application of the management systems approach to the operation of national OSH systems seems to be a logical step. If its application becomes systematic, this approach would bring much needed coherence, coordination, simplification and speed to the processes of transposition of regulatory requirements into effective preventive and protective measures and assessment of compliance.
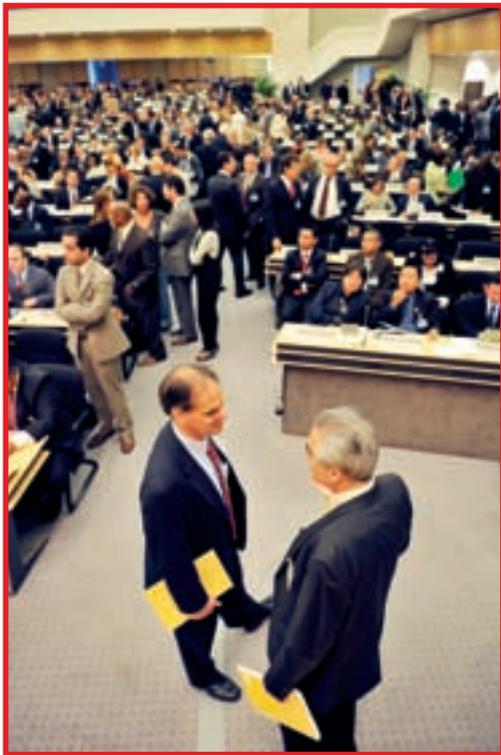
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The goal of continual improvement toward achieving and sustaining decent, safe and healthy working conditions and environment is promoted in the 2003 ILO's Global Strategy on OSH. The concept of applying OSHMS to national OSH systems was further embodied for the first time in an international standard in 2006 when the International Labour Conference of the ILO adopted a Convention concerning the *"Promotional framework for occupational safety and health"* (No. 187) and it's accompanying Recommendation (No. 197). The main purpose of the Convention is to ensure that a higher priority is given to OSH in national agendas and to foster political commitments in a tripartite context for the improvement of OSH. It has a promotional rather than prescriptive content and it is based on two fundamental concepts, namely the development and maintenance of a preventative safety and health culture and the application at the national level of a management systems approach to OSH. The Convention defines in general terms the elements and function of the national policy, the national system and the national programme.

The key operational element is the development of national OSH programmes which should be endorsed by the highest government authority to ensure wide awareness of the national commitment. The application of the management systems approach at the national level proposes an integrated operational mechanism for continual improvement comprising:

■ A national OSH policy formulated, implemented and periodically reviewed by the competent authority in consultation with the most representative organizations of employers and workers;

■ A national OSH system which contains the infrastructure to implement the national policy and national programmes and coordinate the national regulatory, technical and promotional actions related to OSH;

- A national OSH programme defining national objectives relevant to OSH in a predetermined time frame, establishing priorities and means of action developed through an analysis of the national OSH situation as summarized by a National OSH Profile;

- A mechanism to review the outcomes of the national programme with a view to assessing progress and defining new objectives and actions for the next cycle.

Convention no. 187 underlines the importance of social dialogue and the full participation of all stakeholders in this field as a prerequisite for the successful management of the national OSH system. Education and training at all levels are also considered essential for the system and its operation.

Labour inspections systems are still the main formal link between the national OSH system and the organizations concerning labour relations and OSH. With adequate training, they could certainly play a decisive role in ensuring that OSHMS programmes, including auditing mechanisms, conform to national laws and regulations.

The ILO instruments directly concerned with the management of OSH in the enterprise, namely, the ILO OSH Convention, 1981 (No. 155), the Promotional Framework for OSH Convention, 2006 (No. 187) and the ILO-OSH 2001 Guidelines, define the essential elements and function of an OSH management framework, both for national systems and organizations (enterprises). The future of OSHMS lies in striking the right balance between voluntary and mandatory approaches reflecting the local needs and practice.

OSHMS and organizations (enterprises)

In all countries, occupational safety and health implementation and compliance with the requirements pursuant to national laws and regulations are the responsibility and duty of the employer. The application of a systems' approach to the management of OSH in the organization (the enterprise) ensures that the level of prevention and protection is continuously evaluated and maintained through appropriate and timely improvements.

Most organizations could benefit from the concept of OSHMS if they take into account a number of important

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principles when deciding to apply a systems' approach to the management of their OSH programme. Management systems are not the universal remedy and organizations should analyze carefully their needs in relation to their means and tailor their OSHMS accordingly. This can eventually be done by scaling it down or making it less formal. Management must ensure that the system is designed to improve and stays focused on the performance of

preventive and protective measures rather than on itself. It must also ensure that audits contribute to the continual improvement process rather than becoming a mechanism for improving audit scores only.

Auditing

One of the main interests in OSHMS is the capacity of measuring the performance of the system and whether it is improving over time. The quality of this measurement depends very much on the quality of the auditing mechanism, whether internal or external, that is used, and competence of the auditors. Generally, auditing is the monitoring of a process by a competent person or team who is independent of the process. Periodic audits are designed to help determine whether the OSH management system and its elements are in place, adequate, and effective in protecting the safety and health of workers and preventing incidents. They also provide the means to measure performance of the system over time.

When planning improvements, audit evidence should always be reviewed alongside other data on system performance. Any audit scoring system should provide benchmarks for future improvements rather than highlighting past successes. The audit conclusion should determine whether the implemented OSHMS is effective in meeting the organization's OSH policy and objectives, and promoting full workers' participation; responding to the results of OSH performance evaluation and previous audits; enabling the organization to achieve compliance with relevant national laws and regulations, and fulfilling the goals of continual improvement and best OSH practice. Audits require good communication within an organization so when the audit is being conducted, people are ready to supply needed information in the form of documents/records, interviews, or site access. Good communication methods are also needed when audit findings are disseminated.

Private certification and auditing companies can easily be in a situation of conflict when they both help the organization set up its OSHMS and audit it. The experience with financial audits has shown that it may be difficult to provide real independent auditing when there is an existing relationship with the auditors or when service costs become the main driving factor. The selection of auditors and the definition of precise terms of reference for carrying out audits must be considered with care to ensure they take the specific profile of the organization into account. A really effective audit system is one in which those being audited look forward to the process, expecting new and useful ideas for practical improvements. If they face audits with dread, the audit system needs to improve, not those being audited!

Whether the OSHMS requirement are voluntary or mandatory, organizations rely on nationally or professionally accredited certification and auditing bodies to assess their adherence to OSHMS requirements and performance of implementation. Auditing processes complete the OSHMS by providing an independent assessment of its performance and proposing corrective actions and new objectives for further improvements.

Workers' Participation

OSHMS cannot function properly without the existence of effective social dialogue, whether in the context of joint safety and health committees, or other mechanisms such as collective bargaining arrangements. Workers and their representatives should be given the opportunity, through direct involvement and consultation, to fully participate in the management of OSH in the organization. A system is successful only when all the stakeholders are given defined responsibilities in running it.

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A major principle of OSHMS is the establishment of a line management responsibility, including the meaningful involvement of all employees at all levels in the organization, and with defined OSH responsibilities. It has been demonstrated again and again that the implementation of OSH, and even more of OSHMS, can be successful only when all stakeholders participate fully in this implementation through dialogue and cooperation. In the case of OSHMS, a system run solely by managers without input from workers at lower levels in the hierarchy is bound to lose its focus and fail. A number of studies suggest an association between lower lost-time injury rates and the presence of joint OSH committees and trade union involvement in the organization. Other studies indicate that participatory workplace arrangements lead to OSHMS practices resulting in improved OSH performance, and this is even more so in unionized workplaces.

Full workers' participation is strongly promoted in all ILO OSH standards, and particularly in the ILO Convention on Occupational Safety and Health, 1981 (No. 155) and its accompanying Recommendation (No. 164), as well as in the ILO Guidelines on OSHMS. For joint OSH committees and similar arrangements to be effective, it is important that adequate information and training is provided, that effective social dialogue and communication mechanisms are established, and that workers and their representatives are involved in the implementation of OSH measures. Although participation in OSHMS is usually understood to refer to employers and workers in the organization, participation in the sense of information exchange and communication should also concern out-sourced and external stakeholders in the implementation of measures. These may include regulators, subcontractors, neighbouring communities and organizations, clients and enterprises in the supply chain, insurers, shareholders and consumers, as well as international standard setting bodies.

OSH related training at all levels, from managers to workers, is a major element in implementing any OSH programme. This training has to be carried out on a continual basis to ensure knowledge of the system and for instructions to stay up to date with changes in the organization. In this context communication channels between the different levels of the organization must be effective and go both ways, meaning that OSH related information and concerns conveyed by

shop floor workers should be given due consideration and allowed to reach higher management. This is an example of what is meant by the need for the system to focus on people.

Small scale enterprises

Small scale enterprises which are usually short on resources, can also carry out an effective risk assessment through simple measures, such as requiring safety data sheets prior to purchase of products and equipment, job hazard identification and adequate training. While the integration of OSH requirements in the business policies and participatory mechanisms of large enterprises, particularly multinationals, is now an established trend, major efforts are still needed to assist small enterprises in implementing a practical, cost effective way of bringing some elements of OSHMS into their OSH practices. Some small and medium-sized enterprises may not have a fully documented OSHMS, but will be able to demonstrate a clear understanding of hazards and risks and effective controls.

Because it requires a minimum level of skills, technical knowledge and resources, an effective application of OSHMS in small scale enterprises continues to be a daunting challenge. Progress in this area is very dependent on primary prevention and easier access to basic OSH information and training. There are yet a number of the OSHMS steps that could be simplified and adapted to the size and technical means of the enterprise. The training packages *Work Improvement in Small Enterprises* (WISE), the *Work Improvement in Neighbourhood Development* (WIND) for small scale farmers and the *POSITIVE* programme for trade unions have been developed and tested extensively by the ILO. They include simplified forms of risk assessment similar to step 1 of OSHMS implementation.

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While they are not an OSHMS model, they are based on basic primary prevention methodologies presented in a simple manner for small scale enterprises. Therefore, they could be adapted to include some of the basic elements of OSHMS, particularly those related to hazard identification and risk assessment, such as the steps in Table 1 above. National labour inspection services provide a good "vector" for the provision of advice and dissemination of information on simple ways to manage occupational risks in SMEs. Both the national and international organizations of employers and workers have also an important role to play in the development and promotion of these methods, as well as in the provision of the necessary training.

Multinational enterprises have a particularly important role to play in influencing their suppliers. Many of these are small scale enterprises. Sensitivity to local culture can greatly facilitate the acceptance of innovative approaches to OSH. As more enterprises take an active interest in OSHMS, safety and health and working conditions in developed and developing countries should improve.

OSHMS and high risk sectors

As demonstrated above, the essence of OSH is the management of occupational risks. In the same way, OSHMS is a "generic" method that can be tailored to the management of hazards specific to a given industry or process, particularly in high risk industries where the implementation of preventive and protective measures requires a comprehensive and organized evaluation of risks and monitoring of performance of complex control systems on a continuous basis. Some of the examples below describe the application of OSHMS to key high risk sectors of economic activity.

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The **construction industry** has a high occupational accident rate and the use of multiple contractors and subcontractors on construction sites is the rule. A strong incentive for using OSHMS in this sector is that it provides a common template for all the parties working on a site to harmonize the planning, implementation and monitoring of OSH requirements, as well as building a basis for performance auditing. It also facilitates the integration of OSH needs in the early stages of the complex design and planning, bidding and start up stages of a construction project. Thus the implementation of integrated management systems in construction is recognized as an effective tool to ensure a coherent integration of quality, environmental and OSH systems on a worksite with multiple stakeholders. **Mining** is another high risk industry where OSHMS, with its coherent, stepwise and logical approach can be an effective tool for reducing occupational accidents and diseases. The **maritime sector** is another example of a high risk sector. The ILO's Maritime Labour Convention, 2006, promotes the preparation of national guidelines and policies for occupational safety and health management systems and for provisions, rules and manuals on accident prevention.

Chemicals and OSHMS

Since chemicals are an integral part of our natural and urban environment and their benefit to society is invaluable, there is no choice but to learn to manage effectively their unwanted and harmful effects. To be effective, chemical safety strategies must strongly adhere to the general principles of OSH, namely hazard identification and characterization, risk characterization, exposure assessment, and overall, the implementation of a systems approach to achieve a sound management of chemicals. This management requires an integrated approach rather than isolated measures, particularly when some of these problems may often have a global impact. Sound management must cover the complete life cycle of chemicals. All the recent regulations and strategies promoting the sound management of chemicals at the international, national, and organization levels integrate the principles of OSHMS.

The prevention of exposure to hazardous chemicals is a major focus of risk assessment. Intergovernmental and international organizations, such as the ILO, WHO, UNEP, FAO and the OECD, collaborate to produce various internationally agreed guidelines on hazard and risk assessment which are widely used as a basis for evaluating occupational risks. The Globally Harmonized System for the Classification and Labelling of Chemicals (GHS), the International Chemical Safety Cards or the Concise International Chemical Assessment Documents (CICAD) of the International Programme on Chemical Safety (IPCS) are examples of international peer-review and cooperation in this area.

Among the large array of ILO OSH standards, the ILO Chemicals Convention, 1990 (No. 170), provides for a wide scope, comprehensive national framework for the sound management of chemicals, including the formulation, implementation and periodic review of a coherent policy, in consultation with Employers' and Workers' organizations. A very important feature of the Convention is its provisions concerning chemical hazard communication and the transfer of safety information from manufacturers and importer to the users. The accompanying Recommendation and the Code of Practice on *Safety in the use of chemicals at work, 1993*, provide additional guidance. Another important international instrument is UNEP's 2006 Strategic Approach to International Management of Chemicals (SAICM).[2]

The European Union's 2007 Regulation for Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) requires the registration, and generation of data for all chemicals substances produced or imported into the EU above one tonne per year. The *Canadian Environmental Protection Act, 1999* (CEPA 1999) is another example of legislation taking a "risk-based" approach for the assessment and management of new and existing chemical substances. The chemical industry has developed voluntary initiatives for the sound management

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2 http://www.saicm.org

of chemicals on a global basis; two examples are Responsible Care and Product Stewardship.

The limited capacity of SMEs to manage exposure to chemicals, has recently led to the development of a new approach to the management of chemicals. It is called Control Banding and it focuses on exposure controls where a chemical is assigned to a "hazard band", each requiring defined control measures based on its hazard classification according to international criteria, the amount of chemical in use, and its volatility/dustiness.

Major Hazards Control

The chemical and energy sectors (whether nuclear, coal or oil-based) are high risk sector where OSHMS was first applied and used. Major industrial accidents such as the 1974 cyclohexane vapour cloud explosion at Flixborough in the UK, the 1984 Bhopal methyl isocyanate leak that killed thousands of people in India, the Chernobyl nuclear power station explosion and melt down in 1986 or more recently the 2001 ammonium nitrate explosion at the AZF plant in France, illustrate the catastrophic capabilities of industrial installations and the consequences of OSH management malfunction. Many of these events prompted the development of regulatory and technical tools to set very stringent hazard and risk assessment procedures.

A critical element in the risk management procedures of major hazards' installations is the analysis of hazards at the design, construction and operation phases. Some well documented methods and techniques to formalize hazard's assessment are the Preliminary Hazard Analysis (PHA), Hazard and Operability Study (HAZOP), Fault Tree Analysis (FTA), or Failure Modes Effects and Criticality Analysis (FMECA). Many of these methods were developed initially for the nuclear energy industry and adapted to other processes. These tools help in identifying potential process component failure modes, predicting consequences and developing preventive measures and effective emergency preparedness and response plans.

Most industrialized countries have developed regulatory criteria to designate industrial installations as major hazard installations requiring very specific and stringent safety and health measures. The EU 1996 "Seveso" Directive 96/82/EC on the control of major-accident hazards involving dangerous substances is a good example of such regulations..

The ILO's Convention on the prevention of major industrial accidents, 1993 (No. 174) provides a systematic and comprehensive model framework for the protection of workers, the public and the environment against major industrial accidents involving hazardous substances as well as the mitigation of the consequences of such accidents where they do occur. The standards sets out the systematic identification of major hazard installations and their control, responsibilities of the employers, competent authorities and the rights and responsibilities of workers. It also defines the responsibilities of exporting States. The accompanying Recommendation (No. 181) contains further provisions, for example for the international transfer and the
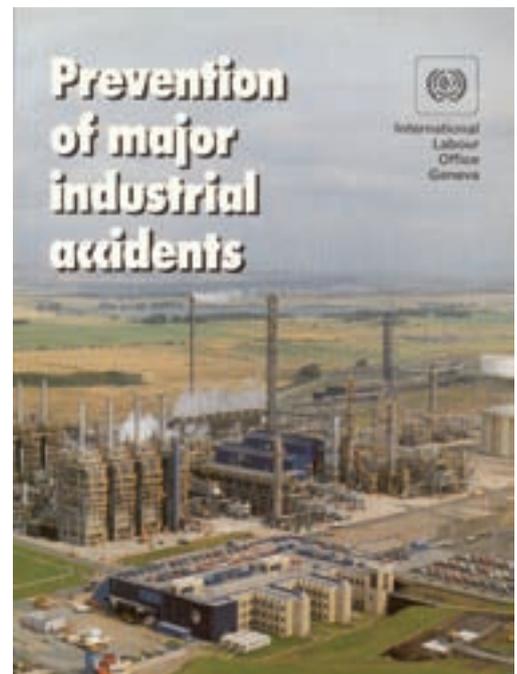
rapid compensation of victims of accidents. It also provides that ratifying States should take the related Code of Practice on *the prevention of major accidents, 1991* into account in the formulation of their national policy, and that multinationals should provide equal measures in all of their establishments. The ILO also developed a *manual on Major Hazard Control*, (1993) aimed at assisting countries in the development of control systems and programmes for major hazard installations.

Nanotechnologies

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The application of nanotechnologies to the production of nanomaterials and the potentially adverse human health effects from exposure to particles smaller than 100 nanometers is a major emerging OSH concern. Engineered nanoparticles may have chemical, physical, and biological properties distinctly different from those of larger particles of similar chemical composition. A review of the literature indicates that some occupational and environmental exposures to a limited number of engineered nanomaterials have been reported, but much more data is needed to characterize the health and environmental effects associated with exposure to such materials. Several governments and intergovernmental organizations, such as the Organisation for Economic Cooperation and Development (OECD) have established task forces to evaluate the potential impact of nanomaterials on human health and the environment; design the hazards classification and the risk assessment and management measures; and assess the regulatory implications of the industrial production and use of nanomaterials. This cooperation is a good example of the application of an internationally peer-reviewed assessment of an emerging risk.

Are Management Systems good for OSH?

OSHMS should not be regarded as the panacea for increasing the performance of the organization in ensuring and sustaining a safe and healthy working environment. As any method, OSHMS has both advantages and weaknesses, and its effectiveness is very much dependant on how it is understood and applied. While most organizations will probably benefit from a full OSHMS, some might consider using a scaled down, less formal approach to the management of OSH. The decision of moving to OSHMS may be sometimes difficult to justify as the distinction between a programme and a system is a potentially weak one.

Programmatic approaches, such as that promoted in the ILO OSH Convention, 1981 (No. 155) do in fact contain systems' features and similarly, systems' approaches do in fact contain programmatic features. This is also the case in a large number of national OSH legislation. However, systems management brings to OSH the possibility of establishing mechanism for not only continual assessment and improvement of OSH performance, but also for the building of a preventative safety and health culture, as defined in the ILO Global Strategy on OSH (2003) and the ILO Convention on a Promotional Framework for Occupational Safety and Health , 2006 (No. 187).

The performance of an OSHMS can only be as good as the performance of the overall management of the organization. Like all methods, it has both strengths and weaknesses which should be known. It is therefore important to be aware of the pitfalls that may derail the operation of an OSHMS, but also know what elements must be in place to ensure a good performance and benefit from the important advantages of OSHMS for safety and health. It must be kept in mind that these strengths and weaknesses apply mostly to medium and large organizations which have the necessary technical and financial resources for a full implementation of OSHMS.

It is very important to remember that OSHMS is a management method and not an OSH programme in itself. Therefore, a management systems' approach is only as good as the OSH framework or programme in place in the organization. OSHMS programmes must function within the national OSH legislation framework and the organization must ensure that the system include a review of regulatory requirements and is updated accordingly to integrate them. A detailed generic description of the elements of an OSH management system in the organization based on ILO-OSH 2001 is provided in Annex 1.

Strengths of OSHMS

It is now recognized that the management systems' approach brings a number of important advantages to the implementation of OSH, some of which have been already identified further above. A systems' approach also adjust the overall safety and health programme over time so that decisions on hazard's control and risk reduction improve progressively. Other key advantages are:

- The possibility of integrating OSH requirements into business systems and aligning OSH objectives with business objectives, thus resulting in a better taking into account of implementation's costs related to control equipments and processes, skills, training and information;
- Harmonizing OSH requirements with other related requirements, particularly those pertaining to quality and environment;
- Providing a logical framework upon which to establish and run an OSH programme that tracks all the elements requiring action and monitoring;
- Streamlining and improving communication mechanisms, policies, procedures, programmes, and objectives according to a set of rules applied universally;

- Applicability to differences in cultural and national regulatory systems;
- Establishing an environment conducive to the building of a preventative safety and health culture;
- Strengthening social dialogue;
- Distributing OSH responsibilities along the line management, involving all: managers, employees and workers have defined responsibilities for an effective implementation of the system;
- Adapting to the size and activity of the organization, and to the types of hazards encountered.
- Establishing a continuous improvement framework; and,
- Providing an auditable baseline for performance evaluation.

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Limitations of OSHMS

While the potential of OSHMS for improving safety and health is undeniable, there are many pitfalls which, if not avoided, can very rapidly lead the exercise toward failure. The usefulness of OSHMS has been questioned in several studies on the subject, and a number of potentially serious problems have been underlined, such as:

- The production of documents and records needs to be controlled carefully to avoid defeating the purpose of the system by drowning it in excessive paperwork. The focus on the human factor can be easily lost if the emphasis is more on the paperwork requirements of a formal OSHMS than people.

- Imbalances between management processes (quality, OSH, environment) must be avoided to prevent dilution of requirements and inequalities in focus. The lack of careful planning and full communication prior to the introduction of an OSHMS programme can raise suspicions about and resistance to the change.

- OSHMS usually puts greater emphasis on safety rather than health and with the risk of missing the onset of occupational diseases. Occupational health surveillance of workers must be incorporated in the system as an important and effective tool for monitoring the health of workers over the long term. Occupational health services, such as defined in the ILO Occupational Health Services Convention, 1985 (No. 161) and its accompanying Recommendation (No. 171) should be an integral part of OSHMS.

- Depending on the size of the organization the resources that are required to set up an OSHMS can be significant and should be the object of a realistic appraisal of overall costs in terms of implementation time, skills and human resources required to install and run the system. This is particularly important when the work is outsourced.

Key elements for a good OSH Management System

✓ Make a careful assessment of the organization's needs in relations to its means;

✓ Adapt the OSHMS accordingly;

✓ Ensure that the system stays focused on the performance of preventive and protective measures;

✓ Keep in mind that it is designed to improve rather than to justify itself;

✓ Ensure that audits contribute to the continual improvement process rather than becoming a mechanism for improving audit scores only;

✓ Remember that a management systems' approach is only as good as the OSH framework or programme in place in the organization;

✓ OSHMS programmes must function within the national OSH legislation framework and the organization must ensure that the system includes a review of regulatory requirements and is updated regularly to integrate them;

✓ OSH related training for the implementation of the OSHMS programme should be carried out on a continuous basis at all levels, from top managers to shop floor workers, and updated regularly ensuring knowledge of the system and keeping up with changes in the organization;

✓ Communication channels between the different levels of the organization need for the system to focus on people. OSH related information and concerns must go both ways to be effective, those conveyed by shop floor workers should be given due consideration and allowed to reach higher management;

✓ OSHMS cannot function properly without the existence of effective social dialogue (direct involvement and consultation). Workers and their representatives should be given the opportunity to fully participate in the management of OSH in the organization whether in the context of joint safety and health committees, or other mechanisms such as collective bargaining arrangements.

✓ A system is successful only when all the stakeholders are given defined responsibilities in running it.

✓ Labour inspections systems are still the main formal link between the national OSH system and the organizations concerning labour relations and OSH. With adequate training, they could play a decisive role in ensuring that OSHMS programmes, including auditing mechanisms, conform to national laws and regulations.

✓ The future of OSHMS lies in striking the right balance between voluntary and mandatory approaches. The trend should be toward a leaner implementation system combining voluntary and regulatory overseeing, particularly regarding auditing mechanisms.

ILO's Technical cooperation on safety and health management systems

Since the publication of ILO-OSH 2001, the ILO has been very active in providing technical cooperation assistance to countries interested in developing their own OSHMS Guidelines. Courses on the subject are offered by the ILO International Training Centre in Turin, Italy. Countries such as Argentina, Brazil, Israel and Ireland have formally recognized the ILO guidelines as a model for national promotion or the development of OSHMS guidelines adapted to their national needs. France has recognised the ILO guidelines as the only ones that may be used for certification nationally. The former Yugoslav Republic of Macedonia has just started a 3 year programme to implement ILO-OSH 2001 in medium and large enterprises. In Japan, tailored guidelines have been developed using the ILO Guidelines as a model. These are the Construction Occupational Safety and Health Management Systems (COSHMS) Guidelines produced by the Japan Construction Safety and Health Association (JCSHA) and the OSH management system guidelines for manufacturing produced by the Japan Industrial Safety and Health Association (JISHA).

Eleven CIS countries, adopted in 2007 a new interstate standard – GOST 12.0.230-2007: "Occupational safety standards system. Occupational safety and health management systems. General requirements" based on ILO–OSH 2001.

A good indicator of the worldwide endorsement of the ILO Guidelines is the fact that they have been translated into over 22 languages and used in at least 30 countries. The ILO guidelines are fast becoming the most referenced and used model for the development of OSHMS programmes at the national and enterprise level. Their generic format makes them easy to use together with other OHSMS standards or to include them in integrated management systems, as well as facilitating the implementation of OSH requirements by both multinational international organizations.

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Many of the voluntary standards, whether developed by national agencies or professional bodies have used the ILO-OSH 2001 Guidelines as a model because it reflects the principles promoted by ILO OSH standards and it was developed and adopted on a tripartite basis and represents therefore a very wide consensus on the most effective way to manage OSH.

Although organizations may use various versions of OSHMS standards depending on national requirements and the sector involved, all these standards integrate the PDCA model mentioned before. A number of OSHMS technical standards and guidelines designed for organizations have been developed by private bodies such as the American National Standards Institute

(ANSI Z10), or the British Standards Institution (BS OHSAS 18000 series). In the last 20 years, a large majority of countries have been introducing the implementation of OSHMS in organizations through a number of voluntary or regulatory mechanisms which can be:

- Mandatory through regulatory measures, at least for specified undertakings (Indonesia, Norway, Singapore);

- Nationally applicable voluntary standards with the support of certification mechanisms (Australia and New Zealand, China, Thailand);

- Voluntary through promotion of national OSHMS guidelines issued by a national body (Japan, Korea);

- Voluntary through the adoption of internationally recognized OSHMS such as ILO-OSH 2001 (India, Malaysia).

Final remarks

During the last decade, the approach of OSHMS has become popular and has been introduced in both industrialized and developing countries. The ways for promoting its application vary from legal requirements to voluntary use. Experience shows that OSHMS is a logical and useful tool for the promotion of continual improvement of OSH performance at the organization's level. Key elements for its successful application include ensuring management commitment and active participation of workers in the joint implementation. It is expected that more and more countries integrate OSHMS in national OSH programmes as a means to strategically promote the development of sustainable mechanisms for OSH improvements in the organizations.

References

1. International Labour Standards by subject, Occupational safety and health, ILO Internet site: http://www.ilo.org/ilolex/english/subjectE.htm#s12

2. Global Strategy on Occupational Safety and Health: Conclusions adopted by the International Labour Conference at its 91st Session, 2003. International Labour Office, 2004. http://www.ilo.org/safework/info/publications/lang--en/docName--WCMS_107535/index.htm

3. List of occupational diseases (revised 2010). Identification and recognition of occupational diseases: Criteria for incorporating diseases in the ILO list of occupational diseases (OSH 74). http://www.ilo.org/safework/publications/

4. *Guidelines on occupational safety and health management systems.* (ILO-OSH 2001). http://www.ilo.org/safework/info/publications/

5. General Survey concerning the Occupational Safety and Health Convention,1981 (No. 155), the Occupational Safety and Health Recommendation, 1981(No. 164), and the Protocol of 2002 to the Occupational Safety and Health Convention, 1981, International Labour Conference, 98th Session, 2009. Report III (Part 1B), International Labour Office, Geneva. ISBN 978-92-2-120636-1.

6. *Fundamental principles of occupational health and safety,* second edition, International Labour Office, Geneva, 2008.

7. "Background information for developing an ILO policy framework for hazardous substances", Sectoral Activities Programme, International Labour Office, Geneva, 2007 (MEPDHS/2007). http://www.ilo.org/public/english/dialogue/sector/techmeet/mepfhs07/mepfhs-r.pdf

8. ILO SafeWork: Information on Control banding: http://www.ilo.org/public/english/protection/safework/ctrl_banding/index.htm

9. Robens: Great Britain Committee on Safety and Health at Work: *Safety and health at work*, report of the Committee, 1970–72 (London, 1972).

10. Report of the OECD Workshop on the Safety of Manufactured Nanomaterials, 7–9 December 2005, Document No. ENV/JM/MONO(2006)19, available at http://www.oecd.org/ehs/

11. Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation (EC) No 1907/2006 and Directive 2006/121/EC amending Directive 67/548/EEC were published in the Official Journal on 30 December 2006.

12. *Strategic Approach to International Chemicals Management*, 2006. United Nations Environment Programme (UNEP). http://www.chem.unep.ch/

13. International Council of Chemical Associations (ICCA) *Responsible Care* http://www.icca-chem.org/en/Home/ICCA-initiatives/Responsible-Care/

14. "Work improvement and occupational safety and health management systems: Common features and research needs", Kazutaka Kogi, *Industrial Health* 2002, 40, 121-133.

15. *Systems in focus: Guidance on occupational safety and health management systems*, Institution of Occupational Safety and Health (IOSH), 2009. http://www.iosh.co.uk

16. *Workplace Arrangements for OHS in the 21st Century*, Professor David Walters, TUC Professor of Work Environment, School of Social Sciences, Cardiff University, United Kingdom, July 2003.

Annex 1
Essential elements of an occupational safety and health management system

Policy

OSH policy: The employer, in consultation with workers and their representatives, should set out in writing an OSH policy.

Worker participation: Worker participation is an essential element of the OSH management system in the workplace.

Organizing

Responsibility and accountability: The employer should have overall responsibility for the protection of workers' safety and health, provide leadership for OSH activities and ensure that OSH is a line management responsibility which is known and accepted at all levels.

Competence and training: The necessary OSH competence requirements should be defined by the employer, and arrangements established and maintained to ensure that all persons are competent to carry out the safety and health aspects of their duties and responsibilities.

Documentation: According to the size of the workplace and the nature of its activities, OSH related documentation should be established, maintained, reviewed, revised as necessary; be communicated an readily accessible to all appropriate or affected workers in the workplace. The documentation may cover the OSH policy, assigned responsibilities; significant workplace hazards and risks and arrangements for their prevention and control; records of OSH activities, work-related injuries, ill-health, disease, and incidents, OSH national laws and regulations; records of exposures, working environment monitoring, health surveillance data; results of monitoring; technical and administrative procedures, instructions and other relevant internal guidance documents.

Communication: Arrangements and procedures should be established and maintained for receiving, documenting and responding appropriately to internal and external communications related to OSH; ensuring the internal communication of OSH information between relevant levels and functions in the workplace; and ensuring that the concerns, ideas and inputs of workers and their representatives on OSH matters are received, considered and responded to.

Planning and implementation

Initial review: The existing OSH management system and relevant arrangements should be evaluated by an initial review, as appropriate to provide a baseline from which continual improvement of the OSH management system can be measured. In the case where no OSH management system exists, the initial review should serve as a basis for establishing an OSH management system. The initial review should be carried out by competent persons, in consultation with workers and/or their representatives, as appropriate.

System planning, development and implementation: The purpose of planning should be to create an OSH management system that supports: (a) as the minimum, compliance with national laws and regulations; (b) the elements of the OSH management system; and (c) continual improvement in OSH performance. Arrangements should be made for adequate and appropriate OSH planning, based on the results of the initial review, subsequent reviews or other available data. These planning arrangements should contribute to the protection of safety and health at work, and should cover the development and implementation of all the OSH management system's elements.

Occupational safety and health objectives: Consistent with the OSH policy and based on the initial or subsequent reviews, measurable OSH objectives and requirements specific to the workplace should be

established; these should be consistent with national laws and regulations;, focused towards continually improving workers' OSH protection to achieve the best OSH performance; realistic and achievable; documented, and communicated to all relevant workplace functions and levels; periodically evaluated and if necessary updated.

Hazard prevention

Prevention and control measures: Hazards and risks to workers' safety and health should be identified, prioritized and assessed on an ongoing basis. In order of priority, preventive and protective measures should (a) eliminate the hazard/risk; (b) control the hazard/risk at the source through appropriate measures; (c) minimize the hazard/risk by the design of safe work systems; and (d) where residual hazards/risks cannot be controlled by collective measures, the employer should provide for appropriate personal protective equipment, including clothing, at no cost, and should implement measures to ensure its use and maintenance.

Hazard prevention and control procedures should be established and should: (a) be adapted to the hazards and risks encountered by the organization;(b) be reviewed and modified, if necessary, on a regular basis; (c) comply with national laws and regulations, and reflect good practice; and (d) consider the current state of knowledge, including information or reports from organizations, such as labour inspectorates, occupational safety and health services, and other services as appropriate.

Management of change: The impact on OSH of internal changes (such as those due to staffing, new processes, working procedures, organizational structures or acquisitions) and of external changes (for example, as a result of amendments of national laws and regulations, organizational mergers, and developments in OSH knowledge and technology) should be evaluated and appropriate preventive steps taken prior to the introduction of changes. A workplace hazard identification and risk assessment should be carried out before any modification or introduction of new work methods, materials, processes or machinery. Such assessment should be done in consultation with and involving workers and their representatives, and the safety and health committee, where appropriate. The implementation of a "decision to change" should ensure that all affected members of the organization are properly informed and trained.

Emergency preparedness and response: Emergency prevention, preparedness and response arrangements should be established and maintained through continual internal training and information, and communication with external emergency services. These arrangements should identify the potential for accidents and emergency situations, and address the prevention of OSH risks associated with them. They should be established in cooperation with external emergency services and other bodies where applicable.

Procurement: Procedures should be established and maintained to ensure that: (a) compliance with workplace safety and health requirements is identified, evaluated and incorporated into purchasing and leasing specifications; (b) national laws and regulations and the workplace's own OSH requirements are identified prior to the procurement of goods and services; and (c) arrangements are made to achieve conformance to the requirements prior to their use.

Contracting: Arrangements should be established and maintained for ensuring that the workplace's safety and health requirements, are applied to contractors and their workers.

Evaluation

Performance monitoring and measurement: Procedures to monitor, measure and record OSH performance on a regular basis should be developed, established and periodically reviewed. Responsibility, accountability and authority for monitoring at different levels in the management structure should be allocated.

Investigation of work-related injuries, ill health, diseases and incidents and their impact on OSH performance: The investigation of the origin and underlying causes of work-related injuries, ill health, diseases and incidents should identify any failures in the OSH management system and should be documented. Such investigations should be carried out by competent persons, with the appropriate participation of workers and their representatives. The results should be communicated to the safety and health committee, where it exists, and the committee should make appropriate recommendations. The investigation data and the recommendations should be communicated to appropriate persons for corrective action, included in the management review and should be considered for continual improvement activities. Reports produced by external investigative agencies, such as inspectorates and social insurance institutions, should be acted upon in the same manner as internal investigations, taking into account confidentiality.

Audit: Arrangements to conduct periodic audits of each of the elements of the OSH management system are to be established in order to determine the overall performance of the system and its effectiveness in protecting the safety and health of workers and preventing incidents. An audit policy and programme should be developed, which includes a designation of auditor competency, the audit scope, the frequency of audits, audit methodology and reporting.

Management review: Management reviews should be conducted periodically to evaluate the overall strategy of the OSH management system to determine whether it meets planned performance objectives and workplace needs; should be based on data collected and actions taken during the period under consideration, and on the identification of what aspects and priorities should be modified to improve performance and achieve objectives.

Action for improvement

Preventive and corrective action: Arrangements should be established and maintained for preventive and corrective action resulting from the OSH management system's performance monitoring and measurement, OSH management system audits and management reviews. When the evaluation of the OSH management system or other sources shows that preventive and protective measures for hazards and risks are inadequate or likely to become inadequate, the corrective measures should be addressed according to the recognized hierarchy of prevention and control measures, and completed and documented, as appropriate and in a timely manner.

Continual improvement: Arrangements should be established and maintained for the continual improvement of the relevant elements of the OSH management system and the system as a whole. These arrangements should take into account of objectives, and all the information and data acquired under each element of the system, including results of assessments, performance measurements, investigations, recommendations of audits, outcomes of management reviews, recommendations for improvement, changes in national laws, regulations and collective agreements, new relevant information, any significant technical or administrative modifications in the activities of the workplace, and the results of health protection and promotion programmes. The safety and health processes and performance of the workplace should be compared with others in order to improve health and safety performance

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