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1. Introduction

Under the Workplace Safety and Health (WSH) Act, employers, self-employed and principals (including contractors and sub-contractors) are required to manage risks at work while employees must adhere to safe work practices.

WSH is about preventing work-related injuries and occupational diseases (ODs), and creating a work environment that is safe and healthy. Good WSH management can improve work productivity and efficiency and this, in turn, will enhance business competitiveness and benefit the business.

2. Scope and Objectives

This publication is developed to assist companies in the metalworking industry, especially the small- and medium-sized enterprises (SMEs), to build and enhance their capabilities in managing WSH at the workplace. It provides information and guidance on how safety and health should be managed as integral parts of the business to business owners, senior managers of companies, and key stakeholders who are involved in business operations.

It helps to establish and improve WSH practices for businesses, and provides reasonably practicable guidance on establishing and maintaining safe and healthy workplaces. The guideline outlines some of the areas that companies can look into to make safety and health an integral part of daily operations.

This publication also aims to bring additional benefits to businesses, aside from good WSH performance. These include greater employee commitment, improved workplace systems, higher employee morale, and a sustained proactive safety culture.

3. Better Workplace Safety and Health, Better Business

In a normal accident-free state, a company's resources are typically optimised with due consideration on returns. However, when an accident occurs, not only would the immediate employee or his family members suffer the pain and loss but the employer would also be affected. For instance, loss can be in the form of work stoppages, redeploying of fresh resources to continue the work of the injured, incurring extra time and training expenses, and customers may also be unhappy with delays affecting orders. Hence, the company can suffer loss of business, reputation and profitability when WSH is compromised.

In contrast, good safety and health at work usually leads to a productive and profitable business in the long run. It increases productivity, enhances corporate image and positions companies with the necessary competitiveness.

Leading companies embrace WSH and they ranked their consistent commitment to WSH as one of the most important factors in achieving key business objectives.

4. Commitment from Management

The leadership and commitment from management is essential in establishing a safe and healthy workplace. Visible commitment from top management serves as a tangible role model for adoption across the entire organisation.

A clear WSH policy should be developed and communicated. The policy will inform employees, suppliers, customers and other relevant parties that WSH forms an integral part of business operations. The WSH policy should:

- be appropriate to the nature and scale of the organisation's operations;
- include a commitment to comply with applicable WSH legal and other requirements;
- include a commitment to prevent injury and ill-health;
- include a continual improvement in WSH management and performance;
- be documented, implemented and communicated to all employees and relevant parties;
- be endorsed by top management; and
- be reviewed periodically to ensure that it remains relevant.

Sample WSH Policy

(Name of Company)

Workplace Safety and Health Policy

All Management and Employees pledge to

- Comply with relevant Workplace Safety and Health (WSH) statutory, regulatory and other relevant requirements;
- Attend relevant WSH training and briefing so as to be competent to do our tasks;
- Create a safe and healthy workplace for employees, suppliers/ contractors and customers; and
- Continually improve WSH performance to develop positive WSH culture.

Signed by employer:
Date:

5. Complying with Safety and Health Rules and Regulations

A set of written safety and health rules and regulations should be established, and employees and contractors are to comply accordingly. This serves to remind them of their safety and health obligations and responsibilities, such as the need to observe all safe work procedures (SWPs) and avoid unsafe behaviours. Key legal requirements that are applicable to the organisation's activities, products and services should also be incorporated. More specific or detailed safety and health rules and regulations can be developed by the individual departments within the organisation. Annex 1 shows examples of typical in-house safety and health rules that organisations can adopt.

To ensure compliance, the organisation should also establish, implement and maintain procedures to identify and provide access to all applicable safety and health rules and regulations. Such information and other requirements should be kept up-to-date and be communicated to all relevant parties and persons working in the organisation.

Table 1 lists some examples of the regulatory requirements that an organisation should seek to understand and comply. The list is not exhaustive and organisations should proactively identify other relevant regulatory requirements that are applicable to their organisations.

Regulatory Requirements	Agency/ Authority	Brief Description
Workplace safety and health	Ministry of Manpower (MOM)	The WSH Act and its subsidiary legislations cover safety and health at the workplace. It requires stakeholders to take reasonably practicable measures to ensure the safety and health of workers and other people who are affected by the work being carried out.
Workplace injury compensation	MOM	The Work Injury Compensation Act makes provisions for compensation to employees for injury or illness suffered in the course of their employment.
Environmental protection and management	National Environment Agency	The Environmental Protection and Management Act and its subsidiary legislations cover the protection and management of the environment and resource conservation, including management of hazardous substances.
Fire safety, emergency preparedness and response	Singapore Civil Defence Force	The Fire Safety Act and its subsidiary legislations cover protection of persons and property against fire, and emergency response and preparedness.

Table 1: Examples of regulatory requirements.

In addition to regulatory requirements, Approved Codes of Practice (ACOPs) are set out in the WSH (Approved Codes of Practice) Notification 2011. These ACOPs provide practical guidance with respect to the requirements of the WSH Act relating to safety, health and welfare at work. Organisations should identify and adopt the relevant ACOPs that are applicable to them, and if not, other documents that are deemed equal to or above the standards prescribed in these ACOPs. Refer to Annex 2 for a list of ACOP titles that are useful for companies in the metalworking industry.

5.1 Inspection and Examination of Statutory Equipment

Some equipment commonly used in workplaces are subject to regular inspections and examinations by an Authorised Examiner (AE), as required by the WSH Act (see Table 2). The company should keep an inventory list of such equipment and schedule their inspections and examinations according to the stipulated frequency.

Equipment	Examination/ Certification Frequency
Lifting hoist and lifts	6 months
Lifting gears	12 months
Lifting gears (to be annealed: if regularly used, chains used in connection with molten metal or molten slag)	6 months
Lifting appliances and machines	12 months
Steam receivers	24 months
Air receivers	24 months
Effective fire warning devices	Maintained and tested every month

Table 2: Examples of inspection and examination requirements for statutory equipment.

5.2 Records Management

Companies should ensure that all safety and health records are accurately identified, maintained, reviewed, and stored appropriately.

Safety and health records should be legible, identifiable and traceable to the activities involved. They should be kept in a systematic manner to enable easy retrieval and protected against damage, deterioration or loss. See Table 3 for the minimal retention periods for safety and health records.



Figure 1: Safety and health records should be reviewed periodically to ensure that they remain current and relevant.

Types of Records	Retention Period (Years)
Risk assessment records	3
Incident reports	3
Medical examination reports of persons involved in hazardous occupations	5
Noise monitoring reports	10

Table 3: Minimal retention periods for safety and health records.

6. Workplace Safety and Health Risk Management

WSH Risk Management (RM) is a systematic way to identify, assess, control and monitor WSH risks associated with any work activity or trade, and to communicate these risks to employees, contractors and other relevant parties (see Figure 2).



Figure 2: Risk management process.

Under the Workplace Safety and Health (Risk Management) Regulations, risk assessments (RAs) must be conducted to address the safety and health risks posed to any person who may be affected by the activities in the workplace, prior to work commencement.

RA allows stakeholders to identify hazards at the workplace and implement effective risk control measures to prevent the unsafe work conditions from escalating into accidents and injuries. Before conducting RA, adequate preparation must be done. A RA team should be formed, preferably consisting of personnel who are assuming differing responsibilities for the work activity to be carried out.

Relevant information should also be collated beforehand to facilitate better understanding of the work process.

After completing the preparation work, the workplace risks are then assessed in three simple steps. They are hazard identification, risk evaluation and risk control (see Table 4).

1. Hazard Identification	2. Risk Evaluation	3. Risk Control
<ul style="list-style-type: none"> Identify hazards. Identify potential accidents or incidents. 	<ul style="list-style-type: none"> Estimate the risk levels of the workplace hazards identified. Prioritise the hazards to be controlled. 	<ul style="list-style-type: none"> Formulate the control measures according to the Hierarchy of Controls (see Figure 4). Analyse and evaluate residual risks.

Table 4: Steps for risk assessment.

Step 1: Hazard Identification

Hazard identification involves identifying the hazards associated with the activity of each process and the potential accidents, incidents or ill-health that could result from these hazards.

A simple way of identifying hazards for a particular work process is to divide the process into major activities of carrying out the work and to analyse these work activities individually in the context of the hazards. It is also important to differentiate between hazards and accidents or ill-health which are caused by the inadequate control of hazards. See Table 5 for an example of a method of identifying hazards systematically.

Work Process	Major Work Activities Associated with the Process	Hazards	Accidents or Ill-health Arising from Hazards
Receiving raw materials	Forklift operations	Moving forklifts collide with other vehicles, pedestrians, parts or equipment due to speeding.	Injury or fatality to the forklift operator or co-workers.
		Over-exertion due to prolonged operation of forklift.	Fatigue or lower back pain.
	Mechanical lifting using overhead, gantry or lorry crane	Struck by moving loads when transporting loads using crane.	Injury or fatality to the crane operator or co-workers.
		Collapse of crane due to its poor maintenance.	Injury or fatality to the crane operator or co-workers.

Table 5: Example of identifying hazards.

Step 2: Risk Evaluation

Risk evaluation is the process of estimating the risk levels of the hazards and determining their acceptability. The outcomes of this step serves as references for prioritising actions to control these hazards and minimise safety and health risks.

Risk is made up of:

- Predicting the severity of the hazard; and
- Estimating the likelihood of the incident or ill-health occurring, with the existing risk controls.

When evaluating risks, consider:

- Existing risk controls:** They must be taken into account when the RA team is assessing risks. By considering the effectiveness of these controls and the consequences of their failure, the risk of the activity can be better assessed.
- Severity:** It is the degree or extent of injury or harm caused by the hazards, or as a result of an accident. The severity may be classified into various categories such as minor, moderate or major.
- Likelihood:** The likelihood of an accident, incident or ill-health occurring is defined as the probability that a said incident will happen and may be also classified into various categories such as remote, occasional or frequent. To minimise the subjectivity of estimating likelihood, besides taking into account existing risk controls, the following sources should be considered:
 - past incident and accident records;
 - industry practice and experience; and
 - relevant published literature.
- Risk level:** This may be determined once the severity and likelihood have been established. This may be achieved by using a risk matrix, the size of which may vary according to complexity of the company's operations.

Figure 3 illustrates how severity and likelihood come together to help determine risk level via a 5x5 risk matrix with numeric ratings.

Likelihood \ Severity	Rare (1)	Remote (2)	Occasional (3)	Frequent (4)	Almost Certain (5)
Catastrophic (5)	5	10	15	20	25
Major (4)	4	8	12	16	20
Moderate (3)	3	6	9	12	15
Minor (2)	2	4	6	8	10
Negligible (1)	1	2	3	4	5

Level	Severity	Description
5	Catastrophic	Fatality, fatal diseases or multiple major injuries.
4	Major	Serious injuries or life-threatening occupational diseases (includes amputations, major fractures, multiple injuries, occupational cancer, acute poisoning).
3	Moderate	Injury requiring medical treatment or ill-health leading to disability (includes lacerations, burns, sprains, minor fractures, dermatitis, deafness, work-related upper limb disorders).
2	Minor	Injury or ill-health requiring first-aid only (includes minor cuts and bruises, irritation, ill-health with temporary discomfort).
1	Negligible	Not likely to cause injury or ill-health.

Level	Severity	Description
1	Rare	Not expected to occur but still possible.
2	Remote	Not likely to occur under normal circumstances.
3	Occasional	Possible or known to occur.
4	Frequent	Common occurrence.
5	Almost Certain	Continual or repeating experience.

Figure 3: Risk evaluation using 5x5 risk matrix with numeric ratings.

Step 3: Risk Control

Based on the risk level determined in Step 2, risk controls should be selected to reduce or confine the risk level to an acceptable level. Table 6 suggests the acceptability of risk for the different risk levels and the recommended actions.

Risk Level	Risk Acceptability	Recommended Actions
Low	Acceptable	<ul style="list-style-type: none"> No additional risk control measures may be needed. Frequent review and monitoring of hazards are required to ensure that the risk level assigned is accurate and does not increase over time.
Medium	Tolerable	<ul style="list-style-type: none"> A careful evaluation of the hazards should be carried out to ensure that the risk level is reduced to as low as reasonably practicable within a defined time period. Interim risk control measures, such as administrative controls or personal protective equipment (PPE), may be implemented while longer term measures are being established. Management attention is required.
High	Not acceptable	<ul style="list-style-type: none"> High risk must be reduced to at least medium risk before work commences. There should not be any interim risk control measures. Risk control measures should not be overly dependent on PPE. If practicable, the hazard should be eliminated before work commences. Management review is required before work commences.

Table 6: Recommended action for risk levels.

The prioritisation of risk controls and their formulation should consider the relative risk levels of different hazards, and the cost and benefit of the controls. The residual risk resulting from the implementation of the controls should also be evaluated.

Reasonably practicable measures must be taken to maintain the risk level within the acceptable range. It is recommended for risks to be eliminated or reduced "at source". If the risk level is high, work cannot commence until the risk level is reduced to medium or low level. Risk control measures should be selected based on the Hierarchy of Controls (see Figure 4).

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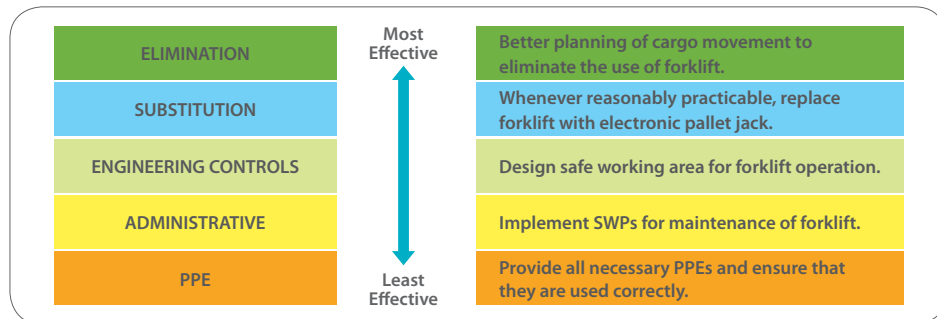


Figure 4: Example of risk control measures based on the Hierarchy of Control for the use of a forklift.

Elimination

Elimination of risk refers to the total removal of the worker’s exposure to the hazards, effectively making all the identified possible accidents, incidents and ill-health impossible. This should be attempted first as recommended in the Hierarchy of Controls. Once the risk is eliminated, the hazard does not appear in subsequent RA forms.

Substitution

This involves substituting a process or a product with a less hazardous process or product to mitigate the risk, for example, a hazardous substance is substituted with a less hazardous one (using water- instead of solvent-based paint).

Engineering Controls

Engineering controls are physical means that reduce the likelihood of occurrence or severity of the consequence of a mishap. These include structural changes to the work environment or work processes, erecting a barrier to interrupt the accident transmission path between the worker and the hazard (e.g., installing machine guarding [see Figure 5] or enclosing a noisy machine).

Administrative Controls

These reduce exposure to a hazard by adherence to procedures or instructions. Documentation should emphasise all the steps to be taken and the controls to be used in carrying out the work activity safely. Permit-to-work (PTW) system, scheduling of incompatible works and SWPs are examples of administrative controls.



Figure 5: Example of an engineering control: Machine guarding installed on moving part of machine.

Personal Protective Equipment

This should be used only as a last resort after all the other control measures have been considered, or as a short-term contingency during emergency/ maintenance/ repair, or as an additional protective measure against residual risks. The success of this control depends critically on the protective equipment being chosen and fitted correctly, and that they are worn at all times and maintained properly.

It may be necessary to use more than one of these measures when no single measure is sufficient on its own to reduce a risk to an acceptable level. For example, engineering controls can be implemented together with administrative controls such as SWPs or training. Table 7 illustrates the possible control measures for a specific hazard.



Figure 6: Example of PPE being used: Worker wearing gloves when working with hand tools.

Work Activity	Hazard	Possible Control Measures
Forklift operations	<ul style="list-style-type: none"> Moving forklift collide with other vehicles, pedestrians, parts or equipment due to speeding. 	<ul style="list-style-type: none"> Display speed limit sign. Install speed delimitter on forklift. Demarcate forklift travel path and pedestrian walkway.

Table 7: Examples of possible control measures for a hazard.

The hazards and their control measures must be communicated to the persons performing the activity. The Manager who oversees the work area, function or activity where the risks exist shall ensure that all persons exposed to the risks are informed of:

- the nature of the risks;
- any measures or SWPs implemented; and
- the means to minimise or eliminate the risks.

To better understand the RA process, refer to the *Step-by-Step Guide on RM for Metalworking Sector* at: <https://www.wshc.sg/wps/portal/RMGuide>

For more information on RM, refer to the WSH Council’s *Code of Practice on Workplace Safety and Health (WSH) Risk Management RA* at www.wshc.sg

See Annex 3 for a sample of a RA form.

7. Workplace Safety and Health Training and Competency

Training helps employees acquire the skills and knowledge to make them competent in the safety and health aspects of their work. Training may include formal classroom training, on-the-job coaching, and instruction to individuals or groups.

Employers should take measures to ensure that employees possess the necessary competencies to do their work. Competency means more than simply training the workers. Experience in applying skills and knowledge is one important aspect and is acquired under adequate supervision. Employers also need to be aware of the relevant legislations and codes that require specific competencies for specific groups of workmen or trades.

7.1 Workplace Safety and Health Performance Competencies

Managers

When managers are properly trained in WSH, they should be able to:

- Identify responsibilities under the WSH Act;
- Establish and maintain a WSH framework;
- Establish and evaluate WSH systems, policies, procedures and programmes;
- Establish workplace RM procedures; and
- Manage workplace risk control measures.

Supervisors

When supervisors, including engineers, are properly trained in WSH, they should be able to:

- Interpret WSH policies, procedures and programmes;
- Educate workers on WSH policies, procedures and programmes;
- Implement and control WSH management programmes;
- Implement workplace RM programmes; and
- Maintain workplace risk control measures.

Employees

When employees are properly trained in WSH, they should be able to:

- Follow SWPs and risk control procedures;
- Participate in WSH management activities;
- Follow workplace emergency response procedures;
- Use equipment and PPE provided safely and properly; and
- Report accidents, incidents, diseases, near misses or any workplace hazards to the supervisor.

7.2 Workplace Safety and Health Performance Training

The organisation should establish and implement WSH training. This could include the following where appropriate and applicable:

- Metalworking Safety Orientation Course for Workers*
- Basic Industrial Safety and Health Course for Supervisors*
- New employee safety orientation
- Safety committee training
- Risk management training
- Safe work procedures (including those during emergency situations)
- Permit-to-work systems, hot work, isolations, gas freeing, confined space entry, emergency response
- Supervisor and manager WSH training (e.g., incident investigation, auditing)
- Contractor briefing and training
- Refresher training
- Occupational first aid course
- Globally Harmonised System (GHS) training

* Mandatory courses for workers employed in manual labour and persons who supervise any process or work in metalworking industry.

8. Communication

Effective communication is important for the safety and health policies and procedures to be understood and consistently implemented.

Communication is important to:

- Ensure a common understanding of job requirements so that work is carried out safely and according to SWPs;
- Raise the awareness of safety and health, including hazards and associated control measures;
- Encourage participation in good WSH practices;
- Support company's WSH policy and management programmes; and
- Reinforce links between different work areas and systems.



Figure 7: Supervisor communicating work instructions to workers.

Procedures should be established and implemented to ensure that pertinent WSH information is communicated to employees and other relevant parties (e.g., contractors and visitors). Supervisors can communicate directly to the workers (see Figure 7) or internal communications may be facilitated across the various levels and functions via means such as electronic mail or notice boards in common areas.

The organisation should carry out the necessary activities to promote WSH awareness. These can include:

- Tool-box or pre-task briefings, identifying hazards and highlighting the control measures used in addressing resulting risks (see Annex 4 for a tool-box briefing sample);
- Display of WSH policy, WSH goals, and safe and unsafe conditions and acts to increase WSH awareness or to highlight a particular safety or health issue;
- WSH talks and screening of WSH videos;
- WSH campaigns involving safety brochures, safety poster, safety quiz, safety demonstration, or safety display;
- Joint safety walkabout by management and employees; and
- First-aid, fire and other emergency response exercises and drills.

9. Operational Activities, Practices and Controls

The organisation should identify the WSH hazards and risks in their operations and activities and implement the necessary controls to manage these risks.

Some of these controls would include:

- SWPs which should include information like the normal sequence of events, the actions required to perform the work safely, the hazards involved, the control measures, and the training and PPE required, as well as any procedure that has to be taken to protect the safety and health of persons in the event of an emergency. Refer to Annex 5 for an example of a SWP;
- Procedures and controls relating to contractors and other visitors to the workplace; and
- Procedures relating to the management of change of activities, controls, and equipment.

Establishing and Implementing Operational Practices and Controls

The organisation should establish and implement operational practices and controls as necessary to manage the WSH risks to an acceptable level. A variety of different methods can be used:

- physical devices or safeguards (such as machine guarding, barriers, access controls);
- work procedures and instructions;
- warning signs and pictograms; and
- alarms and warning signals.

See Table 8 for examples of processes and situations when SWPs should be established.

Processes and Situations	Recommended Safe Work Procedures
Performing hazardous tasks	<ul style="list-style-type: none"> • Use of procedures, work instructions. • Use of PTW systems.
Using hazardous materials	<ul style="list-style-type: none"> • Establish inventory, storage locations and conditions. • Provide Safety Data Sheets (SDSs).
Maintaining and repairing facilities and equipment	<ul style="list-style-type: none"> • Establish preventive maintenance schedules for equipment. • Establish lock-out tag-out procedures for repair and maintenance of equipment (see Figure 8). • Establish inspection checklists for facilities and equipment. • Provide and implement the use of PPE.
Dealing with contractors	<ul style="list-style-type: none"> • Establish criteria for selecting contractors. • Evaluate and monitor contractors' WSH performance.

Table 8: Examples of processes and situations which SWPs are necessary.

SWPs and controls should be reviewed on a regular basis to evaluate their relevance and effectiveness. Refer to Annex 5 for details on the types of WSH practices and controls that should be established at the workplace.



Figure 8: Machine locked-out and tagged-out for maintenance.

10. Workplace Safety Health Performance Measurement

10.1 Measurement and Monitoring

Measurement is essential to maintain and improve an organisation's safety and health performance. It involves the collection and analysis of safety and health data and reports. This may include measuring incidents, injuries, and cases of occupational illnesses, the number and type of inspections, audits, training programmes, property damage and near misses.

Information from measurement and monitoring can be used to check performance, identify opportunities for improvement and refine the safety and health programme.

Measurement of WSH performance is an integral part of the "plan-do-check-act" management process and can take the form of incident rates, tables, charts, and so on. It provides a better understanding of the effectiveness of the safety and health programme by:

- providing information on the effectiveness of the programme by identifying areas where remedial action is required;
- providing a basis for continual improvement; and
- providing an avenue for feedback.

10.2 Incident Reporting and Investigations

Incidents are any unplanned or undesired events that adversely affect completion of a task, for example, near-miss incidents. Accidents are unplanned or undesired events that result in personal injuries and/or property damage.

Accident rates can be used to show the relative level of injuries and illnesses in the company. Examples of these rates include the Accident Frequency Rate (AFR), Accident Severity Rate (ASR), Fatality Rate (FR) and Disease Incidence (DI). Annex 6 shows the formulas for the calculation of these different rates.

Accidents resulting in reportable injuries and ODs must be reported to MOM under the WSH (Incident Reporting) Regulations. The company should investigate all such accidents so that they can be used to measure and monitor its safety performance.

Analysis of the details and data collected from accident, incident and illness reports will be a measurement of the company's WSH performance.

Medical Surveillance

The WSH (Medical Examinations) Regulations require workers who are involved in hazardous occupations to undergo medical examinations (both pre-employment and periodic) by a designated workplace doctor (DWD).

These workers include those who are exposed to the fumes, dusts, mist, gas or vapour of:

- arsenic, cadmium, lead, manganese or mercury, or any of their compounds;
- benzene, organophosphates, perchloroethylene, trichloroethylene, vinyl chloride monomer;
- tar, pitch, bitumen or creosote; and
- asbestos, raw cotton or silica.

Workers who are exposed to excessive noise or are working in compressed air environment are also required by regulations to be checked by a DWD (both pre-employment and periodic).

For more information, refer to the WSH Council's *WSH Guidelines on Statutory Medical Examinations* at www.wshc.sg

11. Risk Management Capability Building

If WSH hazards and risks are not managed properly, they may result in injury, non-compliance and loss of profit. These hazards and risks must be identified and controlled to improve WSH performance. RM and its implementation are therefore crucial, and RM forms part of a comprehensive safety and health management system in the company. The WSH Council's *Code of Practice on Workplace Safety and Health (WSH) Risk Management* provides guidance on workplace RM and its implementation.

Companies can leverage on the bizSAFE programme to build and enhance RM capability in the business. bizSAFE is a five-step programme to assist companies to build their WSH capabilities in order to achieve improvement in safety and health standards at the workplace (see Figure 9). Companies are guided through the journey, starting from top management demonstrating their commitment towards WSH, to acquiring RM capabilities and implementing a safety and health management system.

Employers should consider embarking on the bizSAFE journey to create a safe and healthy workplace for their employees and themselves. By adopting bizSAFE, the employer is taking a step towards complying with the requirements in the WSH Act and its subsidiary legislation (bizSAFE Level 3 — Implement Risk Management). For more information on bizSAFE, visit www.wshc.sg/bizsafe

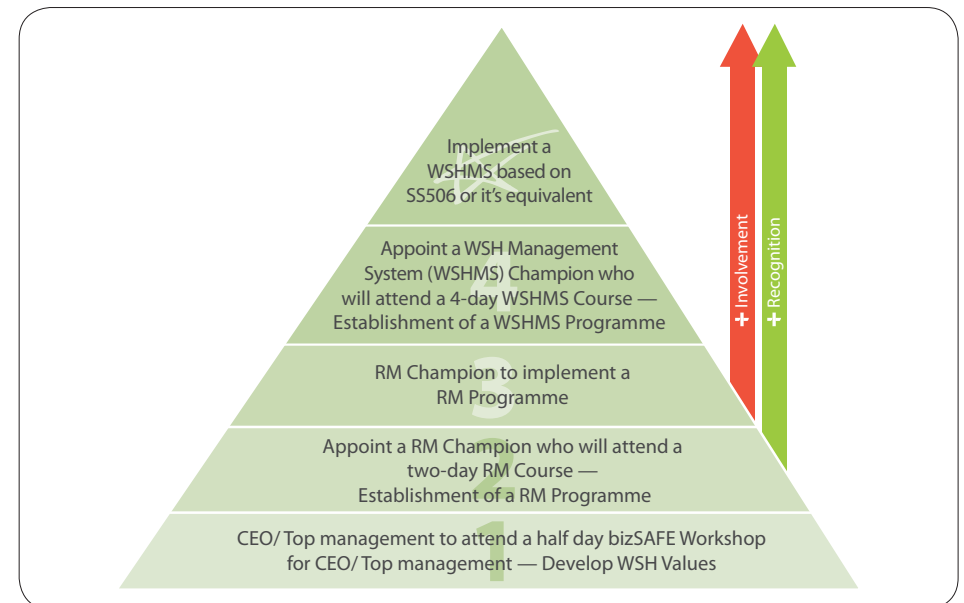


Figure 9: The bizSAFE triangle.

12. Acknowledgements

Organisations	Contributors
Singapore Institution of Safety Officers	Mr Andrew H S Tan
Cameron (Singapore) Pte Ltd	Er Lim Sui Soon
Seagate Technology International	Mr Roger B C Lim
NMB Singapore Limited	Mr Benson Ong Joo See
FMC Technologies	Mr William Lai
Pratt & Whitney Services Pte Ltd	Mr Yen Ping Tan

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Cameron (Singapore) Pte Ltd and Cititech Industrial Engineering Pte Ltd

13. Annex

Annex 1 – In-house Safety and Health Rules

Safety and health rules are a set of instructions to inculcate in employees and contractors their roles and responsibilities in workplace safety and health (WSH) whilst performing their work. Every employee and contractor working in the company must follow all such rules. Companies should:

- Communicate the safety rules and regulations to all concerned parties (i.e., all employees and contractors);
- Carry out supervision to ensure that safety rules and regulations are being followed; and
- Review safety rules and regulations periodically.

General Safety Rules

- Recognise, avoid and report all hazards to one's immediate supervisor.
- Follow all safety rules, warning signs and regulations set forth by the company.
- Always use the right tool for the job and return it to its proper place after use.
- Report all accidents and injuries immediately, however minor, so that first aid or medical care can be rendered to the injured.
- Use proper personal protective equipment (PPE) in work areas that require them.

Housekeeping

- Keep working area clean and unobstructed.
- Do not obstruct passageways and staircases.
- Do not litter.
- Do not obstruct fire exits, fire extinguishers, hose reels, fire call points and sprinkler heads.
- Do not leave unused tools in the work areas unattended.

General Rules of Equipment and Machine Safety

- Do not meddle with machines that one have not been taught to operate.
- Switch off machines before repair or making adjustment.
- Do not use electrical appliances that are damaged or worn out.
- Do not leave machines running unattended.
- Do not use faulty equipment. Highlight to supervisor or maintenance and repair personnel so that they can replace the tools.

Annex 2 – Approved Codes of Practice (ACOPs)*

1. Code of Practice for Working Safely at Height
2. Code of Practice on WSH Risk Management
3. SS 98: Industrial safety helmets
4. SS 473: Personal eye-protectors. Part 1 — General requirements
5. SS 473: Personal eye-protectors. Part 2 — Selection, use and maintenance
6. SS 508: Graphical symbols — Safety colours and safety signs. Part 1: Design principles for safety signs in workplaces and public areas
7. SS 508: Graphical symbols — Safety colours and safety signs. Part 3: Safety signs used in workplaces and public areas
8. SS 510: Code of Practice for Safety in welding and cutting (and other operations involving the use of heat)
9. SS 513: Personal protective equipment — Footwear. Part 1: Safety footwear
10. SS 513: Personal protective equipment — Footwear. Part 2: Test methods for footwear
11. SS 531: Code of Practice for Lighting of work places. Part 1: Indoor
12. SS 531: Code of Practice for Lighting of work places. Part 2: Outdoor
13. SS 531: Code of Practice for Lighting of work places. Part 3: Lighting requirements for safety and security of outdoor work places
14. SS 536: Code of Practice for The safe use of mobile cranes
15. SS 537: Code of Practice for Safe use of machinery. Part 1: General requirements
16. SS 548: Code of Practice for Selection, use, and maintenance of respiratory protective devices
17. SS 549: Code of Practice for Selection, use, care and maintenance of hearing protectors
18. SS 550: Code of Practice for Installation, operation and maintenance of electric passenger and goods lifts
19. SS 553: Code of Practice for Air-conditioning and mechanical ventilation in buildings
20. SS 554: Code of Practice for Indoor air quality for air-conditioned buildings
21. SS 586: Hazard communication for hazardous chemicals and dangerous goods. Part 1: Transport and storage of dangerous goods
22. SS 586: Hazard communication for hazardous chemicals and dangerous goods. Part 2: Globally harmonised system of classification and labelling of chemicals — Singapore's adaptations
23. SS 586: Hazard communication for hazardous chemicals and dangerous goods. Part 3: Preparation of Safety Data Sheets (SDSs)
24. CP 27: Code of Practice for Factory layout — Safety, health and welfare considerations
25. CP 84: Code of Practice for Entry into and safe working in confined spaces
26. CP 91: Code of Practice for Lockout procedure
27. CP 101: Code of Practice for Safe use of powered counterbalanced forklifts

* This list of ACOPs is in accordance with the Workplace Safety and Health (Approved Codes of Practice) Notification 2011, effective 15 February 2011.

Annex 3 – Sample Risk Assessment Form

Sample of a Risk Assessment Form

Company/ Department:	ABC Manufacturing Pte Ltd/ Warehousing	RA Leader: Gan Siaw Onn						Approved by				Reference Number		
Process:	Receiving of raw materials	RA Member 1: Sim Gan Jiong						Signature: B.C. Tan				RAFN/ 0001		
Process/ Activity location:	Warehouse A	RA Member 2: Tan Soo Tiong												
Original assessment date:	02 Jan 2011	RA Member 3: Abdul Madi						Name:	Tan Buay Chee					
Last review date:	03 Feb 2009	RA Member 4: Mohammad Ali						Designation:	Warehouse Manager					
Next review date:	02 Jan 2013	RA Member 5: Suzi Liao						Date:	03 Jan 2011					
Hazard Identification				Risk Evaluation				Risk Control						
Ref	Work Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1	Forklift operations	Moving forklift collide with other vehicles, pedestrians, parts or equipment due to speeding.	Injury or fatality to the forklift operator or co-workers.	<ul style="list-style-type: none"> Display speed limit sign. Install speed delimiter. Demarcate forklift travel path and pedestrian walkway. 	4	2	8	<ul style="list-style-type: none"> Barricades and signs to warn and keep non-essential personnel from entering the work area. 	4	1	4	Immediate supervisor	05 Jan 2011	
		Over-exertion due to prolonged operation of forklift.	Fatigue or lower back pain.	<ul style="list-style-type: none"> Plan work schedules with regular breaks. 	3	2	6	NIL	NIL	NIL	NIL	Immediate supervisor	NIL	
2	Mechanical lifting using overhead, gantry or lorry crane	Struck by moving loads when transporting loads using crane.	Injury or fatality to the crane operator or co-workers.	<ul style="list-style-type: none"> Switch on crane alarm during movement. Use tag lines to control load sway/ swing. Cordon off work area with barricades. 	4	1	4	<ul style="list-style-type: none"> Place warning signs (e.g., wearing of helmet, no entry to unauthorised persons). 	4	1	4	Immediate supervisor	05 Jan 2011	
		Collapse of crane due to its poor maintenance.	Injury or fatality to the crane operator or co-workers.	<ul style="list-style-type: none"> Institute regular inspection and maintenance regime for all lifting equipment. 	4	1	4	NIL	NIL	NIL	NIL	Immediate supervisor	NIL	

Key: S= Severity; L= Level; RPN= Risk Priorisation Number

Annex 4 – Tool-Box Brief (Sample)

Tool-Box Brief (Sample)

Job/ Activity: _____ Name of Briefer: _____

Date/ Time: _____ Position of Briefer: _____

Machine Safety

1. Workers should be alert when working around or operating machinery.
2. Machines if misused can cause injuries such as crushed fingers and amputations.
3. Workers should note that no part of their bodies should be in the way when they are operating the machines.
4. If working with the machines produce sparks or fragments, workers should put on safety glasses to prevent these foreign particles from injuring their eyes.
5. Proper lock-out/ tag-out (LOTO) procedures should be followed when performing maintenance or repair work on the machine.
6. Workers should report any missing machine guards to their supervisor before operating the machine.
7. Workers should never reach blindly into areas that may contain energised parts.
8. Workers should never plug or unplug electrical equipment with wet hands.
9. Workers should always wear the appropriate personal protection equipment (PPE) for each task.

Job-specific safety and health recommendations:

Attended by:

Name:		Name:	
Signature:		Signature:	
Name:		Name:	
Signature:		Signature:	
Name:		Name:	
Signature:		Signature:	

Annex 5 – WSH Practices and Controls

Permit-to-work System

The Permit-to-work (PTW) system is a formal written system used to control certain types of work which are hazardous such as hot work and confined space entry. It is a means of communication among site personnel to ensure that all necessary safety precautions are taken before commencing work.

Contractors and maintenance workers are required to apply for a PTW before carrying out the above-mentioned works. The PTW must be communicated to all concerned parties such as contractors and maintenance workers. The PTW must also be duly approved and issued before work commences.

Hot Work Permit (Sample)

“ABC Company” Hot Work Permit

Permit No. :

Requestor

Department/ Unit:

Date/ Time of Commencement:

Date/ Time of Completion:

Location	Description of Work	Tools Used

No. of gas hoses:

No. of welding cables:

Name of Requestor
(Facilities/ Contractor)

Name & Signature
(Production Manager)

Name & Signature
(Facilities Manager/
In-charge)

Date & Time

Approval

Pre-approval inspection of the hot work area was made and conditions were found to be safe. With the issuance of the hot work permit, the following conditions shall be complied with at all times during the hot work operation:

1. The hot work area shall be kept free of all flammable and combustible substances.
2. Forced ventilation/ exhaust shall be maintained throughout the hot work operation.
3. Fire retardant tarpaulins shall be used to contain sparks or hot metal splashes.
4. A fire watchman shall be stationed at the hot work site to stand by and observe for any fire hazards throughout the hot work operation.
5. The fire watchman shall be equipped with sufficient fire-fighting equipment such as fire extinguishers and fire hose reel.
6. Keep watch on the surface of the opposite side that is being heated. A fire could start there.
7. The fire watchman or the person-in-charge shall make a post inspection of the hot work area after the completion of the hot work operation.

Remarks:

Approver's Name & Signature

Date & Time

Safe Work Procedure

A Safe Work Procedure (SWP) is a working risk control document created by teams within the company that describes a safe and efficient way to perform a certain task.

It lists the associated hazards involved in performing a task, what risk is associated with the hazards, what personal protective equipment (PPE) is required, and the steps involved to complete the activity without incident. Every employee, including contractors, involved in that task on site must ensure that all sections of the SWP are followed.

The SWP must be communicated to all concerned parties such as contractors, maintenance workers and machine operators.

It is important to make sure that the work activity is supervised to ensure that the SWP is being followed. The SWP should be reviewed whenever:

- the task or activity changes;
- when a new hazard is identified;
- after an associated near miss, injury or illness occurs with the task or activity; or
- there is any change to legislation, standards or codes of practice.

Safe Work Procedures (Sample)

Procedure: Loading and Feeding of Bar Materials

Hazard	Risk
Contact with sharp edges of machine.	Cuts to hand or arm.
Caught in or between moving parts of machine.	Contusion or cut injury to hand.
Improper manual handling.	Sprain or strain injury to back.

Safe Work Practices

1. Stop the machine. Ensure that it is completely stopped.
2. Open the cover.
3. Check the pusher tube with a steel rod to see if it is loose. If it is loose, worker needs to load new steel bars.
4. Release the chuckling lever.
5. Remove the end bar from the collet and place it on the tray.
6. Collect the steel bar from the steel bar tray. Maintain equilibrium to prevent steels bars from bending.
7. Load steel bar into the stock tube. Ensure that the steel bar does not hit any person.

8. Knock the steel bar with the bar knocker until it protrudes a little. Do not place your hand between the collet and cutting tool while knocking.
9. Use your finger to push the steel bar back until it flushes with the collet.
10. Lock the chucking lever.
11. Close the cover and start the machine.

Implementation and Review

The supervisor in-charge is responsible to implement and comply with this procedure. The Department Head, in consultation with the safety manager, shall review this procedure as and when necessary.

Incident Reporting and Investigation Procedure

This spells out the incident reporting and investigation procedures and requirements of a company. It ensures that all incidents are reported and investigated, and their root causes identified with a view to prevent similar occurrences. It also ensures compliance with legal requirements for incident notification to the relevant authority.

All employees should report any incident, “near miss”, and any actual hazard to their supervisor or WSH Representative as soon as possible.

All contractors engaged by the Company are required to report any incident, “near miss”, and any actual hazard to the WSH Coordinator or relevant person in-charge.

The WSH Coordinator is to co-ordinate the reporting of all notifiable incidents or dangerous occurrences to the relevant authority.

All employees should be aware of the incident reporting and investigation procedure, and the importance of prompt reporting of incidents. Incidents could be immediately reported verbally and then subsequently in writing. All incidents should be investigated immediately and corrective and preventive actions implemented.

Incident Reporting and Investigation Form (Sample)

This report must be completed by the immediate supervisor of the injured employee within two working days of the incident, and submitted through the Department Head to the Human Resource Department.

Injured’s name:	Age:	Gender: Male/ Female
Job title:	Department/ Section:	Length of service in company:
Date/ Time of incident:	Place of incident:	
Nature of injury:	Part of the body injured:	
Days of absence due to injury:	Period of absence from:	to:
Injured was treated at:	Witness(es):	
Describe clearly how the incident happened (i.e., what was the injured person doing? How was he injured? Where did the accident happen?).		

What was/were the root cause(s) of the incident? (Tick those applicable.)

<input type="checkbox"/>	Did not follow procedures.	<input type="checkbox"/>	Did not wear or use personal protective equipment (PPE).
<input type="checkbox"/>	Used the wrong tool or equipment.	<input type="checkbox"/>	Did not use PPE correctly.
<input type="checkbox"/>	Used tools or equipment incorrectly.	<input type="checkbox"/>	Lack of experience or training.
<input type="checkbox"/>	Used defective tool or equipment.	<input type="checkbox"/>	Poor housekeeping or congested work area.
<input type="checkbox"/>	Adjusted or serviced moving machinery.	<input type="checkbox"/>	Faulty tool, equipment or materials.
<input type="checkbox"/>	Wrong method of lifting and carrying.	<input type="checkbox"/>	Inadequate guards or barrier.
<input type="checkbox"/>	Poor coordination or communication.	<input type="checkbox"/>	Others.

What were the immediate corrective actions taken following the incident?

What were the preventive measures taken to prevent a similar incident from happening?

Investigated by:	Date:
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Comments:

Reviewed by:

Name/ Designation & Date

Hazard Reporting

Hazard reporting is a process that allows employees to report hazardous conditions or practices as they notice them. This procedure allows for prompt reporting and subsequent corrective action without waiting for the next round of regular inspections.

All employees should report hazards to their supervisors immediately and this can be done by verbal reporting or simple form filling.

Hazard Report Form (Sample)

Name:	Date:
Location:	
Equipment:	
Description of the hazard:	
Suggested corrective action:	
Signature:	
Supervisor's remarks:	
Corrective action taken:	
Signature of Supervisor:	Date:

Regular Inspections of the Workplace and Equipment in Use

Periodic inspections are important to identify hazards, unsafe acts and conditions in the workplace. They can also help to monitor any changes in the work process. Such inspections should involve both the management and the employees.

Safety and Health Inspection (Sample)

Location : _____ Date : _____ Time : _____

Department manager/ Representative: _____

Inspection team members : _____

1. Housekeeping

	Yes	No	Remarks
1.1 Are safe means of access provided and maintained?	<input type="checkbox"/>	<input type="checkbox"/>	_____
1.2 Are sufficient number of fire extinguishers provided and are they cleared of obstruction?	<input type="checkbox"/>	<input type="checkbox"/>	_____
1.3 Are materials stacked orderly and securely?	<input type="checkbox"/>	<input type="checkbox"/>	_____
1.4 Are there dedicated waste containers?	<input type="checkbox"/>	<input type="checkbox"/>	_____
1.5 Is the work area kept free of oil spills and tripping hazards?	<input type="checkbox"/>	<input type="checkbox"/>	_____
1.6 Is there a first aid box provided and maintained?	<input type="checkbox"/>	<input type="checkbox"/>	_____
1.7 Are flammable materials properly segregated and stored away from ignition sources?	<input type="checkbox"/>	<input type="checkbox"/>	_____
1.8 Is the site clean and hygienic (i.e., no mosquito breeding conditions and so on)?	<input type="checkbox"/>	<input type="checkbox"/>	_____

2. Work Conditions

2.1 Are the equipment and site adequately safe to carry out the job?	<input type="checkbox"/>	<input type="checkbox"/>	_____
2.2 Are toolbox briefings conducted daily?	<input type="checkbox"/>	<input type="checkbox"/>	_____
2.3 Is risk assessment (RA) being carried out for critical jobs as per statutory requirements?	<input type="checkbox"/>	<input type="checkbox"/>	_____

3. Inspection of Equipment (Check Records)

3.1 Are lifting tools and shackles tested as per statutory requirements?	<input type="checkbox"/>	<input type="checkbox"/>	_____
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3.2 Are portable hand tools and power tools inspected? _____

3.3 Are welding machines, generators, air compressors, welding cables, electrode holders, earthing connections, acetylene cylinders, regulators, oxy-acetylene hoses and flashback arrestors inspected and tagged? _____

3.4 Are forklifts and boom lifts inspected and maintained? _____

4. Use of Hazardous Chemicals

4.1 Are Safety Data Sheet (SDSs) available for chemicals used on site? _____

4.2 Are workers informed of the hazards of chemicals before they are used? _____

4.3 Are chemicals stored properly and labelled? _____

5. Personal Protective Equipment

5.1 Are workers provided with personal protective equipment (PPE)? _____

5.2 Are the PPE provided correct and appropriate for the task on hand? _____

5.3 Are the PPE in good condition? _____

6. Falling Hazard

6.1 Are openings properly guarded? _____

6.2 Is the floor free from grease or slippery material? _____

7. Electrical Hazard

7.1 Are electrical wires or cables in good condition? _____

7.2 Are electrical wires or cables properly insulated? _____

7.3 Are safety devices in order? _____

8. Tools and Equipment

8.1 Are gas manifolds, cutting torches and welding sets tested? _____

8.2 Are flashback arrestors provided? _____

8.3 Are welding holders insulated? _____

8.4 Are gas cylinders secured and in upright position? _____

9. Any other comments?

Name : _____ Signature : _____

Personal Protective Equipment

Personal protective equipment (PPE) includes items such as protective clothing, helmets, goggles, safety boots, other garment or equipment designed to protect the wearer's body from injury by physical, electrical, chemical and biological hazards. The use of PPE can reduce a person's risk of exposure to hazards. PPE should be used in conjunction with other risk controls to effectively manage risks to safety and health risks.

Employers are responsible to provide the necessary PPE for employees at work to ensure their safety and health.

It is important to:

- Ensure that anyone using PPE is aware of the need, usage and limitations.
- Train and instruct employees on the proper and correct use of PPE.
- Ensure that workers wear the appropriate PPE when exposed to risk(s) at work.

Annex 6 – Accident Rates

- i) Accident Frequency Rate (AFR) refers to the number of workplace accidents per million man-hours worked.

$$\text{AFR} = \frac{\text{Number of workplace accidents} \times 1,000,000}{\text{Man-hours worked}}$$

- ii) Accident Severity Rate (ASR) refers to the number of man-days lost to workplace accidents per million man-hours worked.

$$\text{ASR} = \frac{\text{Number of man-days lost to workplace accidents} \times 1,000,000}{\text{Man-hours worked}}$$

- iii) Fatality Rate (FR) refers to the number of workplace fatalities per 100,000 persons employed. Figures used are victim based.

$$\text{FR} = \frac{\text{Number of workplace fatalities} \times 100,000}{\text{Number of persons employed}}$$

- iv) Disease Incidence (DI) refers to the number of occupational diseases (OD; chronic confirmed cases) per 100,000 persons employed.

$$\text{DI} = \frac{\text{Number of chronic confirmed ODs cases} \times 100,000}{\text{Number of persons employed}}$$

A confirmed case of OD is one where there is definite evidence that the worker suffers from a disease that is related to his occupation.