NATIONAL CODE OF PRACTICE

FOR THE PREVENTION OF MUSCULOSKELETAL DISORDERS FROM PERFORMING MANUAL TASKS AT WORK

CANBERRA
AUGUST 2007


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WorkCover New South Wales

WorkSafe Western Australia

SafeWork South Australia

Victorian WorkCover Authority

Foreword

The Australian Safety and Compensation Council (ASCC) leads and coordinates national efforts to prevent workplace deaths, injury and disease in Australia and aims to improve national workers' compensation arrangements and return to work of injured employees.

The *National OHS Strategy 2002-2012*, records a commitment by all Australian, state and territory governments, the Australian Chamber of Commerce and Industry and the Australian Council of Trade Unions, to share the responsibility of ensuring that Australia's performance in work-related health and safety is continuously improved.

The *National OHS Strategy* sets out five national priorities to achieve short-term and long-term improvements. The priorities are to:

> reduce high incidence and high severity risks

> improve the capacity of business operators and workers to manage OHS effectively

> prevent occupational disease more effectively

> eliminate hazards at the design stage, and

> strengthen the capacity of government to influence OHS outcomes.

Performing manual tasks can be hazardous, potentially leading to Musculoskeletal Disorders (MSD). Manual tasks at work resulted in 437,852 compensation claims in Australia between July 1997 and June 2003. This is equal to 41.6 percent of all compensation claims for that period, with a direct cost, not counting indirect impacts (such as the long-term impacts on the quality of life of the injured worker) of $11.965 billion.

This *National Code of Practice for the Prevention of Musculoskeletal Disorder from Performing Manual Tasks at Work (2007)* provides practical guidance on how to prevent MSD.

All ASCC standards and codes of practice are guidance and advisory documents only and their implementation is dependent on legislation enacted by state/territory OHS authorities.

Compliance with the recommendations in this Code of Practice will not necessarily mean that a person has fulfilled their obligations under occupational health and safety acts and regulations relevant to them. Persons should contact their state or territory or Australian Government health and safety authority for information on their obligations.


Contents

Part 1. Introduction

1.1 Code of Practice for the prevention of musculoskeletal disorders from performing manual tasks at work

This Code of Practice sets out practical guidance on how to reduce the risks of musculoskeletal disorder from manual tasks undertaken at work. This Code of Practice aims to reduce the number and severity of injuries to workers from manual tasks.

1.2 Who should use this Code of Practice?

You should use this Code of Practice if you are:

> an employer

> an owner of premises used as a workplace

> a designer, manufacturer or supplier of places of work or items for use in a workplace, or

> a health and safety representative, OHS professional, a worker or anyone else interested in reducing the incidence and severity of musculoskeletal injuries that may arise as a result of manual tasks at work.

1.3 What are the benefits of using this Code of Practice?

If you use this Code of Practice your organisation will be implementing recommended processes for managing risks arising from performing manual tasks at work. This will assist in reducing the incidence and severity of related injuries at work and lead to reduced injury costs. As a result the benefits for your business could include:

> improved business performance, efficiency and productivity

> fewer workers' compensation claims which may lead to lower premiums

> faster and easier return to work for workers who do sustain an injury

> fewer absences from work and less disruption

> retention of skilled workers, and

> a safe workplace with a positive safety culture.

In many cases making simple and inexpensive changes will reduce the risk of injury.

1.4 What are 'manual tasks at work'?

Manual tasks encompass a wide range of activities that require a person to use their physical body (musculoskeletal system) to perform work. This includes work that involves the use of force for lifting, lowering, pushing, pulling, carrying, moving, holding or restraining any person, animal or item. Manual tasks at work include tasks that have repetitive actions, sustained postures and may involve concurrent exposure to vibration.

Most jobs involve some aspect of work which is a manual task. Not all manual tasks are hazardous. However, almost half of all workplace injuries occur as a result of manual tasks.

1.5 What kinds of injuries can result from manual tasks at work?

Those manual tasks that have the potential to cause musculoskeletal disorder are referred to in this Code of Practice as Hazardous Manual Tasks. Hazardous Manual Tasks may lead to a variety of injuries and conditions including:

> sprains and strains of muscles, ligaments and tendons (for example, shoulder muscle strain (rotator cuff tear))

> back injuries, including damage to the muscles, tendons, ligaments, spinal discs (for example, ruptured discs), nerves (for example, sciatica), joints and bones

> joint injuries or degeneration, including injuries to the shoulder, elbow, wrist, hip, knee, ankle, hands and feet

> bone injuries (for example, fractures)

> nerve injuries (for example, carpal tunnel syndrome of the wrist)

> muscular and vascular disorders as a result of hand-arm vibration, and

> soft tissue hernias (for example, abdominal hernias).

In this Code of Practice these injuries are referred to as musculoskeletal disorders (MSD). Death, injury or disease caused by crushing, entrapment or cutting are not covered under this Code of Practice.

1.6 How can a MSD occur?

A MSD may occur suddenly as a result of a single event of overexertion, or it may develop over a prolonged period from the accumulation of many minor tissue injuries. This is often as a result of doing repetitive work and/or work of a similar nature over time.

The back, shoulder and wrist are the most frequently injured parts of the body. There are certain factors and certain characteristics of tasks that increase the risk of developing a MSD. These are detailed in Part 6. Some examples of the activities or circumstances that may fit within these factors or characteristics of tasks include:

> repeating an action frequently

> bending and twisting

> an uncomfortable working position

> exerting high force

> working long periods without opportunity for rest and recovery

> repetitive and heavy lifting

> exerting a force in a static position for extended periods of time

> an adverse working environment (for example, hot, cold, or involving vibration), and

> high job demands and time pressures.


Part 2. Who has a duty to prevent injuries from manual tasks?

2.1 What is the general duty?

Duty holders under the *National Standard for Manual Tasks (2007)* have a responsibility to identify and eliminate the risk of a MSD occurring as a result of performing manual tasks at work. It may not always be reasonably practicable to eliminate the risk. In these circumstances the risk should be minimised as far as reasonably practicable. These general duties are also recognised in the legislation of each state and territory.

Reasonably practicable means that the duty holder must demonstrate that they have done what is reasonable in their circumstances to minimise the risks in order to comply with the law.

A number of factors need to be taken into account to determine if you have made a reasonably practicable response to a hazard. These factors include:

> the likelihood of a person being exposed to risk of MSD

> the potential seriousness of any resulting MSD

> what is known, or ought to be known about the risks (people responsible for health and safety are required to inform themselves of current and relevant information) and how to eliminate them

> the availability, effectiveness and suitability of controls eliminating or minimising the risk, and

> the cost of implementing the risk control.

All the factors are important.

2.2 Who has a duty?

The *National Standard for Manual Tasks (2007)* places the general duty of care outlined above on three types of duty holders. They are:

> **Designers, manufacturers and suppliers** of items, or buildings/structures used as a workplace, where manual tasks are performed.

> **Persons with control of a workplace** which includes the owner of a workplace and the occupier of the workplace.

> **Employers** and others with control of work such as a:

- self employed person
- company group or an organisation
- labour hire company, group training organisation, a host employer, a franchisor or a franchisee
- principal contractor or subcontractor responsible for specific projects/work.

Workers also have a role to play and their duties are outlined in Section 5.

2.3 How far does the duty extend?

Duties will apply only to the matters over which the duty holder has control and to the extent that the duty holder can make management decisions about these matters. The duty holder does not have to be present **at a workplace** to have a duty.

Duty holders may hold a duty that overlaps with the duties of others. For example, Acacia Plant Co., a wholesale nursery, occasionally contracts Jane's Labour Hire (names used are examples only) to provide trades assistants to work in their propagation operation. Acacia Plant Co. and Jane's Labour Hire will each have a duty and should cooperate with each other to protect the health and safety of workers supplied to the nursery.

All of the risk management activities may be undertaken by one of the duty holders. However, under the standard, both duty holders still retain their responsibility for the safety of workers.

If, for example, Acacia Plant Co. undertakes the action required to control the identified risks, both companies retain the duty to ensure that the risks are adequately controlled.

2.4 Who should be considered?

A duty holder has an obligation under the standard to **protect all people** who could be **exposed to risk** as a result of performing manual tasks at work. This includes workers, trainees, apprentices, contractors and work experience students.

Part 3. Duties of designers, manufacturers and suppliers

3.1 Introduction

It makes good business sense to eliminate hazards in the early stages of product planning (that is, 'at the source'), rather than make changes when hazards become a real risk to your clients, staff or business. Undertaking a risk management process using well-informed decisions will enable you to eliminate or minimise hazards at the design, manufacture or supply stage. *The risk management process for designers, manufacturers and suppliers is described in Section 3.7.*

3.2 Who has a duty?

You have a duty to eliminate hazards (or if this is not reasonably practicable, to minimise the risk) at the source if you are a:

> designer of items or buildings/structures used as a place of work, or

> manufacturer or supplier of items.

Items include plant, substances and structures, and may also include materials, fixtures, fittings, tools, equipment, machinery and electronic equipment.

You may not think of yourself as a designer, manufacturer or supplier but if you make management decisions about the design, manufacture or supply of a product to be used for manual tasks (that is, an item or a building/structure used as a workplace) you or your company may have a duty.

Designers

Examples of persons who make management decisions about design and have the duty of a designer include:

> a self employed designer of hand tools and equipment

> an architect, building designer or draftsperson involved in the planning or design of a building/structure used as a place of work, and

> a franchise company that determines the design and layout of a building/structure used as a place of work and specifies the equipment to be used by franchisees.

Manufacturers

Examples of persons who make management decisions about manufacture and construction and have the duty of a manufacturer include:

> employers or self employed persons who manufacture items

> a company that produces machinery, equipment, appliances, implements or tools

- an engineer, building surveyor, interior designer, builder or contractor who makes decisions during the construction, layout and fit out phases of building projects, and
- an employer making management decisions about manufacturing a workshop tool in-house.

Suppliers

Examples of persons who make management decisions about supplying and importing and have the duty of a supplier include:

- the owner and operator of a company that imports machinery, equipment, appliances, implements or tools
- a franchisee who owns and manages an equipment hire outlet
- a company that has control over the size, shape and handle design of heavy products such as concrete-mix packs
- an employer who commissions the manufacture of equipment and materials, or
- an employer who imports machinery from overseas for use in its own workplace.

3.3 What is my duty?

Duties of designers

Your duty is to manage the risks of MSD posed by the products that you design for use during the performance of manual tasks. You must, as far as is reasonably practicable, design out MSD hazards before your product is manufactured and supplied and used for work.

You have this duty whether the items you design are for **use** across many workplaces, or you are commissioned to provide one-off products.

Your duty to manage risk means that you should:

- **Eliminate the MSD hazard from your design or where this is not reasonably practicable minimise the risks** of MSD that workers may be exposed to in each possible use of (or interaction with) the items during performance of manual tasks.
- Provide **information about the risks identified and risk controls to the manufacturer** so that the manufacturer may take action during manufacture, where reasonably practicable, to eliminate or minimise residual risk of MSD, and ensure that no further risks are introduced during the manufacturing process.
- **Provide information** to the manufacturer (or supplier if you are also manufacturing the product) **for potential users** involved in each phase in the lifecycle of the product **about the risks you have not been able to eliminate and the conditions required for safe use.**


Duties of manufacturers

Your duty is to manage MSD risks posed by the use of the product that you manufacture or construct for use during the performance of manual tasks. You must ensure, so far as is reasonably practicable that the manufacturing process does not introduce new or additional risks.

Your duty to manage risk means that you should:

> **Manufacture items or building/structures** that may be used as a place of work that are as safe as is reasonably practicable

> **Manufacture/build/construct using materials that reduce the risks from handling during construction** and when your product is used during manual tasks or building/structure is used as a place of work

> Manufacture/build/construct **using and testing the safety measures** specified by the designer

> **Provide information** to the supplier for users involved in each potential use for the product (see Section 3.4 below) **about the conditions required for safe use and the risks not eliminated at the design stage.**

Duties of suppliers

Your duty is to manage risks posed by the product that you have supplied or imported for use during the performance of manual tasks. Managing risk means, as far as reasonably practicable, eliminate or minimise risks. Duty holders supplying, importing or re-supplying equipment, plant, materials or machinery for use during manual tasks have a duty to ensure that the products supplied are as safe as reasonably practicable and are supplied in a safe manner.

Your duty to manage risk means that you should:

> **Supply products** that are as safe as is reasonably practicable.

> Supply goods so that they can be transported, received, stored and handled safely. For example package, label and supply items in a size and shape that minimise the risk of injury from handling.

> Provide information for potential users involved in each identified use of the product (see Section 3.4 below) about the conditions required for safe use and the risks you have not been able to eliminate or minimise as far as is reasonably practicable at the design, manufacture or supply stages.

> Install equipment or erect structures using safe materials and in a manner and in locations that ensure it can be operated safely.

> Communicate maintenance requirements needed to ensure safe use and operation.

3.4 What is the extent of my duty?

Duties will apply only to the matters over which the duty holder has control and to the extent that the duty holder can, as far as is reasonably practicable, make **management decisions** on these matters.

Your duty relates only to the things you design, manufacture or supply that will be used in the workplace during the performance of manual tasks and to the people who **use** them. To ensure that all workers are not exposed to the risk of MSD the **definition of use** in this Code of Practice includes:

> construction or manufacture

> transport, storage, assembly, erection, installation or commissioning

> operation or use, maintenance, cleaning, testing, inspection or any relevant emergency procedure, and

> decommission, disassembly, dismantling or removal, and safe disposal of the item or building/structure used as a place of work.

3.5 Who needs to be considered?

You will need to consider the safety of all people in a workplace who may use or interact with your product as a result of performing a manual task. This includes all those people who use your product (or building/structure used as a place of work) while undertaking any of the processes listed above.

3.6 What information must I provide to other duty holders and potential users?

You must give purchasers and other users the information they need to safely use your product. Instructions for safe use need to be well thought out and communicated in a way that can be easily understood by users. You should inform purchasers and users about:

> any potential risks of MSD that could not be designed out of the product, and

> how to use the product safely including how to install, operate, maintain, clean, transport and dispose of the product without risk of MSD.

Information provided by designers to the manufacturer must be passed on to the supplier and then to the purchaser. If you are an importer and can't get this information from a designer or manufacturer, you should obtain information from other sources or develop it yourself and confirm its accuracy.


3.7 Managing Risk

What information is needed so that risk can be managed effectively?

In order to make informed decisions about the risks involved and how to manage them, it is important that duty holders understand the:

> intended use(s) of their product (see the definition of use in Section 3.4 above)

> handling of (or associated with) the product

> potential risks the product may pose to workers performing manual tasks, and

> options for eliminating or controlling those risks.

The most effective method of obtaining this information is by consulting with users. If your product has not been directly commissioned you may need to consult with a variety of users to obtain information about each of the possible uses involving manual tasks you have identified. This could be done through focus groups, equipment trials or through customer feedback channels.

Information about the risks associated with manual tasks and how to control them can be found in Part 6 of this Code of Practice. You may want to seek the advice of an ergonomist or other OHS specialist. Accessing recent research in libraries may also be useful. You can also look for records of trials of similar products. Injury data collected by OHS authorities may also be of assistance.

What does risk management involve?

Undertaking a risk management process will enable you to eliminate MSD hazards or minimise the risk. The purpose of risk management is to systematically identify all reasonably foreseeable MSD hazards and understand the nature of the risks they may pose so you can make informed decisions about what you need to do to protect future users and workers from MSD. You must put risk control measures in place and monitor them to ensure they are effective.

The recommended **risk management** process involves:

1. **Identifying all foreseeable MSD hazards as early as possible**. This includes:

    > **understanding the purpose(s) of your product** and the environments and systems of work which may be reasonably expected to be associated with the use of the product during the performance of manual tasks

    > **identifying MSD hazards** that the product may present to all those who you expect to use or interact with the product while performing manual tasks

    > **identifying risks of MSD that may arise** from the range of environments in which the product is likely to be used

    > **making yourself aware of the current knowledge** on risks of MSD, and

    > **consulting with potential users** of your product or with users of products intended for a similar purpose. Talking to experts about your type of product may also be of help.

2. **Assessing the risk of MSD for all possible users of the product who perform manual tasks**. This includes:
   - > **considering which users might be harmed** and how this might arise
   - > **identifying and understanding the risk factors** involved. You can use the method set out in Part 6 of this Code of Practice to help you with this step, and where necessary, supplement it with one or more of the specialised tools listed in Appendix 2, and
   - > **consulting experts and potential users.**
3. **Deciding on the methods to eliminate the MSD hazard or control the risk.** This includes**:**
   - > looking for ways to eliminate the hazard altogether at the design, manufacture, construction or supply stage, and
   - > if the hazard cannot be eliminated, researching ways to best minimise the risk associated with the hazard.
4. **Implementing your plan to control the risks.** This includes:
   - > implementing, as far as is reasonably practicable, the most effective risk control option as soon as possible. If it is not reasonably practicable to do this immediately, determine what steps can be taken straight away to reduce the risk and implement interim risk control measures, and
   - > testing the effectiveness of the risk control measures for each possible use of the product. Virtual testing, user trials and mock ups in consultation with users are recommended.
5. **Monitoring and reviewing.** This includes:
   - > monitoring the effectiveness of controls in the workplace for each potential use (as defined in Section 3.4 above) by seeking feedback from users and improving your measures to control risk of MSD in response to feedback.
6. **Maintaining records of the MSD risk assessment and the steps taken to eliminate or minimise the risks.** This includes:
   - > documenting the risk assessment so that users can be advised of residual risks
   - > developing information about the conditions and work practices required for safe use of the product, and
   - > recording any information on problems, hazards or risks identified in later use, and the result of decisions taken to deal with these difficulties, hazards and risks.

More information about the process of risk management at the design stage can be found in the publication *Guidance on the Principles of Safe Design for Work* available at www.ascc.gov.au.


What do I need to consider when assessing risk?

When assessing risk it is recommended that you take into account the following factors. Consider:

> the range of potential users and uses of the product

> any aspects of the environmental conditions where the product may be used that would pose or increase MSD risk

> the range of ways in which work with this product could be organised and any aspects of systems of work associated with your product which could prolong or increase exposure to any MSD risk, and

> the information, knowledge and skills the user requires to use the product.

What principles do I need to consider when controlling risk?

To control the risk you should, as far as is reasonably practicable:

> reduce the number and simplify the type of manual tasks required to operate the product, for example, the number of keystrokes needed to carry out a software function

> eliminate or reduce the number of repetitive actions, awkward postures, sustained postures and movements required over time to perform the manual task

> reduce the amount of time that a user needs to spend carrying out manual tasks associated with the item being designed, manufactured or supplied

> reduce the forces required to undertake the task

> provide easy to follow instructions, such as durable signs or symbols in easy to observe locations, to help people use products safely

> control the amount of vibration (if any) that can be transmitted to the user

> take into account the range of physical characteristics of workers who are likely to use your product

> design the product so that it is safe to use in all environments in which it is required

> ensure that the speed or rate of operation of your product suits most workers by providing systems for adjustment where possible

> ensure that maintenance and cleaning points are easy to access

> design your product so that correct use is unavoidable

> specify what information, knowledge and skills users require to carry out the function of your product with least risk

> specify the required conditions for likely environments for safe use (for example, specify or provide drainage and piped delivery where water or other liquid is used in a process)

In Appendix 4 you will find additional resources that can assist designers, manufacturers and suppliers to manage risk.

3.8 Case Studies

Design of maintenance systems for a printing press

Background information

> In this case study a client approaches a designer/manufacturer/supplier to purchase a printing press.

> Part of the press is a device known as a turbo that applies water to the paper. The turbo needs to be cleaned to remove paper, lint and ink contamination.

Is cleaning and maintenance of the turbo a hazardous manual task?

> The client had identified the removal process of the turbo as a possible hazard.

> While working with similar cleaning systems over many years workers have reported pain, discomfort and musculoskeletal injuries especially of the back, neck, shoulder, elbow and knees. The possibility of slips and trips as well as striking and crushing were also identified.

> The brief provided by the client to the designer/manufacturer/supplier was to eliminate the turbo maintenance procedure or devise a safer method.

Is there a risk of MSD?

> The turbo is about 1.8 metres long and weighs approximately 50 kg. The interior of the press is very confined. The turbo is heavy and awkward making manual removal for cleaning very difficult and hazardous.

> Risk assessment of the cleaning and maintenance tasks shows that there is a risk of MSD because the turbo is difficult to grasp and the task involves the sustained use of high force as well as sustained awkward postures.

Controlling Risks

Can the risk be eliminated or reduced?

> Designing a printing press that eliminated the use of the turbo was not practicable in this instance.

> However, through design changes the manufacturer reduced the frequency of maintenance – thereby reducing the exposure to the risk and reducing maintenance cost.

> The company that designed and manufactured the press designed a rear hatch to the press and a 'jig' system to aid removal.


Further design work

> Although the frequency of cleaning and maintenance of the turbo was reduced, application of the jig systems in the workplace showed that it was not easy to use and risk of MSD remained.

> The inclusion of the rear hatch in the design changes allowed the later development of a "no lift" system. The resulting concept was a set of temporary rollers that could be placed in the press that enabled the turbo to be rolled out of its position, then out the rear hatch, and onto a purpose-built roller top trolley.

> This system won the WorkSafe Victoria 2006 Prize for **Best Solution for Sprain and Strain Injuries** (www.worksafe.vic.gov.au). A video of the final design can also be found at this website.

Breathing apparatus fitting system for fire fighting

Background Information

> Fitting heavy breathing apparatus on their backs can be an awkward and hazardous procedure for fire fighters. This task is carried out under time pressure and potentially difficult environmental conditions.

> When new fire fighting vehicles were designed for the fire service, managers asked the designer and manufacturer to incorporate into the design of the truck a system for fitting the breathing apparatus to the fire fighter.

Is fitting breathing apparatus a hazardous manual task?

> Over many years of fitting breathing apparatus fire fighters had reported pain, discomfort and musculoskeletal injuries, especially of the back, neck and shoulder.

Is there a risk of MSD?

> Risk assessment of the processes of fitting breathing apparatus showed that it posed a risk of MSD as it involved the application of high force (as the apparatus is heavy) as well as an awkward posture.

Controlling Risks

Can the risk be eliminated or reduced?

> The designer identified that while the task of fitting the breathing apparatus could not be eliminated, the risk could be reduced by redesigning the system for doing the task and providing a mechanical aid.

> In the redesigned system the breathing apparatus is stored in a side compartment of the truck for ease of access. The apparatus is fixed to an arm that can be extended out of the compartment. Fire fighters can back into the apparatus and avoid lifting while in an awkward posture.

> Since the system is not self-evident, instruction and training on use is necessary. Instructions were provided by the designer along with advice that information would be best placed inside the cover of the breathing apparatus hatch for quick reference in an emergency situation.

Breathing apparatus is stored in a side compartment. The breathing apparatus is fixed to an arm that can be extended out of the compartment. (Photo: R. Luke, thanks to SEM Fire & Rescue.)

The person 'backs up' to the breathing apparatus. The apparatus is placed on shoulders without the awkward lifting that previously occurred. (Photo: R. Luke, thanks to SEM Fire & Rescue.)


Part 4. Duties of Employers

4.1 Introduction

The benefits of eliminating health and safety risks in the workplace are clear. Reviewing your work systems and work environment for safety provides opportunities for innovation, cost savings and improvements to productivity. Safer workplaces lead to more satisfied and more productive staff.

4.2 What is my duty?

You are required to identify potential MSD hazards and understand the nature and sources of risk so that you can make informed decisions about what you need to do to eliminate or control them. To manage risk you are required to:

1. **identify hazardous manual tasks** by screening work involving manual tasks to recognise those which have the potential to cause MSD
2. **assess risks** of MSD that arise from these hazards
3. **eliminate** tasks or parts of the task that have a potential to cause MSD, **or** if this is not reasonably practicable implement risk controls to **minimize** the risk **of MSD** as far as is reasonably practicable, and
4. **monitor and review** the effectiveness of the measures you have implemented.

In Part 6 of this Code of Practice you will find an easy-to-use guide that will help you identify the hazards, assess the risk so as to understand the nature of the risks and their cause(s) and take the steps needed to control them.

You should be able to do most risk assessments in-house. You, your workers and health and safety representatives know your business better than anyone. Many situations will require just a few minutes observation to identify problems and ways to reduce the physical demands of the task and risks involved.

Advice from experts may be helpful in difficult or unusual cases or to help you get started. You can supplement the risk management method in Part 6 by using one of the assessment tools in Appendix 2 that may be suitable for more complex tasks. These might include highly repetitive tasks, work involving the use of one hand to carry loads/items, tasks undertaken with high intensity, or tasks with multiple risk factors.

It is good practice to keep a record of the outcomes of your risk assessment and the action you have taken or plan to take in the future as a result. This will help you demonstrate that you have been actively working to ensure that manual tasks in your workplace are as safe as is reasonably practicable. Keeping records also helps you to keep track of what you have done and are planning to do, making the process of risk management more effective over time.

4.3 Do I have a duty to consult?

You are required to consult with employees and their health and safety representatives.

You should consult as early as possible when you are planning to introduce new manual tasks, change existing tasks, alter, or build new workplace structures or select new equipment. Check for MSD risks that may arise from manual tasks before purchasing materials, plant, fixtures and furniture, equipment or handling aids. If possible request equipment on a trial basis, and involve your workers in testing.

You should also consult at each stage of the risk management process.

Talking directly with the people who do the work and their representatives always helps. Involving staff in the process of reducing the risk of MSD is an important way of increasing the likelihood of success. By drawing on the experience, knowledge and ideas of workers you are more likely to identify hazards and their sources and develop effective risk controls for your workplace. Consultation also encourages a co-operative approach to health and safety, and commitment from workers to implement the risk control measures.

Once the hazards and risks have been identified, discuss them with your workers. They may be able to give you ideas on what is causing the risk and how the risk can be minimised in a practical way while still allowing them to operate efficiently in their jobs. Make sure health and safety representatives have access to relevant information such as reports on incidents involving manual tasks. Be sure to allow enough time for representatives to talk with workers and relay their concerns and ideas. If your business is large it may be helpful to establish a manual tasks risk management team to systematically consider all jobs involving manual tasks in the workplace.

Make sure you discuss with your workers the range of risk control options that have been generated and get their opinion on which ones would be the most effective. You might want to pilot one or two options to see which is best and to determine whether the solution needs to be refined. Be sure to consult workers about the information, instruction and training they may require. You may also need to discuss interim risk control measures if the recommended controls cannot be implemented immediately.

4.4 Duty to provide information, training and supervision

Information, training and supervision must be provided to ensure that your workers know how to do their job safely and are able to follow health and safety procedures. Workers need information and training at a number of levels including training designed for the specific workplace in which the tasks will be undertaken. Training to help understand how injuries occur and how they can be prevented enables workers to contribute constructively to the consultation and risk management process.

More importantly your investment in training will only be as effective as the knowledge, skills and commitment to health and safety demonstrated by you and your managers or supervisory staff. Focus your initial training at the supervisor and line manager level. If you and your line managers are demonstrating a commitment to safety, the measures you have selected to control risks are likely to be consistently implemented.

Other people who would benefit from receiving training in addition to workers are health and safety representatives and those who are responsible for the design or selection of equipment or systems.

When training workers in specific tasks and skills, make sure they:

> can recognise the MSD risks and select ways to do tasks that minimises the risk

> understand the reason for doing the task in a particular way

> can practise the recommended procedure before being required to use it and can do the task as instructed, and

> are properly supervised when the task is being carried out.

You will need to provide supervision as well as support and refresher training over time to reinforce new methods of carrying out the tasks and ensure that risk controls are maintained. Keep in mind that adults may find it difficult to change the way they use their bodies once habits have been established.

Provide information and training when:

> workers are being inducted into jobs which can potentially cause MSD from manual tasks

> workers perform a new manual task, use new equipment or tools

> other items are introduced into a workplace, or

> the workplace is redesigned.

In addition you need to ensure that people performing manual tasks know about the importance of managing risk in their workplace as well as how to participate effectively in the processes you use to identify, assess and control the risk posed by manual tasks. Workers need to know:

> how the body can be affected by risks arising from manual tasks

> what sort of manual tasks have the potential to give rise to MSD

> what risk factors give rise to MSD and what can cause these risks

> how to prevent MSD

> how to use risk controls

> how to select and use suitable techniques or methods and equipment

> how to report injuries and MSD hazards and the importance of early reporting, and

> who their health and safety representatives are and what consultative mechanisms are in place.

While providing information, training and instruction is important, it must not be used as a sole or primary means of control of the risk of MSD unless other risk controls are not reasonably practicable.

Part 5. Duties of workers

5.1 Introduction

If you perform manual tasks you have a role to play in ensuring that your work is done safely. The *National Standard for Manual Tasks (2007)* sets out your responsibility to take reasonable care of your own health and safety and the health and safety of others in the workplace.

5.2 What is my duty?

If you are a worker you have a duty to:

1. follow systems of work designed to ensure the risk of MSD from manual tasks is as low as is reasonably practicable
2. follow lawful instructions and training that have been provided to ensure the risk of MSD from manual tasks is as low as is reasonably practicable
3. use any equipment provided for your safety in accordance with the information and training and instruction provided for its use
4. take care to ensure that your actions do not put anyone else at risk
5. cooperate with your employer on health and safety matters including taking part in identifying hazards, assessing risks and controlling risks if your employer asks you, and
6. inform your employer or health and safety representative if you have any safety concerns. For example, you should advise your employer if:
   - there are problems with the maintenance of equipment
   - you are experiencing pain or discomfort that may be related to your work, or
   - you think that some aspect of manual tasks that you perform may put you or others at risk of MSD.

Employers have a range of duties and responsibilities to all workers relating to health and safety. It is to your advantage to work cooperatively with your employer to find practical solutions to manage the risks posed by manual tasks.


Part 6. How to manage risk

6.1 Introduction

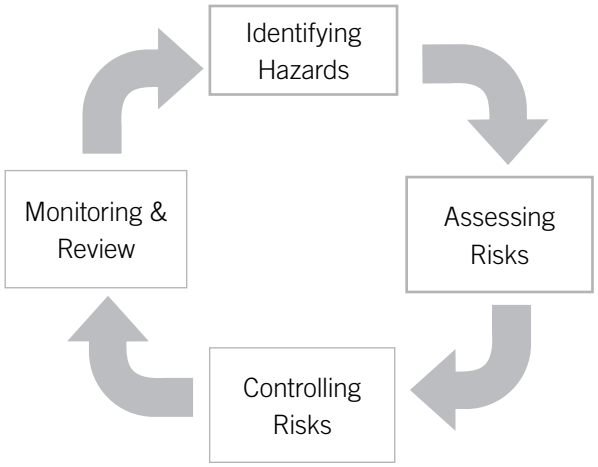
Managing the risk for manual tasks requires systematically identifying and controlling those risk factors that lead to MSD. The risk management process will help you to identify hazardous manual tasks, understand the nature of the associated risks, and the source of the risk so that you can make informed decisions about what to do to eliminate or control them. The stages in the risk management process include:

1. **identifying hazardous manual tasks** by screening manual tasks to recognise those that have the potential to cause MSD
2. **assessing risks** of MSD that arise from these hazardous manual tasks and identifying the sources of the risk
3. **eliminating** tasks or parts of the task that have a potential to cause MSD, **or** if this is not reasonably practicable implementing measures to alter the sources of risk in a way that **minimises** the risk **of MSD** as far as is reasonably practicable, and
4. **monitoring** and **reviewing** the effectiveness of the measures you have implemented as well as **keeping records** of the action taken to manage the risk.

These stages are shown schematically below and in the detailed flow chart at the end of this section.

This section of the Code of Practice outlines a recommended **approach** for assisting employers, to manage risk in their workplace. Appendix 1 includes tools that can guide and assist in the process and help with recordkeeping.

Designers, manufacturers and suppliers can use this information to learn about how MSD occurs, sources of risk and control options. Appendix 4 provides reference to other resources that may assist in managing risks at the design, manufacture and supply stages.



Who should be involved?

Successful risk management of manual tasks needs the involvement and cooperation of **employers and workers** and where in place, **health and safety representatives/ OHS committees**.

People who may need to be involved in different stages of the risk management process, depending on the size of the workplace, include:

> supervisors

> health professionals on staff

> staff responsible for purchasing specifications

> process engineers

> return to work coordinators

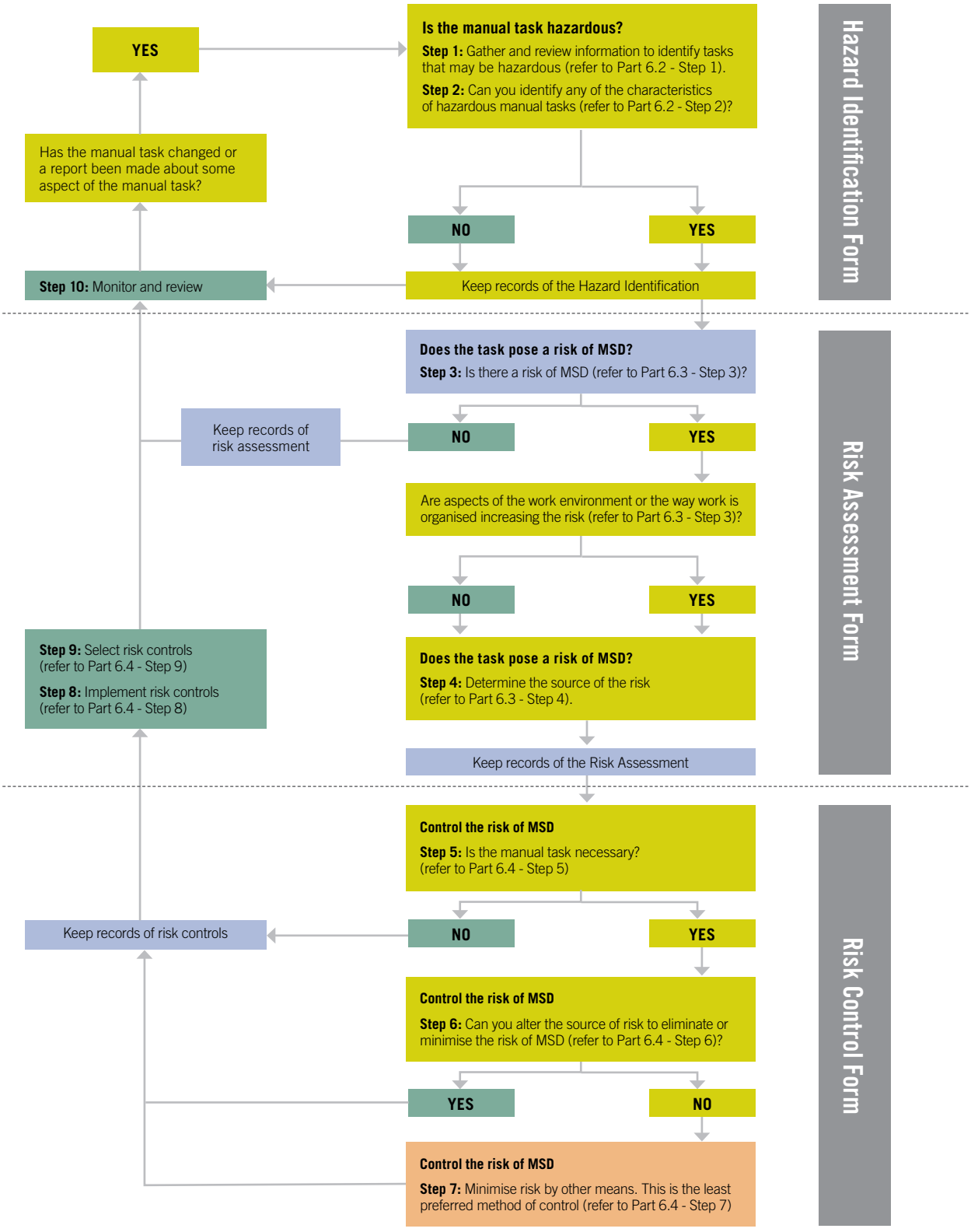
> health and safety representatives or the OHS committee

> OHS professionals, and

> quality managers.

Make sure the person responsible for, and anyone involved in, risk management of manual tasks has the appropriate training and skills (see Part 4 for information about the appropriate training and instruction). It may also be necessary at times to engage people with suitable expertise from outside your organisation or workplace.

Manual Tasks - Risk Management Flowchart

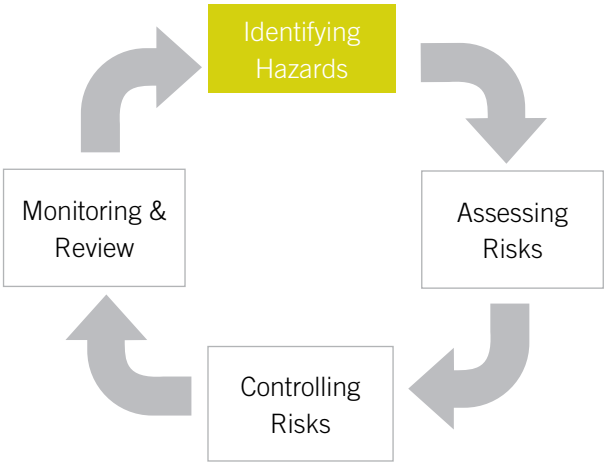


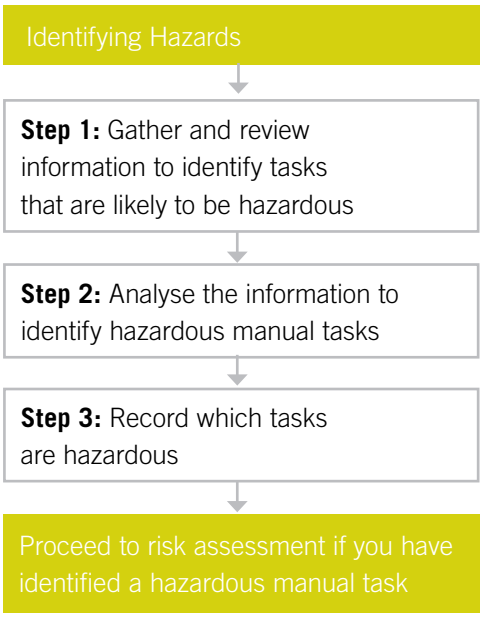
6.2 Identifying Hazards

Introduction to identifying hazards

Not all manual tasks are hazardous. The potential for a manual task to be hazardous is not always obvious. Hazard identification is a way of analysing tasks to find out which have the potential to contribute to the development of MSD.

Injury can result from sudden damage caused by a single strenuous act or an unexpected movement or exertion of force. Injury can also occur from wear and tear accumulated over a period of time as a result of performing the tasks regularly and/or undertaking work of similar nature over time.





Characteristics of Hazardous Manual Tasks

In the *National Standard for Manual Tasks (2007)* and this Code of Practice, manual tasks that involve any of the following are considered hazardous manual tasks:

1. repetitive or sustained application of force
2. repetitive or sustained awkward posture
3. repetitive or sustained movement
4. application of high force including jerky or unexpected forces
5. exposure to sustained vibration in combination with any of the above
6. handling of live people or animals, or
7. handling of loads that are unstable, unbalanced or difficult to grasp or hold.

Some tasks may include more than one of these characteristics.


Steps for carrying out hazard identification

This section explains how to identify the manual tasks in your workplace that have the potential to cause or contribute to the development of a MSD. The structured approach described below improves the chances of identifying all the tasks that have a potential to cause harm. It will also help you to ensure that the number of risk assessments and the level of detail in the assessments can be minimised.

Keep in mind that workers may use the same parts of the body to repeat similar movements when undertaking a number of **tasks of a similar nature** over time. In **combination** these tasks may be hazardous.

Step 1: Gather and review information to identify tasks that may be hazardous

Start by systematically examining the information that you have gathered about tasks which have the potential for harm. This can include records of injuries, incident reports, hazard reports, issues raised by OHS representatives or employees, records of production difficulties that have resulted in additional manual handling, records of maintenance and service requests which mention physical difficulty in using equipment.

You should also observe the work processes and consult with workers and their health and safety representatives when making decisions about which tasks are hazardous. Talking directly with workers always helps as they have first-hand knowledge and a unique understanding of the particular tasks that they perform. Make sure that you discuss any aspects of their work tasks that are difficult and discuss your plans for any future changes to work processes.

Review the information you have gathered and in consultation with your workers and health and safety representatives, make a list of:

a. all **manual tasks** undertaken by workers where an **injury**, **pain or discomfort** which persists, **have been reported**

b. **manual tasks** which workers report as **difficult to do**, such as those that require more than one person to complete

c. **manual tasks associated with interruptions or difficulties with work processes**, particularly the need to redo work, and

d. **tasks** involving the **use of equipment** which is not working properly or **is difficult to use.**

The tasks that you list will be those most likely to be hazardous manual tasks. You should also list:

e. **new manual tasks** or those to be **altered** in some way or are being undertaken in a changed environment, and

f. **manual tasks that have not previously been examined** for their potential as a hazard.

Step 2: Analyse the information to identify hazardous manual tasks

In consultation with workers and their health and safety representatives, work through the list you have compiled observing each task in order to identify tasks which show any of the 'Characteristics of Hazardous Manual Tasks,' described and illustrated below. You can document the characteristics of each task identified on the Hazardous Manual Tasks Identification Checklist in Appendix 1.

Characteristic 1: Repetitive or sustained application of force

In this section **sustained** means maintaining the same position or making the same movement continuously for a period of time.

Repetitive application of force

Repetitive application of force means using force repeatedly over a period of time to move or support an object. Examples of the repetitive application of force include:

> lifting and stacking goods onto a pallet

> repetitively lifting and moving of bins during grape harvesting

> gripping and handling bricks when bricklaying

> using a nail gun to fix palings to a fence

> repetitively opening of blister packs during medication rounds

> repetitively pressing a pedal or button to operate a power press

> typing and other keyboard tasks

> repetitively pressing components with the thumbs or other part of the hand to assemble an item

> prolonged application of therapeutic massage treatments, (for example, Lymphedema massage), and

> removing splinting material from patients using shears.

Handling bricks and a trowel while bricklaying requires the repetitive application of force.


Sustained application of force

Sustained application of force occurs when force is applied continually over a period of time. Examples of sustained application of force include:

> pushing or pulling a trolley around a workplace
> holding down a trigger to operate a power tool
> supporting a plaster sheet overhead while fixing it to a ceiling
> holding a grinder when clearing swarf from a metal cast item
> restraining a person or animal
> supporting a roll of wrapping film and applying force to stretch the film during wrapping of a pallet, and
> supporting, positioning or stabilising a patient's limb during angioplastic surgery or when applying splinting or casting materials.

Pushing the wheelbarrow across the plank requires the sustained application of force.

Characteristic 2: Repetitive or sustained awkward posture

An awkward posture is one in which any part of the body is in an uncomfortable or bent and twisted position.

Examples of repetitive awkward postures include:

> reaching sideways to pick up goods from a conveyor belt and packing them
> reaching forward to pick up items from a conveyor belt and twisting the wrist to turn them over for inspection and packing
> reaching upwards or forwards to lift trays of pies from the shelves of a cooling rack
> bending down to stack items on a pallet on the floor, and
> operating a set of pliers which are too small for the hand in an assembly.

Examples of sustained awkward postures include:

> crouching to service plant or a vehicle
> lying underneath a vehicle and reaching upwards to service it
> kneeling while trowelling concrete or laying carpet
> leaning over to support a new mother while breast feeding
> continually standing with weight mainly on one leg, while operating a power press with foot pedal controls
> bending over a desk or table
> bending the neck and back to the side to see around bulky items being pushed on a trolley
> sustained sitting for prolonged periods of time without intermittent standing or walking, and
> sustained standing at a checkout counter or ticket booth for prolonged periods of time without intermittent walking or sitting.

When stacking these sheets repetitive and sustained awkward postures must be adopted (twisting and bending the back, working with the arms outstretched and bending the wrists).

This writing task requires a sustained awkward posture (prolonged bending of the back and neck and prolonged sitting which is awkward for the lower back and hips).

Pushing and steering this trolley demands sustained awkward postures (bending and twisting the back and neck) and the sustained application of force to move the trolley.

Characteristic 3: Repetitive or sustained movement

Repetitive or sustained movement means using the same parts of the body to repeat similar movements over a period of time or to maintain movement. Examples of tasks involving repetitive or sustained movement include:

> painting

> lifting goods from a conveyor belt and packing them in a carton

> typing and other keyboard tasks

> repeatedly reaching for and assembling components in electronics manufacturing, and

> using a socket and ratchet or spanner to unscrew long bolts.

Repetitive movements of the fingers are required to open pliers because the tool has no return spring. Repetitive use of pliers requires **awkward movements and postures** of the hand.

Characteristic 4: Application of high force

Application of high force occurs in any task that people in the working population would find difficult because of the effort it requires. The high force may be applied by the back, arm or leg muscles or by the hands and fingers. A small amount of force could be considered high force when the small muscles of the hands are used to perform the manual task.

Examples of the application of high force include:

> lifting or carrying a heavy object

> lifting an object which cannot be positioned close to the body

> pushing or pulling an object that is hard to move

> operating hand tools with tight squeeze grips

> lifting a heavy item from or onto a high shelf, and

> gripping small instruments with high force (for example, a dental hygienist cleaning teeth).

Application of high force occurs in any tasks that:

> workers describe as very physically demanding

> a worker needs help to do because of the effort it requires, or

> requires a stronger person or two persons to do the task.

Using a concrete saw requires **application of high force** and **sustained awkward postures** of the back and neck.

A heavily loaded trolley demands the **application of high force** to move and steer it.

Using the tin snips can require the **application of high force.** A bent wrist and wide grip increase the force that must be exerted.

Application of force with speed:

Tasks where force is applied at speed generate high force. Rapid or sudden speed changes such as jerky or unexpected movements while handling an item or load are particularly hazardous because the body must suddenly adapt to the changing force.

Examples of jerky force include:

> impact recoil of a large nail gun

> pulling tangled laundry from on overfilled industrial washing machine or dryer

> removing tamper proof lids from bottles during medication rounds

> picking fruit, where a sudden twist and flick movement of the wrist is required to detach it from the branch

> throwing objects such as fleeces for wool classing, or sheets during bed making

> catching objects, such as when bricks are thrown from lower levels to the working position, or catching items retrieved from high shelves

> tearing off sheets of perforated plastic from a roll when wrapping items for packaging (for example, cling wrap in the food industry)

> pushing meat sections off a fast moving process line for slicing

> cutting vegetables with a knife in a restaurant kitchen

> opening valves that have been tightened and come free unexpectedly, and

> cutting reinforcement steel to size on a construction site with large bolt cutters.

Examples of unexpected force include:

> attempting to catch an elderly patient who suddenly falls during assisted walking

> carrying an unstable load such as bagged stock feed pellets which suddenly moves to one side

> pulling large animals which are frightened or resistant out of a stock carrier

> handling patients who suddenly resist or no longer assist during the handling procedure (for example, repositioning a dementia patient), and

> team handling a large cement mixer onto the back of a truck or utility when one handler is suddenly unable to carry their share during the lift.

Shearing requires **sustained and awkward postures,** and the application of high force to restrain the sheep.

Fruit picking involves the use of **rapid** and **high force** applied at the stem of the fruit to separate it from the tree. It is often done with a **twisting movement.**

Characteristic 5: Exposure to sustained vibration

Tasks where vibration is transferred from tools or machinery to parts of the operators body can be hazardous, particularly when force is being applied. Examples of tasks involving exposure to sustained vibration include:

> using pneumatic, electric and percussive hand tools such as sanders, grinders, drills, chippers and riveters

> using petrol or pneumatic powered equipment including chainsaws and jackhammers

> operating earth-moving plant

> driving a tractor, forklift or truck

> controlling a steering wheel and/or using foot pedals in a tractor, truck or heavy earth moving machinery

> leaning on a vibrating surface such as a large industrial grinder or jackhammer during operation, and

> using high water pressure equipment.

The use of jackhammers and similar tools involves exposure to **sustained hand-arm vibration.**

Seated operators of mobile plant can be exposed to **sustained whole-body vibration.**

Characteristic 6: Handling of live people or animals

Handling of live people or animals is hazardous not only because they can be heavy but because they may move unexpectedly. They can apply sudden, unexpected forces on handlers (see Characteristic 4 above). Movements may be sudden or involuntary or their behaviour may be aggressive. In addition, the state of arousal (or consciousness) of a person being handled, their level of willingness or ability to assist, ability to communicate and understand as well as their need for dignity and privacy can also contribute to the hazard.

Examples include:

> assisting a rehabilitation patient to walk down a ramp into a swimming pool

> extricating an unconscious person from a vehicle collision

> attending to the personal needs of an aged resident in a nursing home

> transferring a patient to a ward bed in theatre

> treating a panic-stricken animal in a veterinary clinic

> restraining an aggressive patient in an emergency department, and

> holding an animal to perform a procedure (for example, while crutching a sheep).

Handling live animals may involve **sustained application of force, unexpected movements**, the **application of high force,** and the adoption of **sustained repetitive awkward postures** (reaching stooping and twisting of the back).

Characteristic 7: Handling of loads that are unstable, unbalanced or difficult to grasp or hold

Loads that are unstable or unbalanced can move or change shape suddenly, or may be uneven and heavier on one side. Loads that are difficult to grasp or hold include those that have no handles or specific handholds, are very large, slippery, floppy, sharp, hot, cold, toxic or unpleasant or are likely to spill. These characteristics can apply sudden, unexpected forces on handlers (see Characteristic 4 above). Examples include:

> lifting a sack of flour or animal feed

> moving an open cooking pot full of food

> carrying trays of drinks or plates in a restaurant

> carrying trays of equipment used in an operating theatre

> carrying a large sheet of plasterboard, and

> carrying a laundry bag full of dirty linen.

The ladder is an **unstable load**. If it tilts, **high force** must be exerted to control it.

You may use the **Hazardous Manual Tasks Identification Worksheet** in Appendix 1 to record the tasks identified in each work area.

Record which manual tasks are hazardous

Some hazardous tasks may include more than one of the characteristics that indicate a manual task hazard. The task only needs to be identified as hazardous once.

If you have identified more than one hazardous manual task it is important to determine the order of priority for assessing the tasks. Ensure that any tasks you suspect may involve a high level of risk are assessed first.

The list you prepared in Step 1 using reasons (a) to (d) will provide a good indication of tasks which are likely to pose higher risk. In addition, the more characteristics of hazardous manual tasks in a task, the higher the risk is likely to be.

Example: Pushing a trolley of metal components

Identifying hazardous manual tasks

Background information

As part of its OHS responsibilities, the employer running a manufacturing plant needs to ensure that its workers are not exposed to risks of MSD from performing manual tasks at work.

Step 1: Gather and review information

Bob's health and safety representative has reported in their regular OHS report that Bob has just been diagnosed with a MSD of the back. Connie has recently told her health and safety representative that she was experiencing constant shoulder and back pain during her work. Vinh, who is employed in the same job as Bob and Connie, is not suffering from any pain or injury.

The employer set up a group to look at all the tasks that Bob, Connie and Vinh do to see whether they involved hazardous manual tasks. The group included the manager of the assembly section, the health and safety representative for that area as well as Bob, Connie and Vinh. The group discussed the work and types of tasks carried out in the area, and the difficulties and issues that were known about any of these tasks.

Bob, Connie and Vinh each work independent 8 hour shifts in the assembly section of a factory that produces metal components. One of their tasks is to push a trolley containing fully assembled components from the assembly area to the packing area 30 metres away. The group decided to work on this task first.

Step 2: Does the manual task display any of the characteristics of hazardous manual tasks?

The trolley must be pulled away from the bench, turned through 90 degrees, and then pushed straight ahead to the packing area. They do this every 20 minutes over the whole shift.

All three employees use similar strategies to do the task. To move the trolley away from the bench, they grasp the handle of the trolley and pull against it, using their whole body weight. To manoeuvre the trolley through 90 degrees, they push against the side of the handle – an action they agree is difficult, even though the trolley has swivel wheels. They bump their whole body weight into the trolley to start it moving along the passage. To avoid running into other employees and to stop at the packing area, they pull hard backwards, against the momentum of the trolley.

The employer and health and safety representative agree that this task involves:

> the repetitive and sustained application of force (Characteristic 1) when moving the trolley to the packing area, and

> the application of high force (Characteristic 4) at various times in the task to get the trolley moving and to turn or stop it.

Therefore, it is considered to be a hazardous manual task.

6.3 Assessing Risk

Introduction to Assessing Risk

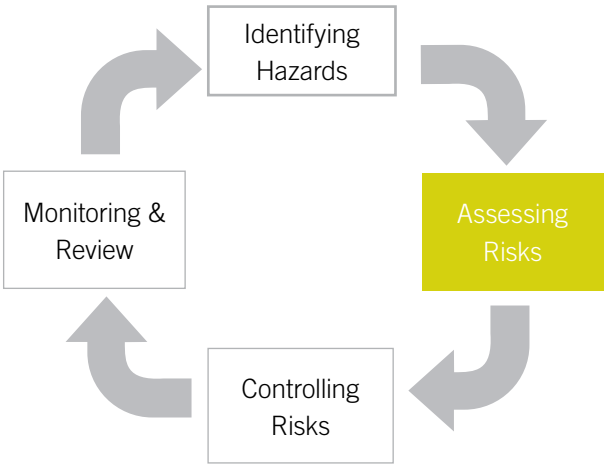
Once you have identified hazardous manual tasks, you need to assess each one for the risk of a MSD. This section explains how to carry out a risk assessment.

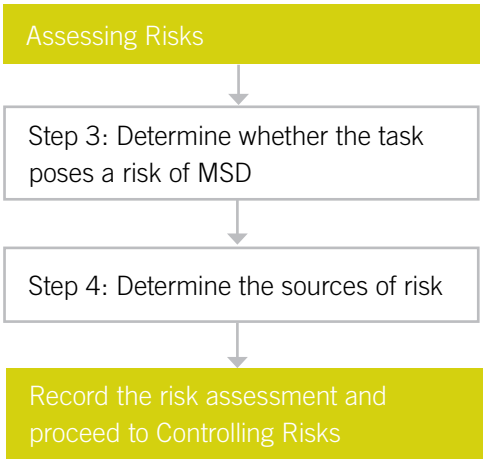
The risk assessment process will help you:

> determine which aspects of the tasks you have identified pose a risk

> understand how they increase the risk of injury, and

> determine the sources of the risk (why the risk factor is present).





To assess whether a task is likely to increase the risk of MSD, you need to examine the task for risk factors that are known to lead to or contribute to injury.

A task may involve more than one risk factor. Where a number of risk factors are present and interact within a task, the risk of MSD increases significantly. The risk will also increase as the magnitude of the risk factor increases, for example, the risk increases with the greater weight of the load or the force required, longer duration of the task or higher frequency of movement. The more bent or twisted, uncomfortable or sustained the posture, the greater the risk.

You may be able to quickly identify risk factors in a task and be aware of a risk control that is known to eliminate the risk from that task (or aspects of the task). If the risk control method is known as the best current OHS practice, you may implement it straight away.

This approach can only be justified where the known risks and risk control measures exactly fit your circumstances, and result in the risks being reduced to the lowest level reasonably practicable.

How to use the guidelines provided below:

The risk factors that can lead to MSD are explained and illustrated below. A number of guidelines have also been included that can be used to indicate that the risk of MSD is likely to be increased.

While scientifically derived, the guidelines below should not be taken to be 'safe limits' for manual tasks. The difficulty with setting safe limits for exposure to risks for manual tasks is that:

> both the loads on the body and the capacity of the body to deal with the loads are difficult to estimate

> there are differences between the ability of individuals to tolerate loads on the body, and

> the interactions occurring between the risk factors make the determination of safe limits difficult and complex.

Scientific evidence shows that the percentage of the healthy population that can perform the task safely, reduces significantly above the guide values listed.

Steps for carrying out risk assessment of a hazardous manual task

There are two steps for carrying out a risk assessment. You need to determine:

> whether the task poses a risk of MSD, and

> the sources of the risk.

Preparation for the risk assessment

Consultation: Remember to consult your occupational health and safety representatives and the workers involved in carrying out the manual task when conducting risk assessments in your workplace.

Observing the task during normal operation is a good place to start. It is useful to familiarise yourself with the features of each task before beginning the risk assessment, such as the:

> activities which make up the task

> work processes and systems of work used

> skills and experience of the people doing the task

> tools and equipment used

> work area design and layout, and

> the working environment.

During the assessment take into account all reasonable variations in the task, for example, seasonal peaks in workload, the organisation of work during equipment maintenance and when staff are on leave.

Manual Tasks Performed at Work

Hazardous Manual Tasks
Direct Risk Factors

Sources of risks cause the direct and contributory risk factors Source of Risk	Repetitive awkward postures Sustained awkward postures	High force Jerky and unexpected forces Speed and force	Frequency Repetition Duration
Work area design and layout	Risk of MSD	Risk of MSD	Risk of MSD
The nature of the item	Risk of MSD	Risk of MSD	Risk of MSD
The nature of the load being handled	Risk of MSD	Risk of MSD	Risk of MSD
Systems of work, work organisation and work practices **Aspects of Work Organisation that are Contributory Risk Factors** > Pace of work and time constraints > Little latitude for workers to influence workload or work methods > Level of resources and guidance available	Increased risk of MSD	Increased risk of MSD	Increased risk of MSD
The Working Environment **Aspects of Work Environment that are Contributory Risk Factors** > Cold > Heat > Humidity > Wind **Vibration** > Hand arm vibration > Whole body vibration	Increased risk of MSD	Increased risk of MSD	Increased risk of MSD

Any combination of more than one direct risk factor and contributory risk factors can further increase the risk of MSD

Implement Risk Controls

A combination of any direct risk factor and a contributory risk factors increases the risk of MSD

Implement Risk Controls

How can MSD occur?

To assess whether a task is likely to pose a risk of MSD, you need to examine the risk factors that are known to lead or contribute to injury. These are called direct risk factors and contributory risk factors.

Direct risk factors are:

> the postures and movements of the worker including repetitive awkward postures and sustained awkward postures

> the forces involved in the task including high force, jerky or unexpected forces and speed and force

> the frequency, repetition and duration of the task.

The contributing risk factors are:

> the work environment including cold, heat, humidity, wind, lighting, floor surfaces and housekeeping

> systems of work, work organisation and work practices including high workloads and tight deadlines, little latitude for workers to influence workload or work methods and unsuitable or insufficient reources such as staffing levels, equipment and guidance available to workers

> exposure to vibration including whole-body vibration, and hand/arm vibration.

Sources of risk include:

> work area design and layout including inadequate design or placement of items in the workplace

> nature of the item or load including loads that are of a heavy weight, hard to grip, can move suddenly, have uneven weight distribution or, involve handling people and animals

> nature of the item handled including weight, balance, handle design, handle orientation, shock loading and impact forces and failure to select for purpose

> working environment including thermal environment, floor surfaces, steps, ramps and containments on floors, limited housekeeping and cleaning, and vibration

> systems of work, work organisation and work practices including work organisation, job design and methods of work for 'average' workers

> Where a number of direct and contributing risk factors are present (interact) within a task, the risk significantly increases.

Step 3: Determine whether the task poses a risk of MSD

Check for risk factors

Determine whether the task poses a risk by checking whether each of the risk factors listed below is present. The **Risk Assessment Worksheet** (Appendix 1c) will guide you in systematically considering each risk factor and can be used to record the result of your risk assessment.

Question 1: Does the task involve repetitive or sustained posture, movements and forces?

Repetitive or sustained postures

Different types of postures and movements can contribute to risk of MSD if they are repetitive or sustained. Generally, as the pace of work increases, postures or movements become more repetitive.

Posture is the position that the body and parts of the body are held in during manual tasks. Posture affects the muscular effort needed to perform a task and how quickly muscles fatigue. Posture and movement are particularly important when forceful and/or repetitive tasks are performed or postures are held for prolonged periods.

Repetitive awkward postures

Repetitive awkward postures are those positions where the whole body or parts of the body parts are not in their normal or neutral position. As a joint moves further away from its normal position, more muscular effort is needed to achieve the same force. Where these postures are assumed repetitively, the risk of MSD increases.

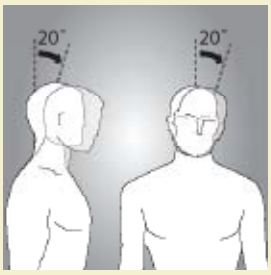
Sustained awkward postures

Sustained awkward postures are those awkward positions (described above) where the whole body or parts of the body (that are not in their normal position) are held for more than 30 seconds at a time. Sustained awkward postures include crouching to service a vehicle, kneeling while trowelling concrete, or laying carpet or continually standing while leaning forward while operating plant or machinery.

Repeated or sustained movement

Repeated or sustained movement - occur when the task involves performing the same actions, for example assembling circuit boards, packing boxes or pushing a trolley in a work cycle (or a similar work cycle). Generally, as the pace of work increases, movements become more repetitive. This means the same muscles are being used continuously. The speed of movement can also increase the risk of injury.

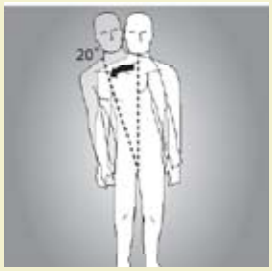
Examples of the repetitive or sustained postures include:



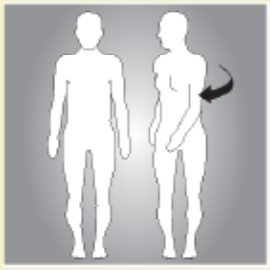
Bending the neck forwards or sideways more than 20 degrees

Twisting the neck more than 20 degrees

Visible backward bending of the back



Bending the back forwards or sideways more than 20 degrees



Twisting the back more than 20 degrees

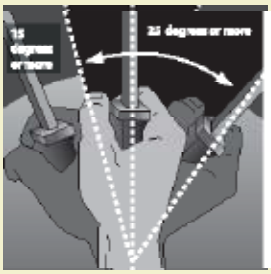
Working with one or both hands above shoulder height

Reaching forwards or sideways more than 30 cm from the body

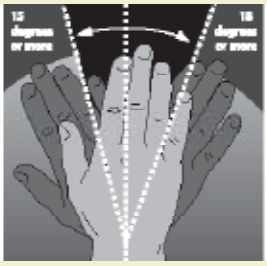
Reaching behind the body

Twisting behind the body

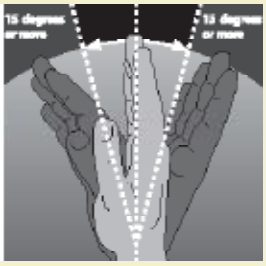
Squatting, kneeling, crawling, lying, semi-lying or jumping



Bent wrists in actions where the fingers and hands are applying forces and fingers are fairly straight (eg. typing)



Where the fingers are bent or applying higher forces (eg. gripping)



Where the wrist is bent to the side

Note: Where measurements of degrees are given above they indicate the amount of bend or twist at which risk starts to occur for the relevant posture. As the degree of bending and twisting increases, the risk increases. The risk is greatest when the postures and movements are most extreme, that is, toward the end of the movement range, and when they feel uncomfortable.

As a general guideline, repetitive means a movement is performed more than twice a minute and sustained means a movement is continued for more than 30 seconds at a time.

How far is 20 degrees? When you look at the face of a clock and the hour hand is on 12 and the minute hand is showing 5 minutes past 12, the angle between the two hands of the clock is approximately 30 degrees.

Tick **yes** on the **Risk Assessment Worksheet** (see Appendix 1c) if the task requires any of the following to be done more than twice a minute or for more than 30 seconds at a time:

> bending forwards or sideways more than 20 degrees

> twisting the back more than 20 degrees

> visible backward bending of the back

> bending the head forwards or sideways more than 20 degrees

> twisting the neck more than 20 degrees

> visible bending the head backwards

> working with one or both hands above shoulder height

> reaching forwards or sideways more than 30 cm from the body

> reaching behind the body

> working with the upper arms away from the body, or

> working with shoulder/s raised.

Tick **yes** on the **Risk Assessment Worksheet** (see Appendix 1c) if the task requires any of the following to be done more than twice a minute or for more than 30 seconds at a time:

> squatting, kneeling, crawling, lying, semi-lying or jumping

> standing with most of the body's weight on one leg

> twisting, turning, grabbing, picking or wringing actions of the fingers, hands or arms

> working with the fingers close together or wide apart

> very fast movements, or

> bending of the wrist (the degree of bending varies for different hand actions - see illustrations).

Record in the comments section on the **Risk Assessment Worksheet** (see Appendix 1c) what you have discovered about what is causing or contributing to these actions (that is, the sources of the risk). For example, the position of a work bench means that workers need to reach forward more than 30 cm when putting the baking tray on the top shelf.

Repetitive or sustained forces

Tasks involving repetitive or sustained forces can contribute to MSD. Generally, as the pace of work increases, movements become more repetitive and may be more forceful.

Examples of tasks that involve repetitive or sustained postures include:

Carrying with one hand or one side of the body

Gripping with the fingers pinched together or held wide apart

Pushing, pulling or dragging

Exerting force while in an awkward position. Holding, supporting or restraining any object, person, animal or tool.

As a general guideline, repetitive means an action is performed more than twice a minute and sustained means an action is done for more than 30 seconds at a time.

Tick **yes** on the **Risk Assessment Worksheet** if the task requires any of the following to be done more than twice a minute or for more than 30 seconds at a time:

> lifting, lowering or carrying
> carrying with one hand or on one side of the body
> exerting force with one hand or one side of the body
> pushing, pulling or dragging
> gripping with the fingers pinched together or held wide apart
> exerting force while in an awkward posture (see section above), or
> holding, supporting or restraining any object, person, animal or tool.

Note in the comments section of the **Risk Assessment Worksheet** (see Appendix 1c), any sources of risk that are causing or contributing to repetitive or sustained forces in the task.

Question 2: Does the task involve long duration?

The duration and frequency of the task

Duration

Tasks which continue over a long period or are repeated over the work day increase the worker's exposure to hazards. This increases the risk of injury, particularly if the tasks involve repetitive postures, movements and forces or high force.

Frequency

Frequency of actions repeated within a task determine the number of actions performed and increase the exposure to forces, movements and postures.

Repetition

Repetition of similar work cycles that require the same actions, for example assembling circuit boards with multiple hand tools or packing boxes with different types of products, means that the same muscles are being used continuously.

Once you have examined the repetitive or sustained postures, movement or forces that are present in the task, the next step is to look at the duration of the task. The duration of the task is how long the task is carried out over a whole shift or continually at any time during a shift.

Tick **yes** on the **Risk Assessment Worksheet** (see Appendix 1c) if the task is done for more than a total of 2 hours over a whole shift or continually for more than 60 minutes at a time.

In the comments section of the **Risk Assessment Worksheet** (see Appendix 1c), note any sources of risk (aspects of the task) that are causing or contributing to it being done.

Question 3: Does the task involve high force?

High force

A manual task that involves high force is one that people in the working population would find difficult because of the effort it requires. Forceful muscular exertions applied or responded to by the worker place high stress on the muscles, tendons, joints, ligaments and vertebral discs. High force also fatigues muscles and increases the time needed to recover.

Remember to ask your employees what aspects of the task they find difficult.

High forces involved in the task can be MSD risks even if they are not repetitive or sustained. This means that any task involving force may be assessed as a risk, even if it is only done occasionally or for short periods. The longer and more often force is applied and the higher the force, the greater the risk.

The risk in tasks involving high force is related to the intensity of the force needed, the speed involved, or whether the force is jerky or sudden.

Some tasks requiring force involve the whole body – for example, lifting, lowering and carrying heavy weights, or pushing a heavy load. Other tasks involve only some parts of the body, such as the hands and arms. A small amount of force could be considered high force when the small muscles of the hands are used to perform the manual task.

Examples of tasks that involve high force include:

This sack of stock feed is heavy and floppy, making it difficult to handle. High force is needed to grip and move it.

The hitting action used to fit the hubcap involves high force. The risk is increased because the task is done while in an awkward posture.

Tick **yes** on the **Risk Assessment Worksheet** (see Appendix 1c) if the task involves any of the high force actions:

> lifting, lowering or carrying heavy loads

> pushing or pulling objects that are hard to move or are hard to stop (for example, a trolley)

> using a finger-grip, a pinch-grip or an open-handed grip to handle a heavy or large load

> exerting force at the limit of the grip span

> needing to use two hands to operate a tool designed for one hand

> holding, supporting or restraining a person, animal or heavy object

> exerting force with the non-preferred hand

> two or more people need to be assigned to handle a heavy or bulky load, or

> during the application of high force, the body is in a bent, twisted or otherwise awkward posture.

Force applied with speed

Fast movements (particularly if repeated) can injure muscles, tendons and ligaments. The rapid or sudden speed changes caused by sudden or unexpected movements are high risk.

Jerky or unexpected forces

Forces abruptly applied or stopped can overload the muscles, tendons, joints, ligaments and vertebral discs. This can occur when throwing or catching loads, or when the load or item worked on moves unexpectedly (for example, when pulling up a fence post that suddenly comes free, or assisting and holding a walking patient who suddenly falls).

Tick **yes** on the **Risk Assessment Worksheet** (see Appendix 1c) if the task involves:

> applying uneven or jerky forces during lifting, carrying, pushing or pulling

> applying sudden or unexpected forces (for example, when handling a person or animal)

> holding, restraining or supporting a person or animal likely to move unexpectedly

> jumping while holding a load

> throwing or catching objects, or

> hitting or kicking actions such as when carpet layers use their knees to strike a tool to stretch the carpet, “punching out” animal hides or kneading dough.


Tick **yes** on the **Risk Assessment Worksheet** (see Appendix 1c) if any of the following information is provided about the task:

> pain during or after the task

> discomfort or symptoms such as numbness or tingling that persists or recurs

(While the two points above may also indicate the presence of risk from other risk factors, they are highly indicative of the presence of risk from high force)

> the task can only be done for short periods due to the effort involved

> 'strong' workers tend to be assigned to do the task

> workers think the task should be done by more than one person, or seek help to do the task, or

> workers say the task is physically demanding, very tiring, very strenuous or difficult to do.

Note in the comments section of the **Risk Assessment Worksheet,** any sources of risk that are causing or contributing to high force being exerted, including forces that are applied unexpectedly or with speed or jerkiness.

Question 4: Is there a risk?

After answering questions 1 to 3, you can now decide whether the task is a risk.

Remember that a task may involve more than one risk factor. Where a number of risk factors are present and interact within a task, the risk of MSD increases significantly.

The task involves a risk of a MSD if:

> You ticked **yes** in Question 1 **and also** ticked **yes** in Question 2
That is the task involves repetitive or sustained postures, movements or forces, AND it involves long duration.

(Now tick the first box under 'Question 4: Is there a risk?' on the **Risk Assessment Worksheet.**)

> You ticked **yes** in Question 3
That is the task involves high force.

Now tick **yes** in the second box under Question 4 'Is there a risk?' on the **Risk Assessment Worksheet** (see Appendix 1c).

Question 5: Are aspects of the work environment or the way work is organised increasing the risk?

When you have determined that there is a risk in the task, you need to consider whether other factors are increasing the risk of MSD. Aspects of the environment including exposure to vibration and the way work is organised can increase risk by increasing the demands placed on the worker, affecting the function of muscles, nerves and blood vessels and increasing fatigue.

Exposure to sustained vibration

The longer a worker undertaking manual tasks is exposed to vibration the greater the risk of a MSD. Workers may be exposed to two types of vibration:

Whole-body vibration

Whole-body vibration occurs when a worker is in contact with a vibrating surface such as a seat or the floor in heavy vehicles or machinery. Prolonged exposure increases the risk of lower back pain, degeneration of the lumbar vertebrae and disc herniation. It can also cause other health effects, for example, motion sickness.

Whole-body vibration can occur when the employee is seated or standing in plant or equipment such as:

> tractors and heavy transport vehicles

> cranes, forklifts and road-making plant, or

> ride-on mowers and skid-steer loaders.

Hand-arm vibration

Hand-arm vibration occurs when vibrations are transferred to the hands and/or arms either from a tool or from steering wheels or controls in heavy machinery. This can result in disrupted circulation in the hands and forearm and damage to nerves and tendons.

Hand-arm vibration can occur when using vibrating tools or equipment such as:

> chainsaws and other mechanised saws

> impact tools, including jackhammers, vibrating plates, chippers and pavement breakers

> powered hand-tools, including nut runners, impact wrenches and grinders

> powered digging tools, including spade and ditch diggers and small augers, or

> lawnmowers and brush cutters.

Examples of tasks that involve vibration:

The use of impact wrenches involves exposure to sustained hand-arm vibration.

The use of chainsaws involves exposure to sustained hand-arm-vibration.

Operating equipment such as ride-on mowers may expose the worker to whole body and sustained hand-arm vibration. This may occur as vibration can be transmitted through the controls of the equipment.

Tick **yes** on the **Risk Assessment Worksheet** (see Appendix 1c) if the task involves exposure to either type of vibration.

The thermal work environment

Aspects of the thermal environment that can increase the risk of MSD include:

Cold

> Working in cool environments such as in cool rooms, freezers, cold stores or working outside in cold weather

> Cold conditions lower body and hand temperature and make handling and gripping of objects more difficult. Cold also interacts with and significantly increases the risk of hand-arm vibration

> Working in a cold thermal environment requires thick or heavy protective clothing that restricts movement which can increase the risk of MSD. It can also cause overheating of the body as the clothing does not allow heat or sweat to dissipate and may decrease the blood flow to muscles, increasing fatigue.

Heat

> Working in high air temperatures, for example, in foundries, laundries, bakeries, kitchens, or working in hot weather. This could include radiant heat, for example, from exposure to the sun or from processes such as smelting or plastics extrusion.

> Additionally, wearing protective clothing in hot environments may restrict movement, sensation and handling ability during a manual task.

Humidity

> Working in humid environments caused by processes such as steam cleaning, cooking or the weather

> Humidity may act to increase discomfort and fatigue.

Wind

> Wind may increase the force required to handle items and reduce control while handling large objects (especially those that are flexible and with a large surface area). When working in windy conditions and in low temperatures that are also windy, the resultant wind chill may lower the body temperature further.

Example of tasks involving a hazardous thermal environment:

Any MSD risks associated with this foundry task are increased because of the hot environment and the protective clothing required. Note that the hot item being handled requires the load to be held a long distance from the body, increasing the force required.

Tick **yes** on the **Risk Assessment Worksheet** (see Appendix 1c) if the work involves:

> high air temperatures (for example, in foundries, laundries, kitchens, manufacturing processes that generate heat or working outside in hot weather)

> radiant heat (for example, from the sun, or from processes such as smelting or plastics extrusion)

> wearing heavy protective clothing while working in hot conditions

> working in hot conditions where workers have not adapted to it

> high humidity caused by the weather or by processes such as steam cleaning

> low temperatures (for example, in cool rooms, cold stores, or working outside in cold weather)

> wearing thick clothing that restricts movement while in cold conditions (for example, gloves)

> handling very cold or frozen objects

> windy conditions, either combined with hot or cold weather, or when large objects are being handled, or

> wind chill caused by exposure to wind in low temperatures.


Systems of work, work organisation, work practices

Physiological responses in the body, such as changes in muscle tension can increase the risk of MSD. Aspects of work organisation, work practices and systems of work that may trigger physiological changes may include:

Pace of work and time constraints

> Pace of work and time constraints – such as high workloads and tight deadlines, lack of rest breaks.

Latitude workers have to influence workload or work methods

> Latitude workers have to influence workload or work methods – such as little latitude to influence pace of work and task design.

Level of resources and guidance available

> Level of resources and guidance available - such as unsuitable or insufficient equipment, staffing levels that do not allow sufficient rest and recovery time or for assistance when needed, uncertainty about work roles and performance requirements or processes for dealing with conflict in workplace relationships.

Tick **yes** on the **Risk Assessment Worksheet** (see Appendix 1c) if, in consultation with the workers performing the manual tasks, any of the following are identified:

> the work rate is set by a machine or the team and not under the worker's control

> systems of work, such as piece work, encourage workers to skip breaks, to finish early, or to produce more items in the set time

> tasks require levels of physical work that workers find difficult to maintain

> sustained high levels of attention and concentration are required

> there is a need to meet frequent tight deadlines, or

> there are sudden changes in workload, or seasonal changes in volume without mechanisms for dealing with the change.

Tick **yes** if workers consider that:

> guidance and resources provided by their employer should be increased to ensure that they can perform their work to the required standard, or

> they need to be given further training, information and supervision to carry out their tasks to the required standard.

Keep in mind that workers may use the same parts of the body to repeat similar movements when undertaking several tasks of a similar nature over time.

Step 4: Determine the sources of the risk

It is helpful to discuss with workers and health and safety representatives or OHS committees, the reasons for the presence of the above risk factors and when they are at their most severe. This will assist in determining the source(s) of risk and selecting and implementing the most effective risk control measure.

For each of the tasks that you have assessed as posing a risk you must determine the source(s) of the risk.

Keep in mind that the risks in manual tasks can result from a combination of sources of risk.

Keep in mind that the sources of risk listed below do not lead to an injury unless a risk factor is present. For example a low work bench (work area design and layout) may be appropriate if the piece of work is large. However it will be a source of risk if it causes a worker to work with a bent back (awkward posture).

The following provides guidance on the sources of risk.

A. Consider the work area design and layout

The physical features of the workplace can significantly affect the way work is done and can be a source of risk. Placement or design of items in a work area can lead to workers being exposed to:

> sustained exertion of force

> sustained awkward posture

> repetitive reaching bending or twisting, and

> increased frequency of tasks.

A work area designed without consideration of the risks that arise from manual tasks may impose awkward postures on workers undertaking manual tasks, for example, bent and twisted positions with shoulders raised and the need to reach for items over long distances. This also increases the amount of force required to carry out the task.

Note on the **Risk Assessment Worksheet** (see Appendix 1c) if and how the area design and layout is a source of risk.

B. Consider the nature of the load being handled

The loads that are handled during manual tasks can be a source of risk. Loads can include people and animals. The nature of the load being handled may lead to:

> high force

> sudden or unexpected forces

> sustained postures, and

> awkward postures.

When determining whether the nature of the load is a source of risk consider:

Large, bulky loads

Large and bulky loads are difficult to handle and promote awkward postures and increased muscular exertion. Loads that cannot be held close to the body increase the risk of injury, for example, lifting lounge chairs over other furniture in a show room.

Loads of heavy weight

As a general rule, the heavier the load, the greater the force required to handle the load. The level of risk is dependent on how the load is handled, for example, a 10kg load held close to the body and transferred from a stack to a bench at waist height poses less risk than a 10kg load lifted from floor to shoulder height. The number of healthy adults who can safely handle heavy loads generally decreases as the weight of the load increases.

Hard to grip loads

The harder it is to grip and control a load, the greater the force required to handle it. Unwieldy loads without handles or hand holds can also result in the hands and arms being used in awkward postures, for example, boxes without cut outs for grips or slippery meat products, which are harder to grip.

Loads that move suddenly

Loads that are unwieldy, unstable, or move unpredictably increase risk by creating sudden high forces, for example, animals which move during treatment, patients who are unconscious or resist assistance, or the contents of a container such as fluid or loose material that moves to one side suddenly.

Uneven weight distribution of loads

Due to the shape and uneven distribution of weight, unbalanced loads are likely to create awkward postures and apply high forces to one area of the body when handled, for example, lifting a water pump, lawn mower or concrete finishing helicopter onto the back of a truck.

Unknown loads

Lack of information about the contents of packages and containers, including weight and packaging arrangements, can increase risk of injury by causing the person handling to overestimate or underestimate the force required to lift or handle it, or to fail to compensate for unbalanced loads.

Handling people and animals

Manual tasks that involve the handling of people or animals are considered hazardous by their very nature. Both the physical properties and behavioural tendencies of humans and animals can be a source of risk of injury, for example, unpredictable movements can result in sudden forces acting on one area of the body.

Note on the **Risk Assessment Worksheet** (see Appendix 1c) if and how the nature of the load being handled is a source of risk.

C. Consider the nature of the item

The nature of items including hand tools, plant and equipment may lead to:

> increased forceful exertion

> increased grip force

> sustained postures, or

> awkward postures.

When determining whether the nature of hand tools, plant and equipment are a source of risk consider:

Weight

Heavy hand tools, particularly if held for long periods of time, increase the force and effort required to perform a task, for example, a 3kg power drill used on an assembly line.

Balance

If the heaviest part of the tool is in front of the wrist, the force required to grip the tool and stop it tilting forward is increased.

Handle design

If the handle diameter is too large or too small, for example, the grip on a standard hand tool used by a small woman, the grip span of the hand will create awkward postures and greater force will be required to control the tool. A handle that is too short or has prominent edges, can result in damaging compression of the palm.

Handle orientation

If the handle design does not orientate the wrist in a handshake position, the worker will need to use an awkward posture to operate the tool. Tools that cannot be adapted for use by both hands or are designed for right-handed use only can result in awkward postures and increased force, for example, standard right handed scissors used by a left-handed worker.

Shock loading and impact forces

Tools that deliver impacts such as hammers, hammer drills, and nail guns transmit impact forces to various ligaments and can require the use of a firmer grip to maintain control. They are a particular source of risk if used repetitively and for long periods.

Maintenance

Inadequate maintenance of tools and equipment can lead to increased force required to operate the tool, for example, pliers that stick when opening. Inadequate maintenance may also produce increased vibration.


Failure to select for purpose

Tools not matched to the needs of the task can be a source of risk by increasing the force required, or by promoting sustained or awkward postures. Examples include a sander trigger without a lock-in mechanism which can result in the sustained application of force when the trigger is held for long periods. Using a hand tool when a power tool could easily be substituted is likely to result in an increased use of force and effort to complete the task. Similarly, using a standard saw, when a long handled saw would more easily reach into tree branches, can result in sustained and repetitive awkward postures.

Continued use of hand tools without sufficient rest breaks or recovery time

Continued use, without adequate time for recovery, of any hand tool (even tools that are well suited to the user and designed for the task) will increase risk of injury by requiring sustained force to support it. In particular, vibrating tools increase risk.

Note on the **Risk Assessment Worksheet** (see Appendix 1c) if and how the nature of the item is a source of risk.

D. Consider the working environment

Workers may be exposed to a variety of thermal environments while undertaking tasks in certain occupations and industries. These conditions can lead to:

> increased grip force due to reduced sensitivity in the hands in cold environments or difficulty grasping due to perspiration on the hands in hot environments

> sudden high force due to loads slipping from the hand, or

> sustained forceful exertion to maintain a grip.

The need to wear personal protective equipment for the thermal environment can be an additional source of risk while undertaking manual tasks, for example, wearing thick clothing that restricts movement while working in cold conditions (such as gloves – refer to Appendix 3A for more details).

Floor surfaces, steps, ramps and contaminants on floors

Floor surfaces, steps, ramps and contaminants on floors can lead to:

> slippery and uneven floor surfaces that may increase the exertion required to perform manual tasks due to difficulty maintaining stability, and increased friction when moving objects such as trolleys, or

> awkward postures due to the need to see the stairs or ramps while handling a load and ascending/descending.

Obstructions related to limited housekeeping and cleaning

Obstructions related to limited housekeeping and cleaning can lead to:

> awkward postures such as reaching or bending over obstacles

> awkward postures such as side bending to see path of travel and avoid obstructions, or

> an increase in forceful exertions due to the stop/start nature of moving objects around obstacles.

Low and excessive lighting, glare and reflection as a source of risk

Low or high levels of lighting, as well as glare and reflection may lead to awkward or sustained postures, such as leaning backwards or forward to either improve viewing or to avoid glare, reflection and excessive light (refer to Appendix 3A on lighting).

Vibration from machinery and tools as a source of risk

The risk from whole-body vibration can occur when a worker is in contact with a vibrating surface such as a seat or floor in heavy vehicles or machinery. Effects of hand-arm vibration may be experienced by workers when using items and hand tools as jackhammers and angle-grinders (refer to Appendix 3B – Vibration for more details).

Note on the **Risk Assessment Worksheet** (see Appendix 1c) if and how the working environment is a source of risk.

E. Systems of work, work organisation, work practices

The way work is organised or the way procedures are designed and applied can be a source of risk. The way work is organised may act to increase muscle tension and cause other physiological changes which affect the working of the musculoskeletal system. Examples include:

> increasing the frequency at which repetitive tasks are performed

> increasing the duration of exposure to the risk

> reducing the time for recovery between tasks

> increasing the amount of force required, and

> inducing physiological changes in the body that increase muscle tension and as a result increase the risk of MSD.

The sources of risk listed below can often occur in combination due to the way work is arranged in a particular workplace. Consider the following workplace factors associated with the development of MSD.

Work Organisation

Consider:

> time constraints (tight deadlines occurring too regularly or during peak periods may increase repetition and exposure to risk)

> pace and flow of work across the shift (too little latitude for workers to influence the pace of work may increase the duration of exposure to risks and lead to inadequate recovery time as well as physiological changes in the body that increase muscle tension)

> too little latitude for workers to influence workload or work methods and changes in the workplace (may increase physiological changes in the body that increase muscle tension)

- availability of resources and guidance (unsuitable or insufficient equipment, uncertainty about work roles and performance requirements or processes for dealing with conflicted in workplace relationships, may increase physiological changes in the body that increase muscle tension), and
- staffing levels, skill mix and shift arrangements (arrangements such as the length of shifts, levels of overtime, placement of rostered days off may not allow for sufficient recovery).

Task Design and Methods of Work

Consider:

- the order in which work is done (the order of activities within a task may lead to the use of postures, movements and force that can increase risk and may not allow sufficient recovery time for specific parts of the body)
- working positions adopted by workers (for example, load handling procedures, methods of hand tool use etc. may increase the amount of force required, and increase the duration of exposure to the risk), and
- pace and flow of work within the task (too little latitude for workers to influence the pace of work may increase repetition and lead to inadequate recovery time as well. This will increase the likelihood of physiological changes in the body that increase muscle tension).

Tasks Designed for 'Average Workers'

Consider:

- a task designed for 'average workers' rather than accommodating to the range of physical characteristics, skills and experience of individual workers, will increase the risk of MSD. This may increase the amount of force required by some workers to perform a task, promote awkward postures and increase the frequency with which repetitive tasks are performed.

Note on the **Risk Assessment Worksheet** (see Appendix 1c) if and how any aspects of the work environment or the way work is organised are increasing the risk.

If the sources of risk can be eliminated or minimised, the presence of risk factors that can lead to MSDs will also be eliminated or minimised.

Remember that the sources of risk do not cause injury unless they generate a direct risk factor. For example, workers assembling electronics components experience risk arising from repetitive bent postures of the wrists, combined with repetitive exertion of forces to push components into position. The risk of a MSD increases where the assembly line is set to a fast pace, requiring workers to work quickly with less time for recovery between awkward postures and exertions.

If the sources of risk can be eliminated or minimised, the presence of risk factors that can lead to MSDs will also be eliminated or reduced.

Example: Pushing a trolley of metal components

Assessing the risk of a MSD

The duration of the task was timed. Bob, Connie and Vinh each take about 45 seconds to push the trolley from the assembly area to the packing area. The trolley is hard to initiate movement, steer and stop, requiring the use of the worker's whole body weight and awkward postures. The task is done once every 20 minutes, and the employees do other tasks between these times. The trolley is pushed for 30 metres over some rough floor surfaces.

Step 3: Is there a risk?

The employer and health and safety representative agreed that the task did involve risk due to:

> the use of high force (Question 3), since it requires pushing and pulling an object that is hard to move or to stop and it required the use of the whole body weight.

While the task was done only every twenty minutes, the fact that the high force needed to be sustained and repeated during the 45 seconds it took to move the trolley also poses risk.

There are additional indications that the task poses a risk. One worker has been diagnosed with a MSD and another worker has reported symptoms of a potential MSD.

Step 4: Determine the sources of risk

The risk assessment showed that the task required the use of high force. The employer and health and safety representative, in consultation with the employees, identified the following sources of risk:

A. Workplace layout:

> the long distance between the assembly area and the packing area (30 metres), and
> the trolley positioning next to the bench in a way that requires it to be turned when fully loaded.

B. The nature of the load handled:

> the trolley is heavy, carrying a total load of 264 kg.

C. The nature of the items used:

> the trolley has no brakes and must be stopped manually, and
> the trolley is hard to turn.

D. The working environment:

> other employees also use the corridor where the trolley needs to be pushed, so stopping and starting occurs often, and
> there are some rough floor surfaces.

E. Work organisation and work practices:

> the same employee does this task throughout the shift.

Next Step

The risk of MSD in the hazardous manual task must be controlled by addressing the sources of the risk.

6.4 Controlling risks

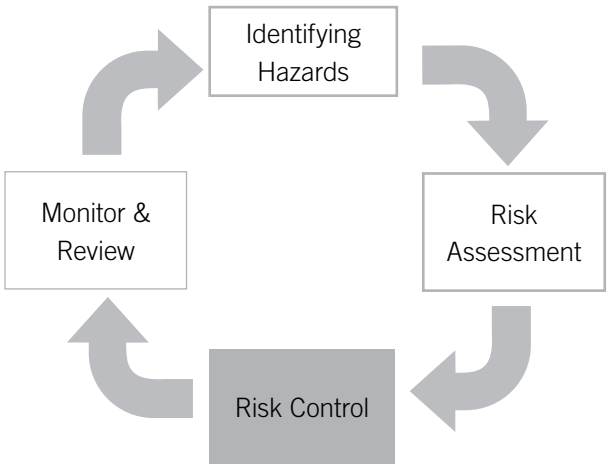
Introduction: What is risk control?

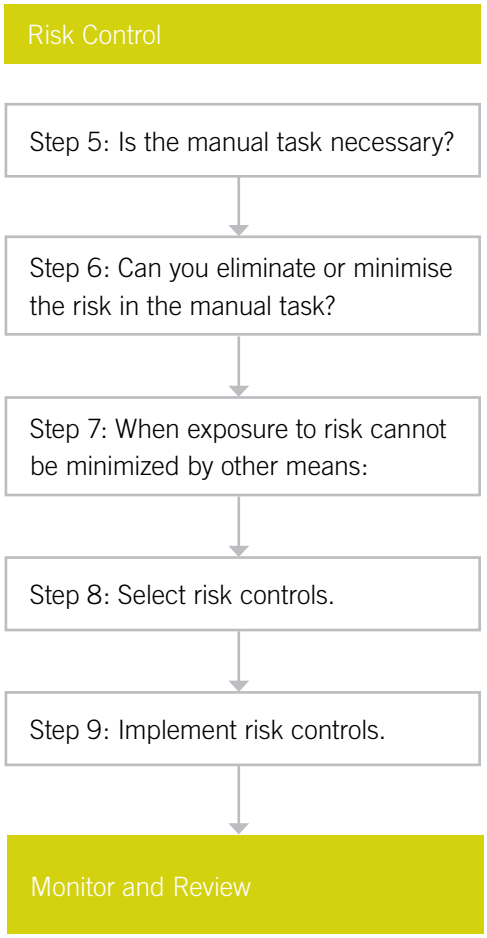
Risk control means implementing effective measures to **eliminate** or **minimise** the risk of MSD.

At the conclusion of the risk assessment, you will have identified why a risk may be present in a hazardous manual task – that is you will have identified the source of the risk.

The following steps will allow you to determine what needs to be done in order to alter the sources of risk, and therefore eliminate or minimise the risk of a MSD arising from hazardous manual tasks.

When deciding how to control the risks, make sure you consult with your workers or their health and safety representatives. Your workers will be able to suggest possible solutions and will have good ideas about which solutions are most likely to work.





Step 5: Is the manual task necessary?

Determine if the hazardous manual task is necessary. Eliminating the need for hazardous manual tasks is the most effective way to prevent MSD. This is best achieved when workplaces, equipment, items to be handled and systems of work are being designed.

You may be able to mechanise or redesign the process in a simple and cost effective way so that it is no longer necessary to perform the task manually, for example, using a mechanical pallet stacker during loading operations.

Can you stop doing the task or part of the task?

Note on the **Risk Assessment Worksheet** (see Appendix 1c) any ways in which the task can be redesigned or any possible mechanisation that will remove the need to perform the manual task.

Step 6: Can you eliminate or minimise the risk in the manual task?

If redesign or mechanisation does not remove the need to perform the hazardous manual task then the risk must be controlled.

You will find a range of control options listed in the following pages that will be of assistance. In most instances you will need to use a combination of risk control measures. It is recommended that you work through the options provided for each of the sources of risk in order to determine the best risk control measures.

Talk to your workers and ask them to suggest ideas and discuss possible solutions. Involve them from the start of the process – this will help all parties accept any proposed changes.

Firstly, attempt to eliminate the risk by altering the source of risk.

Can you **eliminate** the risk by:

> altering the design and layout of the workplace

> altering the nature of the load (including using mechanical aids or assistive devices)

> altering the nature of the items used during manual tasks

> altering the working environment, or

> altering work organisation and work practices, including systems of work?


Note any changes that can be made to **eliminate** the risks of MSD on the **Risk Assessment Worksheet** (see Appendix 1c).

Where it is not reasonably practicable to eliminate the risk, then **minimise** the risk of the manual task by altering the source of risk.

Note any changes that can be made to **minimise** the risks of MSD on the **Risk Assessment Worksheet**.

Note any information, instruction, training and supervision that will be required to make these controls work properly.

Your workers may already use mechanical aids or assistive devices while they are performing manual tasks. You will need to look at the control options to ensure that they are being used in a way that best eliminates or minimises the risk of MSD. You may identify better methods to control the risk, or, you may identify better ways to use the mechanical aids or assistive devices by altering the workplace, the item used, or systems of work. You will need to note any information, training and supervision required to ensure that the mechanical aids and assistive devices are used in safe manner.

Step 7: When exposure to the risk cannot be minimised by other means

If it is not reasonably practicable to apply the suggested risk controls in Step 6, administrative controls may be applied on an interim basis. **These are the least preferred options for risk control** because workers must still work in the presence of a hazard. These controls include the provision of:

> information

> instruction

> training

> supervision, and

> where relevant, personal protective equipment.

These controls may be used alone or in combination with one another.

You should **NOT** rely on these controls as the primary means of managing the risk until you have exhausted the options that either eliminate or minimise the risk. Procedure based controls require management, enforcement and commitment, together with behavioural change. They are dependent on proper training and appropriate human behaviour to work properly and, therefore, tend to be less effective.

Can you reduce the risk with information, instruction, training and supervision? How?

Note any information, instruction, training and supervision that may reduce the risk of MSD on the **Risk Assessment Worksheet** (see Appendix 1c). Also note that this is the least preferred option for minimising those risks.

Step 8: Selecting risk controls

Once the possible risk controls have been identified you need to determine how effective they are likely to be. To be effective they must control the source of risk, which will in turn eliminate or minimise the presence of risk factors, for example, providing workbenches that can be adjusted for height will eliminate awkward postures.

A single risk control measure or a combination of controls may be used. Risk control may initially involve using a short term, interim measure while a long term solution is developed.

Follow the order below to choose controls that provide the highest level of safety possible in the circumstances.

1. If possible, don't perform the hazardous manual task. Phase it out where possible by introducing mechanisation or changing the system of work.
2. Change the way a hazardous manual task is performed to eliminate the risks of MSD.
3. If the risks of MSD cannot be eliminated, change the way a hazardous manual task is performed to minimise the risks.
4. When you cannot eliminate or minimise the risk, the use of information, training, instruction, supervision, personal protective equipment, or a combination of these, can be used as a **last resort** or to supplement other controls.

Once control options have been selected and an implementation plan has been devised, it will be necessary to provide information, training and supervision on the changes made to the task to ensure that workers can subsequently carry out tasks in a safe manner.

Step 9: Implementing risk controls

You can implement risk controls immediately or it can be a staged process – interim controls should be implemented while waiting for long-term solutions. For example, rotate workers through a production line to reduce the amount of time spent working at a low work bench or temporarily raise the bench until it can be replaced or altered permanently.

When implementing risk controls you will usually need to:

> have workers **trial solutions** before you decide to make the solutions permanent

> **review controls** after an initial testing period, as they may need modification

> **develop work procedures** to ensure that your controls are understood and responsibilities are clear

> **communicate** the reasons for the change to your workers and others, and

> provide **training** to ensure your workers can complete the tasks competently.

It is recommended that you keep records of your risk control decisions and the agreed time by which all your actions will be completed. Note the person who will be responsible for implementing the risk controls.

Controls

A. Alter the design and layout of the work area

Alter placement of items in the work area

Where possible items used in manual tasks should be placed to ensure that they are:

> in front of the worker

> between waist and shoulder height

> close to the midline of workers

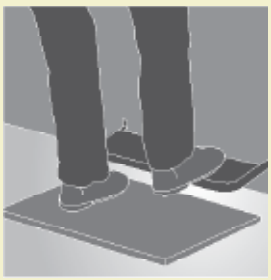
> on the worker's preferred side

> orientated towards the worker

> positioned within comfortable reaching distance

> positioned to avoid double handling and to avoid moving loads manually over long distances

Displays and controls should be laid out to encourage comfortable head and neck postures, comfortable hand and arm reach, and efficient use.



Pedals are best operated from a seated position. If the worker has to stand up, make the pedal large and for use with either foot. Shroud or protect foot pedals to avoid inadvertent activation. Locate a foot pedal at floor level to avoid uncomfortable foot and leg postures.

You should:

> place frequently used displays and controls, including keyboards and other input devices, directly in front of the worker

> position controls at comfortable elbow height

> select electronic or foot controls rather than hand controls if high force is required

> position pedals so that workers can operate them from a seated position, in a comfortable symmetrical posture.

Detailed technical specifications can be found in Appendix 3A.

Locate work components at a comfortable distance from the body.

Alter the design of items in the work area

Seating design

Seated tasks are often performed at a fixed workstation. Seating can be important in minimising awkward postures and should generally be adjustable with the following features:

> a contoured backrest with a lumbar curve except those where the backrest would interfere with the actions to be performed

> a swivel action to prevent the worker from twisting to reach workstation components

> casters fitted to the base, to allow movement on carpet, and gliders fitted to the base, for low resistance flooring, where access to work items located beyond normal reach is required

> a footrest or foot ring fitted on drafting or higher chairs to support the feet.

It is important to remember that workers should not remain in a seated posture for prolonged periods. Design the work so a variety of postures, including standing and walking are required.

Workstation design

Workstations should be designed to accommodate the widest range of physical characteristics of workers possible. Adjustable work surfaces, work stands and table tops allow work surface heights to be quickly changed to meet the needs of a range of workers. In the same way, surface heights can be quickly changed as workers change tasks, minimising awkward postures, for example, when a worker changes from working on large objects to working on small objects.

Where it is not possible for workstations to be adjustable then alter the design so:

> the workstation height suits widest range of physical characteristics of workers

> reaching distances suit shorter workers

> knee and leg clearances suit larger workers.

Working heights

> tasks with high visual demands should be performed above elbow height and work surfaces may need to be tilted, for example, tasks involving delicate or precise manipulation

> tasks where the hands make a narrow range of movements and can rest on the work surface should be performed at, or just above, elbow height. A sloping surface may reduce the muscle effort on the arms and shoulders during tasks that require hand-eye coordination, for example, drafting

> general light manipulative tasks or tasks involving the use of a keyboard should be performed at just below elbow height

- tasks incorporating a range of arm movements using the shoulder should be performed at between hip and shoulder height, for example, taking items from a stack and placing them on a conveyor
- tasks requiring considerable muscle effort or use of the body for leverage should be performed at hip height, for example, drilling at a workbench.

Tasks such as placing items on a conveyor should be performed between hip and shoulder height

B. Alter the nature of the load handled

Controls for the nature of the load

Aspects of loads, such as the size, shape and design of the items being handled can be a source of risk. Altering their nature can reduce or eliminate the risk. It is important, to consider doing this before they come into the workplace, for example by specifying your requirements to suppliers when ordering for packaging, sizing, labelling and arrangements for delivery of items.

Alter load size and shape

Modify loads to facilitate handling in the following ways:

- increase object weight so that it can be better handled mechanically using a unit or bulk load concept such as palletised loads
- provide lifting aids or lifting points so mechanical aids can be used
- repackage the load into a different weight, size or shape
- specify smaller or more manageable loads when purchasing
- reduce the size and/or shape of loads or capacity of containers produced in-house
- reduce the number of objects handled at one time
- where a load is off-centred or unbalanced, place handles on the item so that the heaviest side will be closest to the body during manual tasks.

Additional information on load dimensions can be found in Appendix 3A.

Improve grip

Loads with handles require less effort to grip them, and are easier to manipulate. Ask suppliers to deliver goods in sturdy boxes or containers with handles or handholds. If the box is made of cardboard, the area near the handhold should be reinforced so that it does not rip when the box is picked up.

Where possible provide two handles or handholds to prevent one-handed lifting, particularly where:

> the load is heavy

> the load is moved frequently

> the nature of a load makes it difficult to grasp.

Where handles or handholds cannot be provided:

> consider the possibility of providing handheld hooks or suction pads for loads such as sheet materials

> use handling grip devices adapted to the particular object to be carried

> make sure the outside surfacing is easy to grip and not slippery

> arrange for hot or cold materials to be in insulated containers.

Use handling grip devices adapted to the particular object to be carried

Controls for unstable and unwieldy loads

Minimise the risk of sudden movement of the load

Arrange items in a package so they are well anchored and will not shift unexpectedly while being handled by:

> using slings or other aids to maintain effective control when handling loads that lack rigidity

> filling containers holding liquids or free-moving powder so that there is only small amount of free space at the top of individual containers

> using baffles, dividers or packing materials to keep the contents stable in partly filled packages

> securing loads which may move during handling, for example, animals in slings, fertiliser bags inside sturdy boxes

- minimising the handling of large loads carried vertically (for example, glass panels or plasterboard) in windy conditions
- shrink wrapping part loads on pallets.

Label loads appropriately

Loads should be labelled to indicate any manual handling risks, and where appropriate, any necessary precautions that should be taken when handling the load.

This information should indicate:

- the heaviest side of an off-centred load, for example, with an arrow drawn on the packing carton
- the weight of the load
- whether the load is fragile
- the stability of the load, for example, a label saying that the contents of a package may move while being transported or handled
- any specific handling or unpacking instructions.

Controls for handling people and animals

Handling people

When people are being handled the controls selected and applied should take account of the following:

- conducting a mobility assessment, then accommodating the characteristics of the person being handled through the use of appropriate mechanical and/or assistive devices
- moving the person to a place that does not constrain the movement of the worker performing the task, for example, when using a shower trolley to bathe a patient
- where handling is required, assessing the needs of the task including the specific type of mechanical aids, personnel needed and planning it in a manner that avoids double handling
- where the use of hoist requires two or more people then you still need to minimise double-handling so workers under time pressure don't try to complete the task on their own
- in emergency situations where team lifting is required, ensure that the number of workers is in proportion to the weight of the load and the difficulty of the lift and that those lifting have been trained to team lift
- planning how to handle a person attached to medical or other equipment
- location and storage allows ready access to mechanical aids and assistive devices
- the training needed for safe use of mechanical aids and assistive devices.

Handling animals

When animals are being handled consider the following:

> using mechanical devices or other restraining aids for lifting, transporting, or restraining animals

> moving the animal to a place that constrains or minimises the movement of the animal before commencing the task

> where handling is required, assessing the needs of the task including the specific type of mechanical aids, personnel and planning it in a manner that avoids double handling

> where the use of a mechanical aid or assistive device requires two or more people, minimising double-handling so workers under time pressure don't try to complete the task on their own

> wearing appropriate personal protective equipment.

Any lifting or restraining of animals should be carried out by people with the necessary skills and experience.

Eliminate or reduce load handling by using mechanical aids and assistive devices

The risk of MSD arising from handling loads can be eliminated or reduced by the use of mechanical aids or assistive devices. These reduce the need for workers to lift, carry or support items, animals or people. A wide range of mechanical aids are available across and within specific industries.

Mechanical aids

The best way to prevent injuries is to eliminate the manual task by using mechanical aids. Mechanical aids can also be used to eliminate or minimise the effort required to handle loads.

Mechanical aids should be:

> designed to suit the load and the work being done

> as light as their function will allow

> easy to use

> located close to the work area so they are readily available but do not cause an obstruction

> in full working order

> introduced with suitable instruction and training in their use (and supporting maintenance procedures).

When a mechanical aid is introduced into the workplace, information, instruction, training and supervision should be provided to ensure that new arrangements do not introduce any additional risks to the manual task, or to other workers, for example, a forklift appearing without warning in a work area.

Mechanical aids include:

> conveyors such as roller conveyors, elevating conveyors, belt conveyors, screw conveyors, chutes, monorails or trolley conveyors

> cranes and hoists such as overhead travelling cranes, gantry cranes or jib cranes, mobile or fixed hoists, stacker cranes, industrial manipulators and articulating arms

> loading dock levellers

> turntables

> springs or gas struts, mechanical devices such as hand winches, hydraulic pumps, and battery powered motors

> forklifts, platforms trucks, tractor-trailer trains, tugs and pallet trucks

> lift tables, mechanical and hand stackers, lift trolleys, two-wheel elevating hand trucks, and vacuum or magnet assisted lifters

> glass panel, duct and plaster lifters.

Electrically operated scissor platform.

Using mechanical equipment, such as overhead cranes to lift and move very heavy objects eliminates the need to apply high force.

A vacuum operated lifting device can reduce the forces, awkward postures, and movements required to manually load products onto pallets.

Assistive devices

If the manual tasks cannot be eliminated by the use of mechanical aids, assistive devices can be used to reduce the manual effort required to complete the task.

Assistive devices are most commonly used in the health care sector and include:

> grab rails and pull ropes, slide sheets, pat slides, hoists for moving people, or other repositioning aids

> grab belts or walking frames (where a person is supported by one hand only)

> wheelchairs, hygiene chairs, bath trolleys, and shower trolleys

Other examples include:

> roller floors in airplanes and air-freight handling areas

> roller benches in airports, air skates, gravity feed roller frames

> ball transfers and tables

> mop bucket on wheels

> slings, hooks, jigs, suction handles

> trolleys, barrows, wheeled frames, skate boards and roller pallets.

Using a shower trolley eliminates many of the risks associated with bathing patients.


C. Alter the nature of the item used

Selecting and correctly using items that are designed to assist in performing the manual task will minimise the level of muscular effort required for effective use. This includes mechanical aids and assistive devices.

Items used in manual tasks should be:

> designed and selected specifically to allow the manual task to be performed safely, comfortably, accurately and efficiently

> suited to the environment in which the task is performed

> supported by a maintenance program to ensure they are safe and that the required effort to use them is kept at the lowest possible level

> adjustable to accommodate a range of users

> used correctly by workers (ensure that training and supervision is provided).

There may be more than one source of risk associated with a manual task. When considering hand tool use, the design of the work station should also be evaluated, for example, work surface height, product orientation and work techniques. These may cause problems even when a properly designed hand tool is used. Make sure space is provided for the range of movement needed for the tool and limbs of the worker using the tool. See **Controls, Section A – Alter the design and layout of the workplace** provides more information on workstation layout.

The following sections refer to hand tools – however, any item used during manual tasks should be designed and selected with these risk controls in mind.

In most instances items are purchased from suppliers and the guidelines below are useful in selecting tools at the time of purchase.

Hand Tool Selection

Hand tools should be selected if they:

> can be held in a neutral wrist or handshake position

> allow the hand to retain a comfortable grip span

> can be used by the worker in one hand

> are well-balanced (the heaviest part of the tool should be behind the wrist)

> are suitable for use by either hand

> provide a good grip surface

> prevent a worker from adopting a pinch grip with high force or for prolonged periods

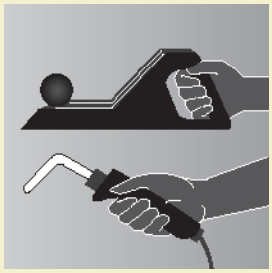
Minimise the level of muscular effort needed, particularly of the shoulder and wrist, to use hand tools by:

> using power tools where possible

> suspending heavy tools where they are used repetitively and in the same place

- counterbalancing heavy tools that are used repetitively and need to be kept away from the body
- using trigger locks where the grip has to be sustained for more than 30 seconds
- holding the work piece in place with either jigs or fixtures
- selecting tools that produce the least amount of vibration
- reducing impact shocks
- limiting torque or 'kick back' reactions.

More information on selecting or modifying items used in manual tasks can be found in Appendix 3A.



Select tools that can be held with a neutral wrist or in a handshake position with the hand adopting a comfortable (not too open or too closed) grip. Orient jigs and fixtures holding the workpiece so that the wrist does not have to bend.

Excessive bending of the wrist is required to use this tool.

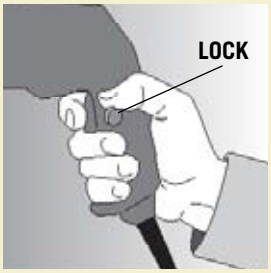
Modifying the tool eliminates the awkward wrist posture.

Select tools that are suited to the task, such as long handled saws when pruning trees.

The heaviest part of this brush cutter is located behind the wrists and the weight is supported by a harness.

An overhead suspension system reduces the forces required to use the iron.

The handles should be cylindrical or oval and designed for a power grip so the hand can wrap round the handle.



Powered hand tools with no locking require sustained application of force on the trigger. A locking switch eliminates the need to maintain force on the trigger and allows a better grip.

D. Alter the working environment

Controls for the thermal environment

Controlling exposure to cold conditions

For workers working in cold conditions:

> make sure that workers take regular rest breaks in a warm place

> ensure that workers wear clothing that is fitted and not too bulky or restrictive

> ensure that workers wear personal protective equipment selected for the task (for example, gloves should provide protection from the cold and also allow a good grip of the objects being handled)

> ensure that workers wear non-slip footwear

> ensure that floors are not slippery.

Controlling exposure to heat and humidity

For workers working in hot and humid conditions reduce temperature and humidity during manual tasks where possible by:

> relocating work away from sources of heat

> providing fans or air conditioning

- using screens, awnings, and clothing to shield workers from radiant heat sources such as ovens, furnaces and the sun
- enclosing hot processes and increasing ventilation
- altering work schedules so that work is done at cooler times
- providing a cool, well-ventilated area where workers can take rest breaks.

Minimise the risk of heat stress and heat exhaustion during manual tasks by:

- providing opportunities for workers who are not used to working in hot conditions to acclimatise, for example, job rotation and regular rest breaks
- ensuring that workers work at a sensible pace
- providing a supply of cool drinking water.

Windy conditions

Minimise the risk of exposure to windy conditions by:

- planning the route of work through protected pathways
- using vehicles to transport items in outdoor conditions
- coordinating tasks during low wind conditions.

Controlling vibration from machinery and tools

Measures to eliminate or minimise exposure to vibration consist of controlling:

- vibration at the source
- the path of the vibration
- the vibration received by the worker.

Appendix 3B provides more detailed information on design factors and controls that can eliminate or minimise exposure to vibration.

Select and maintain floor surfaces, ramps and steps suitable to the work, remove contaminants on floors, and provide adequate housekeeping and cleaning

Uneven, slippery or sloping floor surfaces, or surfaces that increase friction such as carpets, sand, grass, and gravel, may add to the level of exertion required to perform manual tasks, for example, pushing trolleys. Additionally, floors, ramps and steps that are not maintained can lead to unpredictable movements or slips, trips and falls.

Keeping work areas clean, tidy and free of clutter or obstacles prevents workers from adopting awkward postures and reduces the level of exertion that may be required to reach over or around obstacles. It may also prevent slips, trips and falls which may add to the risk of MSD.

Provide lighting suited to the task

Lighting should be selected to suit the task being performed. The suitability of lighting will be influenced by the existing light in the work environment and the visual ability of the person performing the task.

Lighting characteristics which should be considered include:

> illumination levels

> direction of lighting relative to the manual task

> reflection

> glare

> colour.

To prevent awkward or sustained postures that may arise from low or excessive levels of lighting, glare or reflection:

> provide additional lighting, such as a lamp on a movable arm, where required

> improve the layout of existing lights by lowering or raising them or changing their position in the work area

> increase or decrease the number of lights

> change the diffusers or reflectors on existing lights

> change the lights to improve light levels or improve colour perception

> change the orientation or position of the item to avoid shadows, glare or reflections

> clean lights and light fittings regularly

> use screens, visors, shields, hoods, curtains, blinds or external louvers to reduce reflections, shadows and glare

> control natural light sources (particularly bright sunshine) on work pieces, screens and work surfaces by orientation and placement at 90 degrees to the source and/or by providing screening and louvers.

E. Alter the way work is organised and alter work practices

Alter work practices

When risks cannot be eliminated or minimised through the controls listed above, work practices should be altered to minimise risks.

Select the best working position

Determine the most appropriate working position by considering:

> the tasks performed and their demands

> the frequency and duration of the tasks

> the items used in the manual task

A seated work position is best for:

> work that requires fine manipulation or accurate control or placement of small objects

> prolonged work in the same positions

> light manual work

> close visual work that requires prolonged attention – for example, prolonged keyboard work, screen and display monitoring, or electronic assembly

> work that involves operating a foot pedal.

A standing work position is best when:

> large, heavy or bulky loads are handled

> forceful movements are used

> the tasks involve reaching

> movements away from the working position are frequent

> there is no knee room

> there is limited space.

Consider the range of tasks being done over a day and ensure that tasks involve a mixture of seated and standing activities, as well as some walking.

Alter load handling methods

The system of work can be altered to reduce risk of MSD. You can:

Modify the handling task

Where it is not feasible to use mechanical aids or assistive devices, redesign the task by:

> modifying the weight, size and shape of the load

> reducing the amount of loading and unloading by using mobile racks for pallets, containers or trays

> transferring loads at the same level

> promoting pushing, pulling, sliding or rolling suitable loads instead of lifting or carrying them.

Promote symmetry in handling or balanced loading

Ensure that stresses on the discs and back muscles are distributed as evenly as possible on both sides of the body by:

> providing suitable handholds for loads which have to be held or carried at the side of the body

> improving packaging and providing attachments to assist hand grip for off-centred loads.


Adjust procedures for manual tasks in workplaces that constrain movement

Where possible, ensure that:

> the worker can stand up straight

> the size and shape of the load is reduced when there is limited head room

> access ways are suitable both for the size and shape of the load and for mechanical aids used to handle loads

> the space available between shelves is suitable for the size and shape of the load.

Adjust procedures for manual tasks performed in a seated position

When a worker needs to perform a manual task in a seated position:

> reduce the load size, shape and weight where possible, for example, design the tasks so one item is collected at a time rather than two

> place loads as close to the worker as possible to avoid bending, reaching, or lifting with the object away from the body

> provide a swivel-seat so the worker can move a load without twisting their trunk

> encourage workers to slide objects rather than lift loads while seated.

Improve the storage of loads

Where possible:

> store commonly used items or frequently moved loads at knuckle height

> store light or infrequently used items above shoulder height or close to the floor

> provide an intermediate surface so the worker can rest the load if the object must be lifted from a low to a high position.

Storing heavier and frequently used items at waist level eliminates the need for repetitive or forceful lifting of items from below mid-thigh or above shoulder height.

A self-adjusting base in the laundry tubs reduces the need for bending, twisting and reaching during unloading.

A simple trolley removes the need to reach into the cupboard and lift the container while in a bent and awkward posture.

Change the location of loads

Reduce the distance that loads need to be carried and reduce double handling by:

> locating storage areas close to work areas

> stipulating to suppliers where loads are to be delivered

> ensuring that components required to complete a task are in one location, for example, prepare and pack on the same work bench.

Alter work methods for pushing and pulling

If a hazardous manual task involving the handling of loads cannot be eliminated, or the risks cannot be eliminated or minimised (through mechanisation or altering the nature of the load or the design of items used to handle the load), then you may need to alter the way items are pushed or pulled.

Reducing the effort required to start the load in motion

> use motorised push/pull equipment such as tugs, gzunders, electric palate jacks

> position trolleys with wheels in the direction of travel

> use large power muscles of the legs and whole body momentum to initiate the push or pull of a load.

Reducing the effort to keep the load moving

The amount of force required to keep a load moving can be reduced by:

> using hand trucks and trolleys that are as lightly constructed as possible, have large wheels or casters that are sized correctly and roll freely

> using hand trucks or trolleys that have vertical handles, or handles at a height of approximately 1 metre

> ensuring that hand trucks and trolleys are well maintained

> treating surfaces to reduce resistance where loads are slid

> for **pushing,** ensuring handles allow the hands to be positioned above waist height and with elbows bent close to the body

> for **pulling,** ensuring handles allow the hands to be positioned below waist height

> allowing workers to adopt a standing position rather than being seated so the whole body can be used.

A trolley can eliminate many of the risks involved in manual handling, however, the load will still need to be manoeuvered onto the trolley and through the workplace.

Reducing the effort needed to stop the load

The effort required to stop loads can be reduced by:

> indicating the place where loads need to be delivered

> planning the flow of work

> encouraging workers to slow down gradually

> fitting brakes and speed limiters so speed can be controlled, particularly if there is a need to stop quickly so as to avoid other traffic.

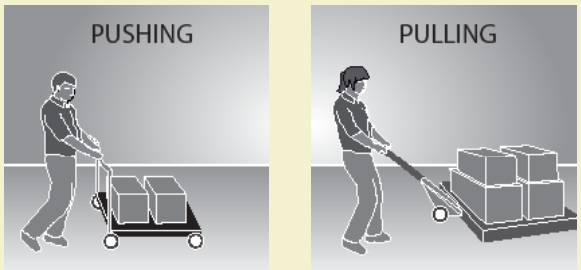
Improve workplace layout

Reduce the distance required to push or pull loads by improving workplace layout to relocate items closer to where they will be used.

Choose appropriate floor surfaces, maintain floor surfaces, remove contaminants on floors, and provide adequate housekeeping and cleaning so as to reduce the effort required to move loads through the workplace.

Pushing versus pulling

Pushing loads is preferable to pulling because it involves less work by the muscles of the lower back, allows maximum use of body weight, uses less awkward postures and generally allows a forward facing posture to be adopted, providing better vision in the direction of travel.



Pushing loads is preferable to pulling.

Use team handling as an interim control

Team handling should only be used in emergency situations or as a temporary interim control. Team handling should be used only where equitable sharing of the load, and handling in symmetric forward facing postures for the duration of lift, carry and set down can be ensured.

Team handling brings its own risks and requires coordination. Manual tasks should be redesigned to allow the use of mechanical equipment, or eliminate the need to lift, if there is a regular need for team handling.

Team lifting can increase the risk of MSD if:

> the load is not shared equally

> workers do not exert force simultaneously

> individual workers need to make foot or hand adjustments to accommodate other team members, reducing the force each can exert

> performed on steps or on a slope where most of the weight will be borne by handlers at the lower end

> individual workers unexpectedly lose their grip, increasing or changing the balance of the load on other team members.

Whenever team handling is used, it is essential to match workers, co-ordinate and carefully plan the lift. Make sure:

> the number of workers in the team is in proportion to the weight of the load and the difficulty of the lift

> one person is appointed to plan and take charge of the operation

> enough space is available for the handlers to manoeuvre as a group

> team members are of similar height and capability where possible

> team members know their responsibilities during the lift

> training in team lifting has been provided and the lift rehearsed, including what to do in case of an emergency

> aids to assist with handling (a stretcher, slings, straps, lifting bars, lifting tongs, trolleys, hoists) are used where possible and training is provided in their use.


Alter methods for working with tools and equipment

Use of vibrating tools

Appendix 3B details the manner in which items can be designed to eliminate or minimise the exposure to vibration.

Alter work organisation

Alter work organisation to allow workers sufficient time to recover from manual tasks that involve:

> repetitive awkward postures or sustained postures for long durations

> application of high force

> vibration

> high levels of mental demand combined with manual tasks, for example, inspection work.

Insufficient recovery time may result in workers becoming fatigued. Fatigued workers are less able to generate muscular force, tend to be less coordinated, tend to be more prone to errors and are therefore more likely to sustain an injury.

Work arrangements can be changed to allocate designated breaks or rotate workers to alternative duties that have different task demands, allowing specific body parts to rest and recover. For example, alter work arrangements to allow workers to move from using fine hand movements in assembly tasks to whole arm or whole body movements in tasks such as packing, to productive rest tasks such as checking, inspections or supervision.

Alter the pace of work

Work pacing should accommodate the physical demands of the manual task. Workers should not have to work at a rate that is at the limit of their ability. When a work rate needs to be established, employers must consult with health and safety representatives and the workers concerned.

Set realistic work rates by:

> allowing workers to work at their own pace for critical or physically demanding tasks

> providing adjustability in the line speed, for example, reduce the speed when conditions are altered, such as when new products are introduced or poor quality materials are used

> providing opportunities for workers to resupply materials or components, or to carry out basic inspection activities.

The flow of work may vary between workers over time. Provide buffers for:

> workers on an assembly line or who are machine paced to allow material to be taken off-line, for example, ‘holding’ bins or benches off the main processing conveyor

> inspectors or workers in positions where the time to perform a task can vary.

Alter the flow of work

Exposure to risk of MSD from manual tasks can be eliminated or reduced by organising work to minimise multiple handling. Steps taken to improve work flow are likely to improve efficiency and product quality.

The supply of products and raw materials, the processing, the packing, and the distribution are often critical steps within many jobs. Where possible, the flow of work should be improved by:

> having raw materials delivered, located or transferred by non manual means, to the location or work area where they will be used, for example, building supplies should be delivered to the on-site location they will be used at or to the external lift rather than being delivered to the front gate

> delivering materials, tools and items on mobile systems, for example, on roller palettes

> processing and packaging items in the same location or on the same workbench

> locating storage areas close to distribution areas

> using just-in-time systems which minimise the need for storage and additional handling

> asking suppliers to deliver products, items or tools in a way that allows them to be used without the need for additional handling, for example, flat packs delivered on a vertical frame or table tops facing the right way up for use.

Allow for task variation

Undertaking repetitive tasks and completing different tasks with similar physical demands and actions can lead to fatigue in those muscles used. In addition to providing adequate rest breaks, consider:

> combining two or more tasks so both are done by one worker and alter the workstation and items used accordingly

> combining a series of tasks to increase the work cycle time for each worker to allow a wider variety of movements and more time between repeated movements

> frequently changing tasks by rotating workers through tasks with different demands, for example, tasks with different actions and movements which use different muscle groups

> alternating workers between different tasks where it does not upset other work procedures

> providing short breaks doing another task when the job is monotonous

> allowing workers to seek assistance from another person when necessary.


Alter workloads

Reduce the likelihood of fatigue and injury by:

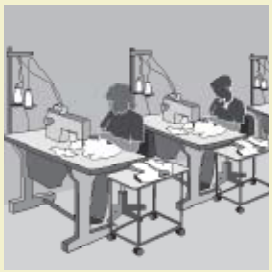
> arranging staff levels so there are workers available to complete tasks within deadlines or at peak periods

> preparing work in advance for those times when deadlines become urgent

> scheduling work to avoid recurrent deadlines

> planning resources and organisation of tasks to prevent increased risks during these peak periods, and

> rearranging materials flow around the worksite or between different parts of the work process, to smooth out peaks and troughs in workloads and reduce multiple handling.



The work rate for high volume production and processing should not extend employees to their physical limits.

Provide adequate rest breaks

Regular rest breaks provide opportunities for workers to prevent the build up of, or recovery from the effects of, fatigue in muscle groups that are used during manual tasks that involve:

> repetitive awkward postures or sustained postures

> application of high force

> vibration

> long duration

> high levels of mental demand combined with manual tasks, for example, inspection work.

The frequency and the duration of rest breaks will be dependent on the nature of the task – generally, the greater the force required, or the longer a posture sustained, the greater the amount of time required to recover.

Note that tasks (or a number of tasks that are similar in nature – that is use the same muscle groups) that are longer in duration than 2 hours in a working day, are a particular source of risk. Ensure that rest breaks, task variation and job rotation (referred to below) prevent fatigue or allow workers adequate time to recover from the build up of fatigue from performing manual tasks for long durations.

More frequent and shorter rest breaks are better for rest and recovery than fewer, longer breaks. Short five to ten minute breaks could be built into task rotation arrangements where work is of a similar nature, for example, process production or hand tool use. Micro-pauses, that is very short intermittent breaks in physical activity, are also beneficial and should be built into the design of tasks and methods of work, for example:

> workers are trained to put down hand tools or release them (suspension) between operations

> keyboard operators remove hands from keyboards during natural keying breaks.

Alter shifts and rosters

Long working shifts and shift patterns can reduce recovery time and increase exposure to risks of MSD.

Arrange:

> shift lengths

> the levels of overtime

> placement of rostered days off, and

> the numbers of workers during peak periods.

to allow for adequate recovery time and to reduce exposure to risks of MSD.

You will need to take into account the physical demands of the manual tasks being performed.

Reduce likelihood and impact of physiological changes in the body that increase muscle tension and may increase the risk of MSD

To reduce the likelihood of physiological changes:

> ensure that workloads and deadlines are achievable

> ensure that work performance criteria are clear and achievable

> give and receive feedback about work requirements and performance standards and acknowledge good work performance

> provide guidance for dealing with conflict in workplace relationships

> allow workers some latitude to influence workload, work methods and changes in the workplace

> ensure workers are consulted about their work and work methods and any changes you intend to make to work arrangements

> ensure workers are provided with training about new or changed tasks so that they know how to perform the tasks safely and are clear about their role.

Provide training when working arrangements are altered

Training is an important supplement to the control process. It allows new equipment to be used, or newly-introduced work processes to be adopted in the manner intended that eliminates or minimises the risk of MSD. Make sure:

> training specific to the task is provided

> workers are allowed a period of time to consolidate their learning to reach their optimum capacity

> training is updated when new tools, equipment or methods have been introduced.

Keep in mind that adults may find it difficult to change the way they carry out a task once habits have been established. You will need to provide support and refresher training over time to reinforce new procedures.

Do not use training as a control in itself or as a substitute for job or task redesign. Reliance should not be placed on expecting people to work safely at all times in a hazardous environment.

Example : Pushing a trolley of metal components

Controlling risks

The risk of MSD from a hazardous manual task must be controlled by addressing the sources of risk.

Bob, Connie and Vinh's employer has now to decide how to eliminate or minimise the risk as far as reasonably practicable by identifying and selecting risk controls that address the sources of the risk.

Step 5: Is the task necessary?

The task could be eliminated by:

> installing a conveyor between the assembly area and the packing area (eliminates pushing the trolley as well as the need to load the trolley in the assembly area and to unload the trolley at the packing area. This second task exists only as part of getting the product from the assembly area to the packing and creates unnecessary handling).

Step 6: Can the risk be eliminated or reduced?

The task can be redesigned or the sources of risk eliminated or minimised by:

A. Altering the design and layout of the workplace:

> changing the workplace layout so that the assembly area is closer to the packing area (reduces the risk).

B. Altering the nature of the load handled:

> reducing force needed to move the trolley by reducing the weight of the loaded trolley, for example, by halving the number of components placed on the trolley (reduces the risk through decrease in force required).

C. Altering the nature of the items used

> using an electric tug, pedestrian forklift or other powered device to move the trolley from the assembly area to the packing area (reduces the risk by eliminating the high force, but introduces possible risks from introducing mechanised plant into a corridor used by pedestrians).

> installing brakes on the trolley to reduce the force needed to stop it (reduces the risk of exerting high force in stopping, but does not affect high force needed to get the trolley to move or to turn).

> increasing the diameter of the wheels on the trolley to reduce the force needed to turn and push it (reduces the risk by reducing the force needed to get the trolley to move).

D. Altering the working environment

> fix and smooth the floor surfaces (reduces risk by reducing forces required to push the trolley).


E. Altering work organisation and work practices

> redesigning the task so that the trolley does not have to be turned through 90 degrees at the start of the push (reduces the risk by reducing the number of high force exertions needed to move the trolley).

> making another person available to help the user push the trolley (reduces the risk).

> rotating the trolley-pushing task between a number of employees on each shift to reduce the number of times each person does the task over a shift, but on its own does not actually reduce the risk present each time the task is done.

Step 7: Other methods to control the risk

Their employer will need to provide information, training, instruction and supervision when any changes are made to the way the task is performed, including changes to layout, object and items, the working environment or the work organisation and procedures, to ensure that the workers affected by the changes can work safely.

However, their employer and the health and safety representative agree that information, training, instruction, supervision, or a combination of these cannot be effective if used as the SOLE means of controlling the risk.

Step 8: Selecting risk controls.

Once the employer and health and safety representative have identified options for controlling the risk, the most appropriate control must be selected.

Steps 5 to 7 indicate the preferred order of risk controls, however, the employer must do what is reasonably practicable in the circumstances to eliminate or minimise the risk of MSD.

A number of factors need to be taken into account when determining what is reasonably practicable:

The likelihood of and severity of harm to workers:

Because the task involves the application of high force, any employee assigned to this task is very likely to develop a MSD. Bob has already been diagnosed with MSD, and Connie's report of ongoing pain indicates that she may also be suffering from MSD of the back.

State of knowledge about the risk and ways of eliminating it or controlling it:

Their employer contacted a competitor and found that they had introduced a conveyor because employees performing a similar task were reporting similar symptoms. The competitor has had two expensive workers compensation claims as a result of using trolleys in a similar manner (on average, MSD of the back is more severe and costly than other types of MSD).

Availability and suitability of options to control the risk*:*

Installing a conveyor is the most effective way to control the risk. A conveyor has the added benefit of eliminating the need to load and unload the trolley – tasks that are also likely to involve MSD risks.

However, their employer had been told by other employers in the same industry that the plant had to be ordered from overseas and took 3 to 4 months to arrive. They spoke to the available suppliers, who confirmed that the conveyor would not be available immediately.

Changing the workplace layout, including smoothing the concrete floor, together with changing the systems of work would reduce the risk substantially but would not eliminate it. The employer found that both of these changes were used in the industry and would be suitable for the situation in this workplace, but each would take some time to set in place fully in this workplace.

In the meantime, the systems of work could be altered to reduce the force needed to turn, steer and brake the trolley. The position of the trolley at the assembly area could be changed, and the load reduced. Cracks in the floor surface could be filled to further reduce the force required to push the trolley. The task could also be shared by two employees pushing together, so that each has to exert less force. These intermediate solutions could be implemented quickly and easily.

Cost of eliminating or reducing the risk:

The costs of installing the conveyor are substantial, but the benefits would be high, as the task of pushing the trolley (and therefore the risks associated with it) would be eliminated. In addition, installing a conveyor would eliminate the need to load and unload the trolley and the risks involved in it, making the transfer of stock to the packing area more efficient, and relieving congestion in the corridor. The floor would not have to be altered.

The costs of changing the workplace layout to bring the packing and assembly areas closer together are also considerable, though less than installing a conveyor. The risk would not be reduced substantially by these changes alone – even though the trolley would not have to be pushed as far, high forces would still be needed to start and stop it. The trolley would still need to be loaded and unloaded, and these tasks are likely to pose a risk of MSD. Changes to the floor and staff rotation would still need to be made. This would reduce the costs, but the benefits would similarly be reduced.

Changes to work organisation and work practices could also reduce the risk. Changing rotation rosters would reduce the overall risk for the three employees involved, however, other employees would also be at risk. Assistance with pushing would result in reduced force, but would interrupt other work. The direct cost is negligible and such changes could be implemented immediately until the structural or conveyor changes are made.

Step 9: Implementing risk controls

Their employer and the health and safety representative agreed that the best solution was to modify the conveyor and extend it to the packing line, since this will also control a number of other risks. Implementing this risk control will take 3 to 4 months. Their employer ordered the conveyor extension.

Until the conveyor changes are made, interim risk controls will be used. These can be introduced immediately, and include allocating another employee to assist Bob, Connie and Vinh, halving the loads, and redesigning the job so that the trolley doesn't need to be turned when loaded.

Next Step

The changes made to the workplace, work organisation and work practices need to be monitored and reviewed to ensure that they work effectively to control the risk of MSD, and to ensure that they don't introduce any new risks.

The employer, together with the health and safety representative checked how the interim changes were going with the employees and if any more interim changes were needed.

The employer added reminders to their diary to check with the supplier of the conveyor at regular intervals so that this long-term control measure would not be forgotten once the interim controls were introduced. Once the date of supply had been confirmed, the employer arranged for installation over a weekend so that the assembly and construction activities did not pose a risk for employees and caused as little disruption to production as possible. A way of reporting issues and risks was arranged as well as a regular check on, and discussion about, how the new system was working.

6.5 Monitor, review and keep records

Step 10: Evaluate, review and keep records

Evaluation and review

Monitoring and reviewing the risk control measures you have implemented helps you determine their effectiveness. Start by checking that all the actions planned have been carried out. You also need to:

> check to see that the risk controls are working successfully and are being used correctly. The tasks should be easier to perform now.

> look at the task in action to see whether the initial risk factors have been minimised as you intended

> make sure that a change introduced to solve one problem has not created difficulties elsewhere, and

> make sure that the changes are properly evaluated by people who do the job. If new problems have occurred, or if there has been change to the work requirements or equipment used, then conduct a further risk assessment.

Review is an ongoing process. Consult with your workers and supervisors regularly. It is helpful to observe work activities during walk through surveys and to monitor injury reports to ensure problems have been resolved.

Record keeping

Keeping records of the hazard identification, risk assessment and risk control processes will help you demonstrate that you have been actively working to ensure that risks of MSD from performing manual tasks issues are being managed.

Keeping these types of records will:

> maximise the effectiveness of the process by helping you to keep track of what you have done and are planning to do, and

> ensure that you don't revert to the old 'unsafe' procedure in the future by keeping track of **why** you changed the task.

The hazard identification and risk assessment tools provided with this Code of Practice will enable you to keep accurate and relevant information.

Glossary

designer means a person who has control over the design, re-design or alteration of:

a. an item or

b. a building or structure used as a place of work.

hazard means any thing (including an intrinsic property of a thing), or situation, with the potential to cause or contribute to the development of a musculoskeletal disorder to workers performing manual tasks. It may include the type of work performed, the way the work is performed including the use of, or handling of, items or a combination of both these factors.

hazardous manual task means:

a. a manual task having any of the following characteristics:
   - repetitive or sustained application of force
   - repetitive or sustained awkward posture
   - repetitive or sustained movement
   - application of high force, or
   - exposure to sustained vibration

b. a manual tasks involving the handling of a person or an animal or

c. a manual tasks involving the handling of unstable or unbalanced loads or loads which are difficult to grasp or hold.

health and safety representative means a person elected to represent a group of workers on health and safety issues.

item subject to the scope of duties for designers, manufacturers and suppliers as outlined in part 2, includes the following:

a. plant

b. substance

c. building or structure used as a place of work.

Note: An item may also be described in some jurisdictions as materials, packaging, containers, fixtures, fittings, tools, implements, instruments, machinery or electronic equipment. The above definition may include such items where they are relevant in managing the risks posed by a hazardous manual task as defined in this Code of Practice.

manual task means a task comprised wholly or partly by any activity requiring a person to use his or her musculoskeletal system in performing his or her work, and can include the use of force for lifting, lowering, pushing, pulling, carrying or otherwise moving, holding or restraining any person, animal or item.

manufacturer means a person who has control over the making or construction of:

a. an item, or

b. a building or structure used as a place of work.

musculoskeletal disorder (MSD) means an injury or disease of the musculoskeletal system that arises in whole or in part from undertaking manual tasks in the workplace, whether occurring suddenly or over a prolonged period of time. For the purpose of this Code of Practice it does not include an injury or disease which is caused by crushing, entrapment or cutting resulting from the mechanical operation of plant or equipment.

Note: Musculoskeletal injuries and disorders include traumatic damage or a wide range of inflammatory and degenerative conditions affecting the tissue of the body including, but not limited to, the muscles, tendons, ligaments, nerves, connective tissue, joints, and supporting blood vessels.

person includes companies and corporate entities such as a body corporate, unincorporated body or association and a partnership.

supplier means a person who has control over the supply, importation or re-supply of:

a. an item, or

b. a workplace.

person with control means:

a. a person with control of the work such as an employer

b. a person with control of the workplace, such as an owner of a workplace

c. principal contractors, a self-employed person or persons, a person who conducts a business or an undertaking, or a person who has management or control of a business or workplace

and does not include

d. workers, employees and supervisors.

Note: 'person with control of work or a workplace' are expressed and applied in differing manners across jurisdictions. Each jurisdiction may adopt their own expression when implementing the *National Standard for Manual Tasks (2007)* and this National Code of Practice.

reasonably practicable means what can be done and which is reasonable in the circumstances taking account of:

a. the probability (likelihood) of the hazard or risk occurring

b. the degree of harm arising from the hazard or risk

c. the state of knowledge about the hazard or risk and ways it may be removed or mitigated

d. the availability and suitability of ways to remove or mitigate the hazard or risk, and

e. the cost of removing or minimize the hazard or risk.

Note: 'reasonably practicable' is expressed and applied in differing manners across jurisdictions. Each jurisdiction may adopt their own expression when implementing the *National Standard for Manual Tasks (2007)* and this National Code of Practice.

risk means the likelihood of a manual task causing musculoskeletal disorders to workers and the likely severity of those musculoskeletal disorders should they occur.

risk control means a method to manage the risks posed by a hazard by eliminating the risks or, if this is not reasonably practicable, minimising the risks of musculoskeletal disorders so far as reasonably practicable.

system of work includes any of the following:

a. work processes

b. work practices

c. work methods.

use means the act of interacting with any item, system of work, or workplace in the course of performing a manual task.

work means any activity (physical or mental) carried out in the conduct of a business, an organisation, a trade, or a profession, regardless of whether or not:

a. remuneration is offered for the activity, or

b. the business is conducted for profit.

worker means an employee or a person who is undertaking work under a contract of employment, an apprenticeship, a traineeship, or other contract of service which may include work experience placements.

workplace means any place where a worker carries out work.

Note: A workplace is not limited to a building or structure. For example, a vessel used for teaching members of the public to scuba dive or a vehicle supplied by an employer for use by a worker in performance of work may be a workplace.

Appendix 1A Hazardous Manual Tasks Identification Worksheet

Work area:

Management representative:

Health and Safety representative and workers taking part:

Date:

Does the task have any of the characteristics of a hazardous manual task? (tick any of the following that apply)

Task	Repetitive or sustained application of force	Repetitive or sustained awkward posture	Repetitive or sustained movement	Application of high force	Exposure to sustained vibration	Handling loads that are unstable, unbalanced or difficult to grasp
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

If you ticked any boxes for a particular task, you must do a risk assessment of that task.

You must also identify hazardous manual tasks whenever changes occur or are planned in the workplace, or new information or reports of MSD are brought to your attention (see Section 6.1).

Appendix 1B Discomfort Survey

A discomfort survey can help identify hazardous manual tasks. Early reporting of symptoms can lead to risk controls being put in place before injury occurs.

The survey sheet below will help you identify and record instances where workers experience discomfort that:

> persists, or

> re-occurs the next day, or

> persists after rostered days off.

Encourage workers to report pain or discomfort at work or at any other time. Follow up the reasons for the problem. Even if only one worker reports problems, assess the presence of a risk factor.

Name (optional) _____

Date _____

Job work location _____

Tasks involved _____

Time on this job: Less than 3mths ☐ 3mths to 1 yr ☐ 1 to 5 yrs ☐

Supervisor _____

1. Do you suffer from swelling, numbness, tingling, 'pins and needles' stiffness, aches and pains in any part of the body? Indicate in the diagrams where the problem occurs.

2. Rate the level of discomfort/pain on a scale of 1 to 5

1. ☐ Just noticeable
2. ☐
3. ☐ Moderate
4. ☐
5. ☐ Unbearable

3. What do you think caused the problem?

_____

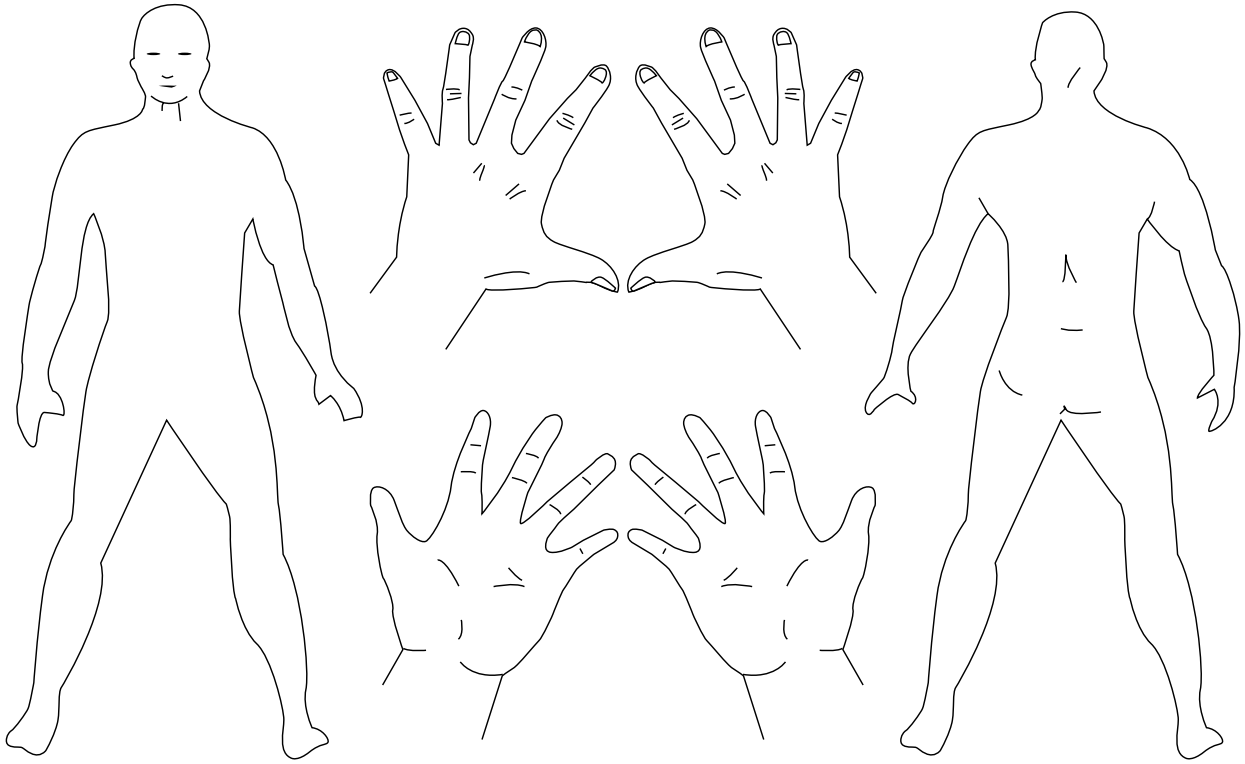
_____

_____

_____

_____

_____



Appendix 1C Risk Assessment and Risk Control Form (ASSESSING & CONTROLLING RISKS FROM MANUAL TASKS)

Assessment details

Date of assessment:	
Description of manual task:	
Location of task:	

Persons doing assessment

Work area management rep:	
Work area H&S rep:	
Others (employees, consultants):	

Reason for identification

☐ Existing task	☐ Change in task, object or tool	☐ Report of musculoskeletal disorder (MSD)
☐ New task	☐ New information	☐ Change in the workplace/work environment

The *National Standard for Manual Tasks (2007)* requires duty holders to assess the risk of any hazardous manual tasks found in the workplace and put effective measures in place to:

> prevent injury by eliminating the risk
> where elimination is not reasonably practicable, reduce the risk of injury as much as is reasonably practicable.

How to use this worksheet

Follow the worksheet step by step and refer to the *National Code of Practice for the Prevention of Musculoskeletal Disorders from Performing Manual Tasks at Work (2007)* (COP) as indicated on the worksheet to:

> assess tasks in the workplace involving hazardous manual tasks and determine the sources of risk – **Refer COP Sections 6.3**
> list appropriate risk control measures – **Refer COP Sections 6.4**
> implement those measures – **Refer COP Sections 6.4**.

You are required to consult with the relevant health and safety representatives and, where possible, also involve the employees who do the tasks, when assessing the tasks and planning and introducing risk controls.

This worksheet and the Code of Practice can be downloaded from the ASCC website at www.ascc.gov.au

Record your assessment! – It is recommended that you retain your risk assessment if it shows a risk of injury.

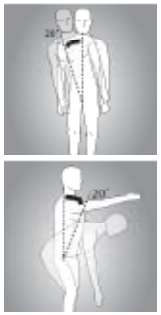
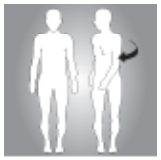
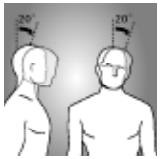
Control any risk! – This worksheet provides general guidelines only. Some workers may still be at risk of injury because manual handling occurs in a variety of tasks and workplace situations, and injury may be caused by a number of factors. It is important, as far as is reasonably practicable, to control any risk you find.

Question 1 – Does the task involve repetitive or sustained postures, movements or forces?

Tick **yes** if the task requires any of the following actions to be done:

> repetitively (done more than twice a minute) OR

> sustained (done for more than 30 seconds at a time)

Postures and Movements	Page	Comments*	Describe any risk control options you have identified	Control Options (not exhaustive list)
Bending the back forwards or sideways more than 20 degrees  ☐	41			**Eliminate the manual task** > Automate or mechanise the task, especially repetitive functions > Modify operation or production method > Use bulk handling methods. **Alter the design and layout of the workplace (p 62)** > Ensure the equipment accounts for differences in worker size, shape and physical ability – i.e. adjustable or fixed to suit all workers > Ensure working heights are matched to the task and the worker > Ensure items are within reaching distance. > Place items where the person can be in a comfortable symmetrical posture when handling > Provide seating that matches the needs of the task and the worker – i.e. adjustable seating for multiple workers > Reposition items that workers are required to look at.
Twisting the back more than 20 degrees  ☐	41			
Any visible backward bending  ☐	41			
Bending the head forwards or sideways more than 20 degrees  ☐	41			

Postures and Movements	Page	Comments*	Describe any risk control options you have identified	Control Options (not exhaustive list)
Any visible bending of the head backwards ☐	41			> Use fixtures/jigs to orientate the item worked on by the worker > Provide arm supports for precision work. **Alter the nature of the load handled (p 64)** > Alter the size or shape of the load. **Alter the items used (p 70)** > Use power tools > Ensure tools are suitable for the task > Ensure tools orient the arm, hand and wrist in a power grip position. **Alter the working environment (p 72)** > Ensure visual requirements are not too demanding by providing breaks, better lighting > Provide visual aids > Ensure lighting is suitable to task demands – i.e. task lighting for fine, manipulative work. **Alter the work organisation (p 74)** > Relocate equipment or items > Restructure task to minimize multiple handling > Remove machine or other pacing > Remove or monitor piecework schemes > Select the best working position for the type of work being undertaken.
Twisting the neck more than 20 degrees  ☐	41			
Working with one or both hands above shoulder height  ☐	41			
Reaching forward or sideways more than 30cm from the body ☐	41			
Reaching behind the body  ☐	41			
Squatting, kneeling, crawling, lying, semi-lying or jumping  ☐	41			

* Describe what the person is doing – e.g. hand operation of drill 10 times per minute, performed 3 hrs per day, five days a week

What are the sources of risk? Describe any aspect of the design and layout of the workplace, the nature of the load handled, the nature of the item used, the working environment, the work practices or work organisation that may have caused you to tick a box.

Postures and Movements	Page	Comments*	Describe any risk control options you have identified	Control Options (not exhaustive list)
☐ Standing with most of the body's weight on one leg	41			
☐ Twisting, turning, grabbing, picking or wringing actions with the fingers, hands or arms 	41			
☐ Working with the fingers close together or wide apart  	41			
☐ Very fast movements	41			
☐ Bending of the wrist beyond the angles indicated on page 40 of the Code of Practice 	41			

* Describe what the person is doing – e.g. hand operation of drill 10 times per minute, performed 3 hrs per day, five days a week

What are the sources of risk? Describe any aspect of the design and layout of the workplace, the nature of the load handled, the nature of the item used, the working environment, the work practices or work organisation that may have caused you to tick a box.

Forces	Page	Comments*	Describe any risk control options you have identified	Control Options (not exhaustive list)
Lifting, lowering or carrying ☐	43			**Eliminate the manual task** > Automate or mechanise the task, especially tasks that are repetitive > Modify operation or production method > Use bulk handling methods. **Alter the design and layout of the workplace (p 62)** > Provide a means for attaching mechanical aids for lifting to the load > Use jigs to hold or support the items > Alter the workplace so mechanical aids can be used and are accessible. **Alter the load handled (p 64)** > Reduce weight and dimensions of the load > Reduce the number of items handled at one time > Provide handles, handholds or cut-outs to improve grip > Reduce amount of manipulation required (use mechanical aids) > Modify the load so mechanical aids can be used. **Alter the items used (p 70)** > Use power tools > Ensure tools are suitable for the task > Use lightweight tools where possible > Use tool counterbalances.
Carrying with one hand or one side of the body  ☐	43			
Exerting force with one hand or one side of the body  ☐	43			
Pushing, pulling or dragging  ☐	43			
Gripping with the fingers pinched together or held wide apart  ☐	43			

* Describe what the person is doing – e.g. hand operation of drill 10 times per minute, performed 3 hrs per day, five days a week
What are the sources of risk? Describe any aspect of the design and layout of the workplace, the nature of the load handled, the nature of the item used, the working environment, the work practices or work organisation that may have caused you to tick a box.

Forces	Page	Comments*	Describe any risk control options you have identified	Control Options (not exhaustive list)
Using a finger grip, pinch grip, or an open handed grip to handle a load  ☐	43			> Ensure tool handles fit workers comfortably > Maintain tools and equipment. **Alter the work organisation (p 74)** > Alter the method used to perform the task – i.e. push rather than pull and slide rather than lift > If gloves are used, ensure that they fit and are suited to the task > Provide rest or recovery breaks to prevent the onset of fatigue > Restructure task to minimize multiple handling.
Exerting force while in an awkward posture, for example, supporting items while arms or shoulders are in an awkward posture, or moving items while legs are in an awkward posture  ☐	43			
Holding, supporting or restraining any object, person, animal or tool  ☐	43			

Question 2 – Does the task involve long duration?

Tick **yes** if the task is done for:

	Page	Comments*	Describe any risk control options you have identified	Control Options (not exhaustive list)
More than 2 hours over a whole shift, ☐ OR Continually for more than 60 minutes at a time	43			**Alter work organisation (p 74)** > Increase variety of tasks over the whole day > Provide rest or recovery breaks to prevent the onset of fatigue > Implement task rotation.

Question 3 – Does the task involve high force?

Tick **yes** if the task involves any of the following actions:

High Force	Page	Comments*	Describe any risk control options you have identified	Control Options (not exhaustive list)
Lifting, lowering or carrying heavy loads ☐	45			**Eliminate the manual task** > Automate or mechanise the task, especially repetitive functions > Modify operation or production method > Use bulk handling methods. **Alter the design and layout of the workplace (p 62)** > Use foot pedals > Provide a means for attaching mechanical aids for lifting to the load > Use jigs to hold items. > Modify the workplace layout to ensure the movements of workers handling people are not constrained. **Alter the load handled (p 64)**
Pushing or pulling objects that are hard to move or are hard to stop (e.g. a trolley)  ☐	45			
Using a finger-grip, a pinch-grip or an open-handed grip to handle a heavy or large load  ☐	45			

* Describe what the person is doing – e.g. hand operation of drill 10 times per minute, performed 3 hrs per day, five days a week

What are the sources of risk? Describe any aspect of the design and layout of the workplace, the nature of the load handled, the nature of the item used, the working environment, the work practices or work organisation that may have caused you to tick a box.

High Force	Page	Comments*	Describe any risk control options you have identified	Control Options (not exhaustive list)
Exerting force at the limit of the grip span  ☐	45			> Reduce weight of the load > Reduce the number of items handled at one time > Provide handles, handholds or cutouts to improve grip. > Modify the load so mechanical aids can be used > Move animals to a place that constrains movement before commencing the task. **Alter the items used (p 70)** > Use power tools > Ensure tools are suitable for the task > Use lightweight tools where possible > Use tool counterbalances > Ensure tool handles fit workers comfortably > Maintain tools and equipment. **Alter the work organisation (p 74)** > Restructure task to minimize multiple handling > Reduce amount of manipulation required (use mechanical aids) > Alter the method used to perform the task – i.e. push rather than pull and slide rather than lift.
Needing to use two hands to operate a tool designed for one hand ☐	45			
Holding, supporting or restraining a person, animal or heavy object  ☐	45			
Exerting force with the non-preferred hand ☐	45			
Two or more people need to be assigned to handle a heavy or bulky load ☐	45			
During the application of high force, the body is in a bent, twisted or otherwise awkward posture  ☐	45			

* Describe what the person is doing – e.g. hand operation of drill 10 times per minute, performed 3 hrs per day, five days a week

What are the sources of risk? Describe any aspect of the design and layout of the workplace, the nature of the load handled, the nature of the item used, the working environment, the work practices or work organisation that may have caused you to tick a box.

High Force	Page	Comments*	Describe any risk control options you have identified	Control Options (not exhaustive list)
Applying force suddenly in response to unexpected forces (for example, when an animal suddenly moves) ☐	45			> If gloves are used, ensure that they are well fitted and are suited to the task > Provide adequate rest breaks to prevent the onset of fatigue > Reduce the effort require to start a load in motion by aligning wheels to the direction of travel > Control unpredictable movements, for example movements of animals by using physical constraints.
Hitting or kicking ☐	45			
Holding, supporting or restraining a person or animal likely to move unexpectedly ☐	45			
Throwing or catching ☐	45			
Jumping while loading a load ☐	45			

* Describe what the person is doing – e.g. hand operation of drill 10 times per minute, performed 3 hrs per day, five days a week

What are the sources of risk? Describe any aspect of the design and layout of the workplace, the nature of the load handled, the nature of the item used, the working environment, the work practices or work organisation that may have caused you to tick a box.

Tick **yes** if workers report any of the following about the task

High Force	Page	Comments*	Describe any risk control options you have identified	Control Options (not exhaustive list)
☐ The task can only be done for short periods	46			
☐ Pain or significant discomfort during or after the task	46			
☐ Stronger workers are assigned to do the task	46			
☐ Workers think the task should be done by more than one person, or seek help to do the task	46			
☐ Workers say the task is physically very strenuous or difficult to do	46			

Question 4 – Is there a risk?

Does the task involve repetitive or sustained postures, movements or forces, AND long duration?

☐ Tick **yes** if you ticked any boxes in Questions 1 and 2 — **The task is a risk. Risk control is required.**

Does the task involve high force?

☐ Tick **yes** if you ticked any box in Question 3 — **The task is a risk. Risk control is required.**

Question 5 – Are aspects of the work environment or the way work is organised increasing the risk?

Tick **yes** if the task involves:

Vibration	Page	Comments*	Describe any risk control options you have identified	Control Options (not exhaustive list)
☐ Hand-arm vibration 	48			**Eliminate the manual task** > Use remote controlled processes to isolate workers from vibration sources. **Alter the design and layout of the workplace (p 62)** > Isolate workers from vibration sources through the use of damping or suspension systems. **Alter the items used (p 70)** > Select alternative lower vibration equipment > Use balancers/tensioners > Use vibration damping materials > Maintain equipment. **Alter work organisation (p 74)** > Reduce exposure time to vibration. **Eliminate the manual task**
☐ Whole-body vibration 	48			

* Describe what the person is doing – e.g. hand operation of drill 10 times per minute, performed 3 hrs per day, five days a week

What are the sources of risk? Describe any aspect of the design and layout of the workplace, the nature of the load handled, the nature of the item used, the working environment, the work practices or work organisation that may have caused you to tick a box.

Thermal Environment	Page	Comments*	Describe any risk control options you have identified	Control Options (not exhaustive list)
☐ Low temperatures (for example, in cool rooms, cold stores, or working outside in cold weather)	49			> Automate or isolate processes. **Alter the items used (p 70)** > Insulate hot/cold items or tools. **Alter the working environment (p 72)** > Redirect cold exhaust air > Improve ventilation and air circulation > Provide shade > Provide thermal screens/barriers > Provide sheltered walkways/wind barriers > Provide lighting suited to the task. **Alter work organisation (p 74)** > Avoid working in the cold > Provide warm clothing > Avoid working in the heat > Provide a supply of drinking water > Allow workers time to acclimatise to cold and heat > Provide rest breaks > Implement task rotation > Provide information and training.
☐ Wearing thick clothing that restricts movement while working in cold conditions (e.g. gloves)	49			
☐ Handling very cold or frozen objects	49			
☐ High air temperatures (for example, in foundries, laundries, kitchens, manufacturing processes which generate heat, or working outside in hot weather)	49			
☐ Radiant heat (for example, from the sun, or from processes such as smelting or plastics extrusion)	49			

* Describe what the person is doing – e.g. hand operation of drill 10 times per minute, performed 3 hrs per day, five days a week

What are the sources of risk? Describe any aspect of the design and layout of the workplace, the nature of the load handled, the nature of the item used, the working environment, the work practices or work organisation that may have caused you to tick a box.

Thermal Environment	Page	Comments*	Describe any risk control options you have identified	Control Options (not exhaustive list)
☐ Wearing heavy protective clothing while working in hot conditions 	49			
☐ Workers are working in hot conditions and they are not used to it	49			
☐ High humidity caused by the weather or processes such as steam cleaning	49			
☐ Windy conditions, combined with hot or cold weather	49			
☐ Handling large objects in windy conditions	49			
☐ Wind chill caused by exposure to wind in low temperatures	49			

* Describe what the person is doing – e.g. hand operation of drill 10 times per minute, performed 3 hrs per day, five days a week

What are the sources of risk? Describe any aspect of the design and layout of the workplace, the nature of the load handled, the nature of the item used, the working environment, the work practices or work organisation that may have caused you to tick a box.

Work organisation and work practices	Page	Comments*	Describe any risk control options you have identified	Control Options (not exhaustive list)
☐ The work rate being set by a machine or the team and not under the worker's control 	50			**Alter work organisation (p 74)** > Allow for task variation > Provide rest breaks > Allow workers some latitude to influence the rate and pace of work > Ensure workloads and deadlines are achievable > Ensure good communication and reporting of problems > Give and receive feedback about work requirements and performance > Allow workers some latitude to influence workload, work methods and changes in the workplace > Monitor and control overtime and shiftwork > Provide appropriate training and supervision to develop and maintain skills required > Allow for a gradual build up to full production speed > Seek advice on special requirements.
☐ Systems of work, such as piecework, that encourage workers to skip breaks to finish early, or to produce more items in the set time	50			
☐ Levels of work demand that workers find difficult to keep up with (pace)	50			
☐ Sustained high levels of attention and concentration	50			
☐ Systems of work that offers the worker little or no control over the way they do their work	50			
☐ Workers frequently needing to meet tight deadlines	50			

* Describe what the person is doing – e.g. hand operation of drill 10 times per minute, performed 3 hrs per day, five days a week

What are the sources of risk? Describe any aspect of the design and layout of the workplace, the nature of the load handled, the nature of the item used, the working environment, the work practices or work organisation that may have caused you to tick a box.

Work organisation and work practices	Page	Comments*	Describe any risk control options you have identified	Control Options (not exhaustive list)
☐ Sudden changes in workload, or seasonal changes in volume without any mechanisms for dealing with the change	50			
☐ Levels of physical work demand that workers find difficult to maintain (effort)	50			

Tick **yes** if workers

☐ Feel that guidance and resources provided by **supervisors or co-workers** should be increased so they can perform to the required standard	50			
☐ Feel that they have not been given sufficient training and information by **their employers** in order to carry out their job successfully	50			

* Describe what the person is doing – e.g. hand operation of drill 10 times per minute, performed 3 hrs per day, five days a week

What are the sources of risk? Describe any aspect of the design and layout of the workplace, the nature of the load handled, the nature of the item used, the working environment, the work practices or work organisation that may have caused you to tick a box.

Has there been a report of MSD associated with this task?

The report of MSD associated with the task usually means increased risk so implementing risk controls should be a high priority.

☐ Tick **yes** if any reports of MSD have been made

Provide comments here. It may be helpful to sketch the task or attach a photograph, and describe the task or area more fully.

If you found any risk of MSD, you must control it as far as is reasonably practicable.

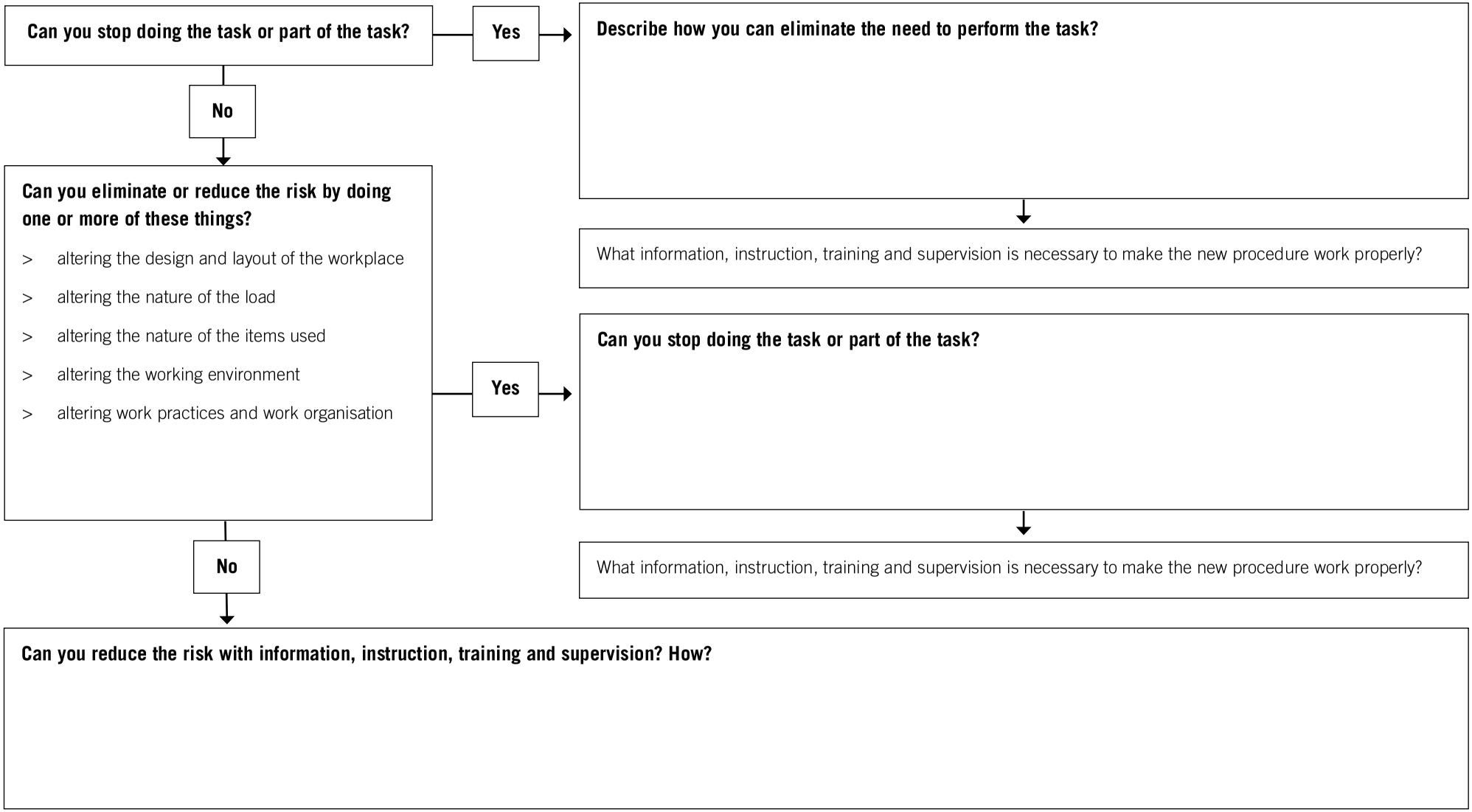
Generally, the more boxes you ticked in each section on this worksheet, the greater the risk.

If the assessment shows a risk of MSD, you should keep this record until the task is no longer done or if the task is changed and another assessment is done.

Risk Control

How are you going to fix the problems?

You may need to use a combination of risk controls to eliminate or minimise the risk as far as reasonably practicable.



Implementing Risk Controls

Task:	Date prepared:

When will these controls be implemented?

Short-term (immediately to within a few weeks)				
Action required	*Person responsible*	*Completion date*	*Reviewed date*	*Action completed*
Medium-term (within a few weeks to a couple of months)				
Action required	*Person responsible*	*Completion date*	*Reviewed date*	*Action completed*
Long-term (within several months)				
Action required	*Person responsible*	*Completion date*	*Reviewed date*	*Action completed*

Appendix 2 Further guidance and tools for assessing the risk of MSD arising from manual tasks at work

In some situations, further advice and guidance on assessment of risk posed by tasks and selection of risk controls may be helpful. For example, you may wish to seek further advice when:

> significant costs may be involved in controlling risks

> more information is needed to decide which risks need to be addressed as a priority

> more information is needed to choose between risk controls, or

> there is disagreement about the results of a risk assessment.

For further advice and guidance:

> contact health and safety consultants – see under "Occupational Health and Safety" in the Yellow Pages

> access the advice provided by your local Occupational Health and Safety Authority. Contact details of each state and territory authority can be found http://www.ascc.gov.au/, or

> contact industry groups, employer associations or unions.

The method of hazard identification and risks assessment provided in this Code of Practice will be adequate for most situations. However you may find other methods for assessing risks and helping to determine risk controls helpful for some more complex tasks. A number of methods are described in the Table 1 below.

When thinking about using any of these methods, it is important to note that:

> each method is limited in the types of manual tasks and risks it can assess

> most methods require the involvement of an appropriately competent person in their use or in the interpretation of their results

> some methods require specialist equipment, and

> the method should be appropriate to the task and provide the information required.

Table 1 Further risk assessment methods

Tool	Application	Limitations, equipment and skills requirements
Snook Tables *The Liberty Mutual Tables for Evaluating Lifting, Lowering, Pushing, Pulling and Carrying Tasks* are available at http://libertymmhtables.libertymutual.com/CM_LMTablesWeb/taskSelection.do?action=initTaskSelection	The Snook Tables identify options to redesign tasks, for example, by reducing the weight of the load, reducing the frequency of the pushing / pulling. The tables can be to used provide guidance on estimating the maximum acceptable pushing/pulling forces for specific tasks.	Requires: > Measurement of weights, distances, pushing and pulling forces, frequency and duration of tasks > Training in use and interpretation
Strain Index A computerised version of the tool is available at http://ergo.human.cornell.edu/ahJSI.html	The Strain Index is used to assess MSD risks for the hand, wrist and elbow arising from hand intensive tasks, such as assembly work. It provides a quick and systematic assessment of hand and wrist injury risks. The Index is useful for comparing risk before and after intervention. It provides an action level for intervention.	> Application of the Strain Index is limited to tasks involving intensive hand use. In particular it does not assess risk to the shoulder joint.

Table 1 Further risk assessment methods (Continued)

Tool	Application	Limitations, equipment and skills requirements
OWAS (Ovako Working Posture Analysing System) An electronic version of the OWAS tool is available free of charge from http://turva1.me.tut.fi/owas/	OWAS is used to assess postures, forces and task duration. OWAS may be used to identify improvements in the design of work methods, work spaces, tools or machines.	> Should be used to supplement other assessment methods Requires: > Direct observation or video of tasks > Training in use and interpretation
RULA Electronic copies of the tool available at http://www.ergonomics.ie/mirth.html http://www.nexgenergo.com/ergonomics/ergointeluea.html	RULA is used to assess repetitive tasks mainly involving the upper body, neck, back, wrist and arm. It looks at posture, frequency duration and forces. It assesses interaction of risk factors and provides guidance on levels of risk requiring action.	Requires: > Direct observation or video of tasks > Training in use and interpretation
REBA Electronic copies of the tool are available at http://www.ergonomics.ie/mirth.html	REBA is useful for identifying tasks that involve unpredictable, variable postures and to identify high risk postures and points for intervention to reduce risk.	Requires: > Direct observation or video of tasks > Training in use and interpretation
ManTRA (Manual Tasks Risk Assessment)	ManTRA can be applied to a full range of manual task assessments as it includes a quick assessment of all body regions and addresses a comprehensive range of physical risk factors. ManTRA also examines the interaction between risk factors and provides a risk rating and priority risk factor profile.	Requires: > Direct observation of tasks > Training in use and interpretation
Quick Exposure Check (QEC)	QEC can be used to assess a wide range of manual tasks. It also uses worker ratings to assess the task. Assessment of the back is limited.	Requires: > Direct observation of tasks > Training in use and interpretation
UK HSE Manual Handling Checklists (MAC) http://www.hse.gov.uk/msd/mac/index.htm	IMAC is useful in the assessment of manual handling of heavier loads. It is an observational method that is simple to apply.	Requires: > Direct observation of tasks

Appendix 3A. Technical details

The following sections provide more information and details on the controls listed in Section 6.4.

A. Alter the design and layout of the work environment

Reaching

Locate work components at a comfortable distance from the body.

Workers should be able to perform frequent reaches, particularly in repetitive tasks, and/or when handling loads without:

a. bending the back forward or sideways, or

b. twisting the back.

The upper arm should be as close to vertical as possible when reaching to reduce the load on the shoulder.

Frequent reaches should be no more than *30cm* to the front of the body in a seated position and *50cm* in a standing position.

Infrequent reaches should be no more than *50cm*, or so that the elbow is not straight when force is applied, for example, when using tools or picking up loads.

Other reaches to be avoided if done frequently include:

> reaching above shoulder or head height,

> holding the arms in front or to the side of the body, and

> reaching behind the back.

Handling capability decreases as reach distance increases. Occasional long reaches, for example, to turn off a switch, can be beneficial in inactive jobs.

B. Alter the nature of the load handled

Load dimensions

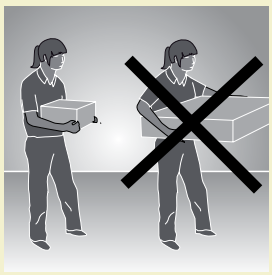
To allow the best grip on a package or container, the ideal dimensions are as follows:

> the width of the load (measured across the body) should be no more than about *50cm* to allow the lifter's elbows to be supported against their trunk when a load is carried in front of the body

> the length of the load should not extend more than *30cm* away from the lifter's body so that its centre of gravity is close to the worker's body

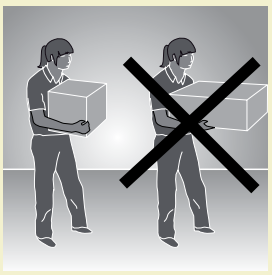
> the sum of any two dimensions should be not be more than *75cm*


- for loads without handles, it should be possible to reach the bottom front corners of the load when carrying it at hip height
- load height should allow workers to see where they are going and where loads have to be placed.



The width of the load (measured across the body) should be no more than about 50cm to allow the elbows to be supported against the trunk

The length of the load should not extend more than 30cm away from the body so that its centre of gravity is close to the worker's body.



If any 2 dimensions are no more than 75cm or there are loads without handles, it should be possible to reach the bottom front corners of the load when carrying at hip height. Load height should allow workers to see where they are going or where loads have to be placed.

Container handles

Container handles should be:

- wide enough for the palm, for example, *11cm wide*. Add *2.5cm* if using gloves
- cylindrical, with a *4cm* diameter. Add *2.5cm* if wearing gloves
- placed towards the top of a load for stability and to reduce the distance it has to be lifted if stored at a low level
- covered, for example, padded to reduce local contact stresses from hard or sharp surfaces
- lightly ribbed or textured when hand slippage is a problem.

Handholds should be wide enough for the palm and deep enough to accommodate the knuckles, for example, *11cm* wide and *5cm* deep. Add *2.5cm* if wearing gloves.

C. Alter the nature of the item used

Purchasing specifications

When purchasing plant, tools or equipment specify:

> the uses or functions of the plant and equipment

> the general performance characteristics required to reduce the risk to health and safety from handling and use

> the need to accommodate a range of physical characteristics of workers

> the inclusion of information on the amount of vibration emitted by the plant/tool/equipment and how it has been minimised.

Selecting for weight and balance

The weight of a hand tool will determine how long it can be held or used and how precisely it can be manipulated. Ideally, a worker should be able to operate a tool with one hand.

Select tools that weigh:

> as little as possible for precision tools, but not more than *1.75kg*

> preferably about *1.5kg* for power tools, but not more than *2.3kg*

Where possible the heaviest part of the tool should not be in front of the wrist. If it is not well balanced, the effort needed to grip the tool to stop it tilting forward is increased.

Selecting for good handle design

Select tools with handles that:

> are cylindrical or oval in cross section

> generally, have a diameter between *30mm* and *45mm*

> for precision work, have a diameter of between *5mm* and *12mm* and a grip length of *10 cm*

> for torque (for example, large screwdrivers), have a diameter of up to *50 – 60mm*

> for two-handled tools (for example, pliers or scissors), have grip spans of at least *6cm*, and not more than *9cm*

> for power tools, have a diameter of up to *50 – 60mm* and a grip length of *12cm*

> for pliers, scissors or wire cutters, have spring returns that don't impede normal operation

> for hand-held saws and similar tools, have cut-outs that are about *12cm* long and *6cm* wide

> have a knurled surface or small indentations to improve grip

> are covered with a compressible material (for example, rubber) to improve grip

> have a guard or stopper at the front

> have well-rounded edges to minimise contact stress.


Selecting for good trigger design

Triggers should be designed:

> for easy activation by either hand

> with a trigger strip of at least 5cm

> with a trigger lock in instances where the grip has to be sustained for more than 30 seconds.

Maintenance and servicing

Routine maintenance and regular servicing of tools and other items should be to the manufacturer's specification.

Establish procedures that detail:

> which tools require servicing

> who is responsible for the servicing (either by workers or qualified personnel)

> the type of the servicing required

> the frequency of servicing which may need to increase with the age of the tool.

Selecting tools to eliminate or minimise impact force

Reduce impact forces by:

> using internal damping to reduce repeated shocks to the hand and wrist from hand-held power tools

> avoiding repetitive use of hammers for assembly because of the repeated shocks to the wrist and hand

Limit torque reaction or 'kick back' by:

> using clutch-type tools, shutoff tools, hydraulic pulse tools, and external devices such as torque bars or articulating bars

> using as small a tool as possible, for example, use an angle grinder with a diameter of 10 cm rather than 20 cm.

E. Alter the way work is organised and alter work practices

Personal protective equipment

To reduce the potential for injury, consider:

> providing or promoting the selection of clothing that allows freedom of movement, for example, women can use culottes or slacks to allow tasks to be done more efficiently than if wearing a skirt

> providing different sizes of gloves when they are required to be worn so the right size can be selected

> providing gloves which are designed for the type of task to assist in gripping and handling

> providing knee protectors for work involving kneeling to reduce stress on the knee.

Design tasks for the working population

Task design must take account of the range of human dimensions and capabilities such as height, reach and weight. Adapt work systems to accommodate the health/fitness status of a worker. If this is not possible allocate the worker to other tasks. In designing work systems critical considerations also include:

> the capacity of workers who have not reached physical maturity for physically demanding work

> the possibility that older workers may have a decreased physical capacity for physically demanding or fast work

> the need for gradual adjustment to physically demanding work activities during recovery from injury or illness, and

> pregnancy which affects the risk of back pain because the changing shape of the body and physiological changes in connective tissues places more work on the back muscles in supporting the weight of the uterus.

Provide transition arrangements for workers undertaking unaccustomed work

Unaccustomed work can affect workers:

> who are new or transferred to a task

> returning from extended absences (for example, injury, vacations or layoffs), and

> working on a process which has been redesigned.

To reduce the risk of injury, provide transition periods for such workers to work up to full speed. Provide an adjustment process through:

> reduced line or machine speeds

> reduced workloads or more frequent breaks, and

> job rotation.


Appendix 3B. Vibration

A number of factors determine the health effects from exposure to vibration. If a worker performing a manual task is exposed to vibration, the risk of MSD will increase dramatically the longer a worker is exposed to that vibration. In particular the risk increases where a worker is performing manual tasks which are highly repetitive, of long duration, or require the repetitive or sustained use of force.

Vibration is considered a risk factor in manual tasks because, generally, a worker will need to exert more force to handle or use items that vibrate. If the vibration cannot be eliminated at the source, work practices need to be modified to give the worker greater opportunity to rest and recover when handling vibrating items.

Two types of vibration

There are two different types of vibration:

> **whole-body vibration (WBV**) – mechanical vibration that is transmitted to the whole body. Examples include the vibration experienced when driving large mining, construction or other heavy vehicles. Prolonged exposure to WBV can lead to traumatic and degenerative disorders of the lower back.

> **hand-arm vibration (HAV)** – mechanical vibration that is transmitted to the hands and arms. Examples include the vibration experienced when using items of machinery such as jackhammers, chainsaws, angle-grinders or brush-cutters. The most common injury associated with HAV is vibration white finger (known as Raynaud's syndrome), a condition caused by a reduction in the circulation of blood through fingers gripping power tools.

Controls to eliminate or minimise the risks from exposure to vibration during manual tasks

Measures to eliminate or minimise exposure to vibration consist of controlling:

> vibration at the source

> the path of the vibration

> vibration at the position of the worker performing the manual task.

This can be done by:

> using other working methods with less exposure to vibration

> choosing work equipment with least vibration (such as anti-vibration tools)

> providing other equipment that reduces the risk of injury from vibration

> ensuring appropriate maintenance programmes for work equipment

> providing suitable training, instruction and information to workers on safe use of equipment

> limiting the duration and intensity of exposure by developing work schedules with adequate rest breaks

> providing suitable protective clothing (for example, gloves to prevent exposure to cold and to 'dampen' vibration at high frequencies).

Hand-Arm Vibration - Controls

Select tools to eliminate or minimise exposure to vibration

Substitute alternative manufacturing methods or processes to eliminate the need to use vibrating tools, for example, operate vibrating processes by remote control where possible. Where this is not possible, purchase tools that produce less vibration.

When selecting tools:

> obtain specifications on vibration characteristics and recommended length of exposure time

> choose tools that have a speed adjustment to decrease vibration, internal damping, vibration-isolated handles, and automatic shut offs

> explore the possibilities of obtaining accessories such as anti-vibration handles or internal damping mechanisms that may not have been provided with the equipment itself but can be installed after purchase of the tool.

Modify existing tools to either damp the vibration or prevent the vibration from moving into the handle of the tool by:

> using tool stands, isolated fixtures, or isolated handles to prevent hand-arm vibration

> using air-cushioned cylinders, air shutoff clutches, or properly selected isolation mounts

> using internal damping of hand tools such as insulation

> changing gearing mechanisms

> covering handles with vibration-insulation rubber or foam

> redirecting the exhaust or using exhaust mufflers or baffles to direct air exhaust away from the workers' hands.

Problems from vibrating tools also depend on the way they are used. To reduce the effects of vibration:

> use pressure regulators for pneumatic (air powered) tools, so the tool operates at the design pressure rather than full-line pressure

> explore the possibility of altering the task to reduce the grip force the worker needs to apply. The larger the force the worker uses in gripping, the more vibrational energy that is absorbed

> consider using a slip-resistant surface on the tool handle (moist hands can cause workers to exert greater grip force to control the tool).

> consider using a suspended balancing system to reduce the weight of the tool and the gripping force needed (this reduces the transmission of vibration energy to the hand).


Whole Body Vibration - Controls

Design factors

> operate vibrating processes by remote control where possible

> improve vehicle suspension, suspend vehicle cabs and install operator seats mounted on suspension systems incorporating spring and damper elements

> isolate or dampen vibrating work platforms through suspension systems

> provide seats with back rests incorporating lumbar support

> mount machines and plant on vibration isolating mounting pads

> use anti-fatigue mats under the feet for standing workers to dampen vibration

> provide standing workers with a sit/stand seat or lean seat to reduce the energy transmitted up the bones of the legs.

Working with vibrating machines

> make sure equipment is operated within the speed suggested by the manufacturer, or reduce the speed of travel to reduce vibration levels

> ensure that suspension systems are working correctly

> inflate tyres to the correct pressures

> encourage workers to use back rests with the lumbar support correctly positioned

> provide workers with footwear with vibration absorbing soles.

Alter the way work is organised and alter work practices to reduce exposure to vibration

Reduce exposure to vibration and allow sufficient time for recovery by:

> limiting the time spent by workers on a vibrating surface or using vibrating tools

> rotating workers within a working day to reduce the exposure of each worker to vibration, for example, consider organising workers in teams so that workers performing manual tasks do not use vibrating tools for long durations

> providing workers with adequate rest breaks away from vibrating sources to avoid constant, continued exposure to vibration.

Maintain equipment on a regular basis to minimise vibration. For instance:

> keep chisels and cutters sharp and screws tightened

> periodically replace shock absorbers, replace or repair bent shafts, and maintain internal tool workings such as pneumatic cylinder stops

> lubricate bearings and grease and oil parts

> rebalance rotating equipment

> replace leaking compressed air valves.

Consider changes to the working environment such as:

> improving ground surfaces where vehicles are driven regularly, for example by repairing potholes, clearing debris, or levelling

> maintaining floor surfaces (including ramps and dock levellers) for vehicles such as forklifts to reduce exposure from driving over uneven or cracked surfaces.

Provide information, instruction, supervision and training to workers on whole-body vibration, the risk of back pain and what they can do to prevent injury, including:

> adjusting the seat for a good seating position

> adjusting the suspension seat for the driver's weight – this is necessary when different people drive the vehicle

> driving the vehicle to reduce vibration levels by driving at the speed suggested by the manufacturer, or by reducing speed over uneven ground or floor surfaces

> planning work site routes with the smoothest terrain and keep speed low when crossing uneven terrain

> steering the vehicle to avoid hitting objects and pot holes

> varying the pattern of work to break up periods of continuous driving

> recognising symptoms (such as lower back pain) which may indicate potential health problems

> the need to report early symptoms of vibration disease to a supervisor.

Provide information, instruction, supervision and training to workers on hand-arm vibration, including:

> good working practices to reduce vibration directed into the hands, for example, resting the tool on a support or on the work piece as much as possible

> gripping tools properly for safe operation

> the need for tools to be well maintained

> recognising symptoms (finger tingling or whitening) which may indicate potential health problems

> the need to report early symptoms of harm from vibration to a supervisor.

Vibration in the workplace should be measured by a competent person in accordance with the Australian Standards listed below:

> *AS 2670.1–2001: Evaluation of human exposure to whole-body vibration – General requirements*

> *AS 2763-1988: Vibration and shock – Hand-transmitted vibration – Guidelines for measurement and assessment of human exposure*


Appendix 4

Resources for designers manufacturers and suppliers

ASCC

> Guidance on the Principles of Safe Design at work
<http://www.ascc.gov.au/ascc/AboutUs/Publications/NationalStandards/IndexofNationalStandardsCodesofPracticeandrelatedGuidanceNotes.htm>

> The role of design issues in work-related injuries in Australia 1997-2002
<http://www.ascc.gov.au/ascc/HealthSafety/SafeDesign/Safedesign.htm>

> Design Issues in Work-Related Serious Injuries
<http://www.ascc.gov.au/ascc/HealthSafety/SafeDesign/Safedesign.htm>

> Safe Design for Engineering Students (not available on the internet - contact the Office of the ASCC for further information)

Jurisdictions:

NSW

> Code of Practice: Safety Aspects in the Design of Bulk Solids Containers including Silos, Field Bins and Chaser bins, 2005
<http://www.workcover.nsw.gov.au/NR/rdonlyres/756EBFFA-CC2B-4605-9DA2-915AA59482F0/0/code_safety_aspects_design_bulk_solids_containers_4734.pdf>

> Health and Safety Guidelines for Hairdressers
<http://www.workcover.nsw.gov.au/Publications/Industry/ConsumerandBusinessServices/hairdressersguide.htm>

> CHAIR (Construction Hazard Assessment Implication Review) Safety in Design Tool
<http://www.workcover.nsw.gov.au/publications/OHS/SafetyGuides/chairsafetyindesigntool.htm>

QLD

> Code of Practice: Safe Design and Operation of Tractors, 2005
<http://www.dir.qld.gov.au/workplace/law/codes/tractors/>

VIC

> Designing Safer Buildings and Structures
<http://www.worksafe.vic.gov.au/wps/wcm/connect/WorkSafe/Home/Forms+and+Publications/Publications/import_Designing+Safer+Buildings+and+Structures>


> Designing Workplaces for Safer Handling of Patients and Residents
<http://www.worksafe.vic.gov.au/wps/wcm/connect/WorkSafe/Home/Forms+and+Publications/Publications/import_Designing+workplaces+for+safer+handling+of+patients+and+residents>

> Safety by Design – Eliminating Manual Handling Injuries in Road Transport
<http://www.worksafe.vic.gov.au/wps/wcm/resources/file/ebd85d439ffd8da/Safety_Design.pdf>

WA

> Checkout workstations in retail – safe design and work practices
<http://www.safetyline.wa.gov.au/pagebin/guidwswa0085.htm>

> A guide for designers, manufacturers, importers, suppliers and installers of plant
<http://www.safetyline.wa.gov.au/pagebin/pg000576.pdf>

Other:

Australian Building Codes Board

> Responsible for building regulatory matters and development of the Building Code of Australia (BCA)

<http://www.abcb.gov.au >

Standards Australia

> Multiple standards relating to design – see specific subject matter (ie Safeguarding machinery)

<http://www.standards.com.au >

RegNet

> National Research Centre for OHS Regulation, Australian National University.

<http://www.ohs.anu.edu.au >

Health and Safety Executive, UK (HSE)

> The Health and Safety Commission is responsible for health and safety regulation in Great Britain. The Health and Safety Executive and local government are the enforcing authorities who work in support of the Commission

<http://www.hse.gov.uk >

Safety in Design

> benchmarked standards for knowledge and competence for designers

> industry guidance on design for the built environment

<http://www.safetyindesign.org>

Practice Notes prepared by industry associations:

Building Design Professions (BDP)
<http://bdp.asn.au>

Royal Australian Institute of Architects (RAIA)
<http://www.architecture.com.au>

Publications:

> Morris W, Wilson J, Koukoulaki T. Developing a participatory approach to the design of work equipment. Belgium. TUTB, 2004

> Health and Safety Executive. A guide to managing health and safety in construction. UK: HSE, 1995

> Christensen W, Manuele F, eds. Safety Through Design. USA. National Safety Council, 1999

Appendix 5

References

During the development of this Code of Practice the Manual Tasks Technical Group sourced material from the following documents.

> WorkSafe Victoria, 20 April 2000, Code of Practice for Manual Handling, Melbourne(More information and updates on the Code of Practice for Manual Handling is available from the WorkSafe Victoria website, www.worksafe.vic.gov.au)

> Queensland Department of Employment, Training and Industrial Relations, Manual Tasks Code of Practice 2000, Brisbane

> Queensland Department of Employment, Training and Industrial Relations, Manual Tasks Involving Handling People Advisory Standard (known as a Code of Practice) 2001, Brisbane

> WorkCover New South Wales, January 2004, Manual Handling Resource, Sydney

> Office of the Australian Safety and Compensation Council, Guidance on the principles of safe design for work, May 2006, Canberra

(The Office would like to acknowledge the use of examples developed by John Culvenor from *Guidance on the principles of safe design for work* and his assistance in their adaptation as case studies located at the end of Part 3 of this Code of Practice.)