National Occupational Health and Safety Commission

GUIDANCE NOTE FOR THE PREVENTION OF OCCUPATIONAL OVERUSE SYNDROME IN THE MANUFACTURING INDUSTRY [NOHSC:3015(1996)]

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FOREWORD

The National Occupational Health and Safety Commission is a tripartite body established by the Commonwealth Government to develop, facilitate and implement a national occupational health and safety strategy.

This strategy includes standards development and the development of common national approaches to OHS legislation; the development of industry-based preventive strategies and the promotion of best practice in the management of OHS in the workplace; research and statistics; chemicals assessment; information collection and dissemination; and raising the standard of OHS training and education.

The National Commission comprises representatives of the peak employee and employer bodies - the Australian Council of Trade Unions and the Australian Chamber of Commerce and Industry - as well as the Commonwealth, State and Territory governments.

Consistent with the National Commission's philosophy of consultation, tripartite standing committees have been established to deal with issues relating to standards development, research and the mining industry. Expert groups may be established to provide advice to the standing committees on those issues with which the National Commission is concerned.

PREFACE

In 1986, following the release of its now superseded publication *The Prevention and Management of Occupational Overuse Syndrome: General Code of Practice* [NOHSC:2001(1986)], the National Occupational Health and Safety Commission established a working party to develop an industry-specific document for the prevention and management of occupational overuse syndrome in the manufacturing industry.

The working party produced this *Guidance Note for the Prevention of Occupational Overuse Syndrome in the Manufacturing Industry* [NOHSC:3015(1996)] which was endorsed by the National Commission and was first published in 1992. It provides general guidelines for all those involved in the prevention of occupational overuse syndrome on how to minimise risk in manufacturing industry.

This guidance note should be read in conjunction with the National Commission's *National Code of Practice for the Prevention of Occupational Overuse Syndrome* [NOHSC:2013(1994)][1] which is included at Appendix 1. The *National Code of Practice for the Prevention of Occupational Overuse Syndrome* [NOHSC:2013(1994)][1] supersedes the National Commission's 1986 and 1990 editions of its code of practice on occupational overuse syndrome. The 1990 edition of the National Commission's code of practice on occupational overuse syndrome was included at Appendix 1 in the previous (1992) edition of this guidance note. In order to avoid duplication of material, users will be referred to the National Commission's *National Code of Practice for the Prevention of Occupational Overuse Syndrome* [NOHSC:2013(1994)][1], where appropriate. Additional assistance and information, which is available from Worksafe Australia or the department or authority which coordinates occupational health and safety in your State or Territory, may be required for specific applications, especially in unique, difficult or complex situations.

Worksafe Australia would welcome suggestions for increasing the usefulness of this document and details of alternative solutions and new developments in the prevention of occupational overuse syndrome. Periodic revisions of the guidance note will be undertaken in the light of this feedback and the accumulating knowledge of the factors associated with occupational overuse syndrome.

1. INTRODUCTION

1.1 The general principles outlined in this publication will be relevant to the majority of sectors of the manufacturing industry and specific examples will be provided where possible. The primary emphasis of this publication is on prevention, however, a strategy for case management is provided in the National Commission's *National Code of Practice for the Prevention of Occupational Overuse Syndrome* [NOHSC:2013(1994)][1] which is included at Appendix 1.

1.2 Additional information and assistance may also be required for specific applications, especially in unique, difficult or complex situations.

DESCRIPTION OF OCCUPATIONAL OVERUSE SYNDROME

1.3 Occupational overuse syndrome, also known as repetition strain injury (RSI), is described in the National Commission's *National Code of Practice for the Prevention of Occupational Overuse Syndrome* [NOHSC:2013(1994)][1] as:

> a collective term for a range of conditions characterised by discomfort or persistent pain in muscles, tendons and other soft tissues, with or without physical manifestations.

1.4 Occupational overuse syndrome is usually caused or aggravated by work, and is associated with repetitive movement, sustained or constrained postures and/or forceful movements. Psycho-social factors, including stress in the working environment, may be important in the development of occupational overuse syndrome.

1.5 Some conditions which fall within the scope of occupational overuse syndrome are well-defined and understood medically, but many are not, and the basis for their cause and development is yet to be determined.

1.6 Occupational overuse syndrome may affect workers in any occupation. Some descriptive terms used in the literature for occupational overuse and related syndromes in industrial settings include carpet-layer's knee, bricklayer's back, cotton-picker's arm, housemaid's knee, chicken plucker's elbow, cotton twister's wrist and process worker's arm.

RESPONSIBILITIES IN IMPLEMENTATION OF PREVENTIVE STRATEGIES

1.7 The National Commission's *National Code of Practice for the Prevention of Occupational Overuse Syndrome* [NOHSC:2013(1994)][1] states that employers have the responsibility to provide a safe and healthy work environment, while employees have a responsibility to cooperate with employers in the fulfilment of their obligations.

Organisational Policies

1.8 The first step in the prevention of occupational overuse syndrome is the development of an organisational policy. The policy should be developed in consultation with those involved at the workplace and take into account relevant legislation.

1.9 Such policies should be circulated to all parties and should clearly state with whom responsibilities lie. All intervention, both current and that planned for the future, should then be based on these policies. Health and safety policies should be integrated with other relevant organisational policies including, for example, those related to the purchase of equipment.

Consultation

1.10 For successful preventive strategies there must be effective consultation at all stages of intervention. Consultation should involve workers, supervisors and managers; and also health and safety representatives/committees and union representatives where they exist.

Planning

1.11 In the short term, it is important to take steps to adapt the existing work environment to meet the standards outlined in this publication. In the longer term, steps should be taken to improve the work environment by taking a proactive approach in redesigning plant and equipment, tasks, jobs, work structures and work organisation. The effectiveness of the preventive strategy should be monitored and reviewed.

Introduction of Change

1.12 After reading this guidance note and examining work systems and workplaces, you will probably find you will need to consider organisational change.

1.13 Successful organisational change involves:

- the ***setting and attainment of overall goals and objectives;***
- ***consultation*** with those involved at the workplace. This will facilitate the necessary attitudinal change and give employees an opportunity to have a real influence in decisions; and
- ***integration***, that is, the process of meeting human, technical and business needs to produce a high-quality work environment and a satisfied, skilled and motivated work force.

STRATEGY FOR PREVENTION

1.14 Due to the number of factors associated with occupational overuse syndrome, a preventive strategy should encompass a range of elements and not any isolated, single factor.

1.15 The following elements have been expanded from those outlined in the National Commission's *National Code of Practice for the Prevention of Occupational Overuse Syndrome* [NOHSC:20l3(1994)][1] and apply more specifically to the manufacturing industry:

- Work Systems: Organisation and Design
  - Work Patterns
  - Bonus and Incentive Schemes
  - Supervision
  - Task Variation/Work Pauses
  - Work Adjustment Periods
- Workplaces: Organisation and Design
  - Working Position
  - Work Surface Height
  - Visual Requirements
  - Work Layout
  - Workloads
  - Displays and Controls
  - Work Tools
  - Physical Work Environment
- Training and Education
  - Types of Programs
  - Target Groups

OCCUPATIONAL OVERUSE SYNDROME INDIVIDUAL WORK AREA CHECKLIST

1.16 The checklist in Chapter 3 of this guidance note will enable supervisors to identify problems associated with individual work areas. It may not cover all problems encountered but will provide a basis for action. It is recommended that issues identified through the checklist be brought to the attention of management so that appropriate action can be taken.

2. STRATEGY FOR PREVENTION

WORK SYSTEMS: ORGANISATION AND DESIGN

2.1 The aim of effective work systems design is to satisfy both technological and organisational requirements as well as the individual's social and personal needs.

2.2 Appendix 2 outlines social factors that should be considered when work systems are designed or redesigned.

Work Patterns

Work Rates

2.3 Performance differs between individuals and varies in the same individual. Hence, work rates should be set realistically to the total job demands. A cautious approach should be taken in determining work rates where the work or job is new and there is no previous experience to act as a guide. Work rates must be within the physical and psychological capacities of workers and should be established and reviewed by management in consultation.

Work Cycles

2.4 Consideration should be given to the duration of work cycles. If short work cycles cannot be avoided, a variety of tasks which use different muscle groups should be provided.

Machine Pacing

2.5 Alternatives to machine pacing, such as the use of buffer zones (see Section 2.6), should be used. However, where machine pacing does exist, avoid excessive work rates which may be indicated by:

- complaints of discomfort from workers;
- jerky and unnecessarily forceful movements; and
- bottlenecks in production lines.

Buffer Zones[2]

2.6 It may not be possible for some organisations to eliminate paced production lines and still remain competitive. However, it has been found that operators working on such lines are subject to substantial stresses. These risks can be reduced by using a conveyor line to transport assemblies between operators, but not to pace them. The assemblies are removed to adjacent benches, worked on, then returned to the conveyor. Alternatively, buffer stores of the product can be placed at frequent intervals along the line so that stoppage or slowness at one point does not rapidly affect the rest of the line. These methods may allow workers to proceed at their optimal pace.

Peak Demands

2.7 Many jobs have predictable peak periods and large variations in job demands occur. The tension generated during these periods may be prevented by sensible long-term planning of resources and organisation of tasks.

Overtime/Extended Hours

2.8 Supervisors and workers need to be aware of the added risk of occupational overuse syndrome by exceeding employees' capacities through extending working hours.

2.9 Excessive, regular overtime can be avoided by appropriate planning and management of resources.

2.10 Supervisors and workers also need to be aware of the possible hazards of shiftwork, particularly if workers are not afforded the opportunity to rest adequately between shifts.

Bonus and Incentive Schemes[3]

2.11 Bonus schemes, piece-rates, premium systems, payment by results and measured day work are all terms given to methods of production involving incentive schemes. Within any group of employees, a variation in working rates will occur due to factors such as natural skills and fatigue.

2.12 There is evidence to support a strong link between certain types of incentive and bonus systems and the occurrence of occupational overuse syndrome. Methods of payment that may be more appropriate are bonuses, paid on the basis of skill level, rather than individual productivity, or on the basis of organisational output over a period of time. Schemes should be determined in consultation with all those involved.

Supervision

2.13 As supervisors provide the main link between employees and managers, one of their prime functions is to ensure that production is maintained without compromising the health and safety of employees.

2.14 To fulfil this role, supervisors need:

· management support;

· a clearly defined position of authority and responsibility;

· training in relevant aspects of occupational health and safety; and

· training in supervisory skills, see the section 'Training and Education' later in this chapter.

2.15 When supervisors are aware of the work practices and the concerns of employees, they may be in a position to anticipate problems which, if corrected, will reduce the occurrence of injury. In this way, supervisors can take a preventive approach to occupational overuse syndrome.

2.15 To ensure the early detection and management of occupational overuse syndrome supervisors should:

· maintain close liaison with employees to detect any early indications of accumulated fatigue or other problems associated with occupational overuse syndrome;

- encourage employees to report symptoms or problems at the earliest stage possible;
- ensure that where work pauses are provided, they are taken; and
- take appropriate action once a problem has been reported, see Chapter 6 of the National Commission's *National Code of Practice for the Prevention of Occupational Overuse Syndrome* [NOHSC:2013(1994)][1].

Task Variation/Work Pauses

2.17 Task variation should be the primary goal in job design. Wherever possible, jobs should be designed so that recovery from the effects of repetitive work is possible. There should be sufficient flexibility in task demands for employees to move around and reduce the effects of fatigue. Regular pauses of specified duration and frequency should be provided where the job requires a sustained period of repetitive or static activity.

2.18 Frequent short pauses are generally preferable to infrequent longer pauses. Where it is determined that work pauses are required due to continuous and sustained activity, it is recommended that such pauses be provided at least once an hour. The need for, and the frequency and duration of, work pauses should be determined by management in consultation with employee representatives. A number of agreements, mainly in the keyboard area, have been negotiated between management and unions, which provide for work pauses of up to 10-15 minutes in each hour.

2.19 Education of both management and employees is necessary with respect to the need for, and purpose of, regular work pauses.

Work Adjustment Periods

2.20 Newly engaged employees, including staff undertaking new tasks, and those returning from an absence of two weeks or more, need a period of adjustment. This will enable the operator to establish body tone equal to the demands of the task, and to gain confidence and skill in performing the task.

2.21 In small organisations in the manufacturing industry which close down for a vacation period, for example, consideration may be given to returning to work mid-week. Workers can then adjust, in the first short week, to working patterns.

2.22 For information on general principles related to work adjustment periods, readers are referred to the National Commission's *National Code of Practice for the Prevention of Occupational Overuse Syndrome* [NOHSC:2013(1994)][1].

WORKPLACES: ORGANISATION AND DESIGN

2.23 The aim of workplace organisation and design is to optimise output and worker well-being while minimising physical and psychological stress.

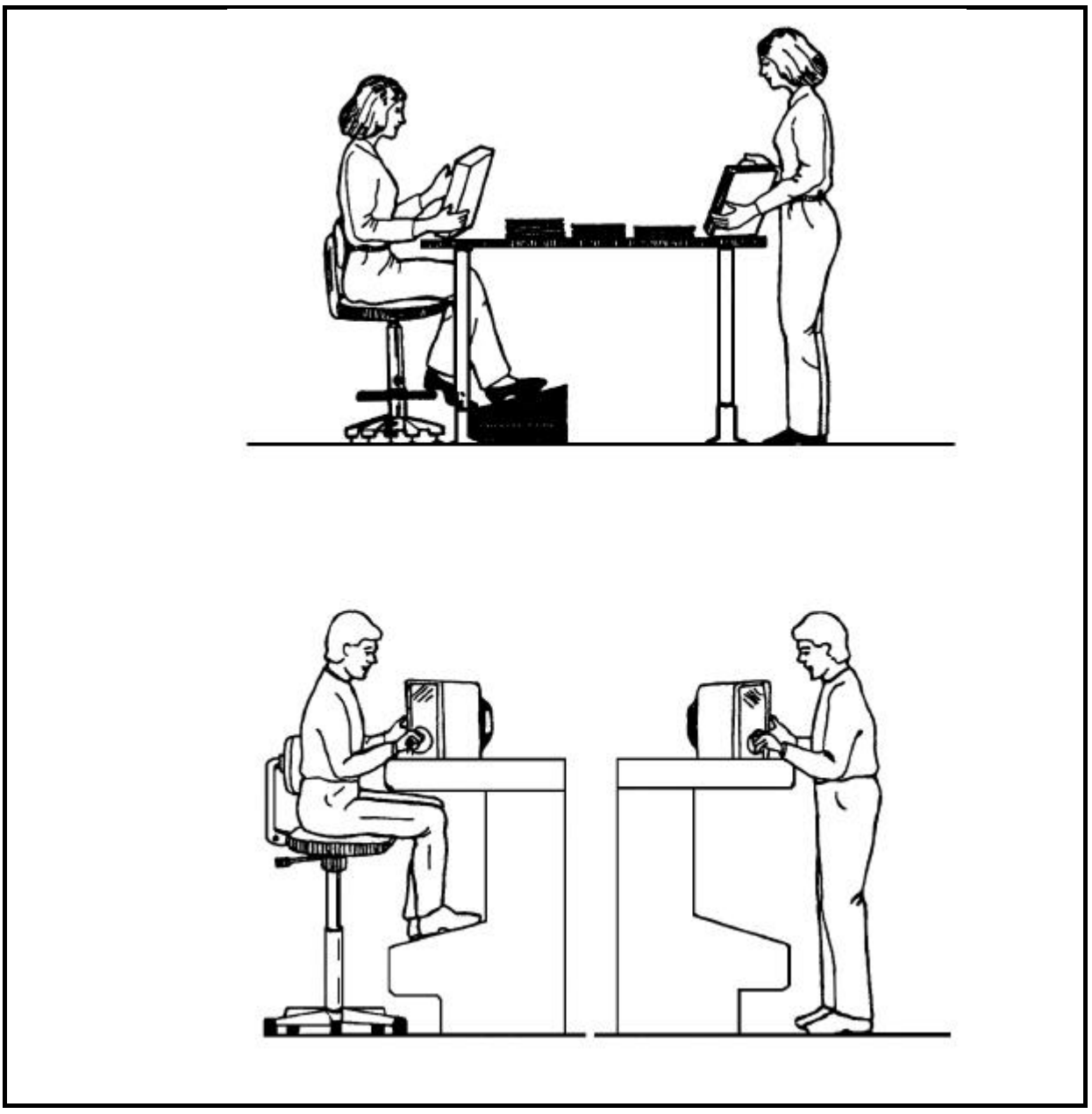


Figure 1 Alternate sitting and standing positions at work.

Working Position

2.24 The most appropriate working position, such as sitting, sitting/standing or standing, is determined by task analysis, which includes assessment of:

- the task and sub-tasks that are performed;
- the frequency and duration of tasks; and
- the material, equipment and tools used.

Alternate Sitting and Standing Position

2.25 Where possible, posture should be varied to include both sitting and standing positions to reduce the effects of accumulated muscle fatigue brought on by maintaining one position for too long (see Figure 1).

Standing at Work[4]

2.26 The standing position is appropriate where:

- heavy, bulky loads are involved;
- there are frequent moves from the workplace;
- there is no knee room under the equipment;
- there is limited space; and
- there are a large number of controls and displays necessary for the operation of some machinery.

2.27 Standing for long periods can put excessive stress on the musculoskeletal system and should be avoided. Consider the following solutions:

- Provide a footrest to enable the worker to stand with either foot elevated and, thus, alternate posture and lessen stress on the back (see Figure 2).
- Provide appropriate mats and floor coverings. The harder and less 'giving' the floor surface, the more stress there is on the body.
- Provide a stool, chair or support, where suitable.
- Provide the opportunity to change positions, move around or alternate between sitting and standing (see Figure 1).

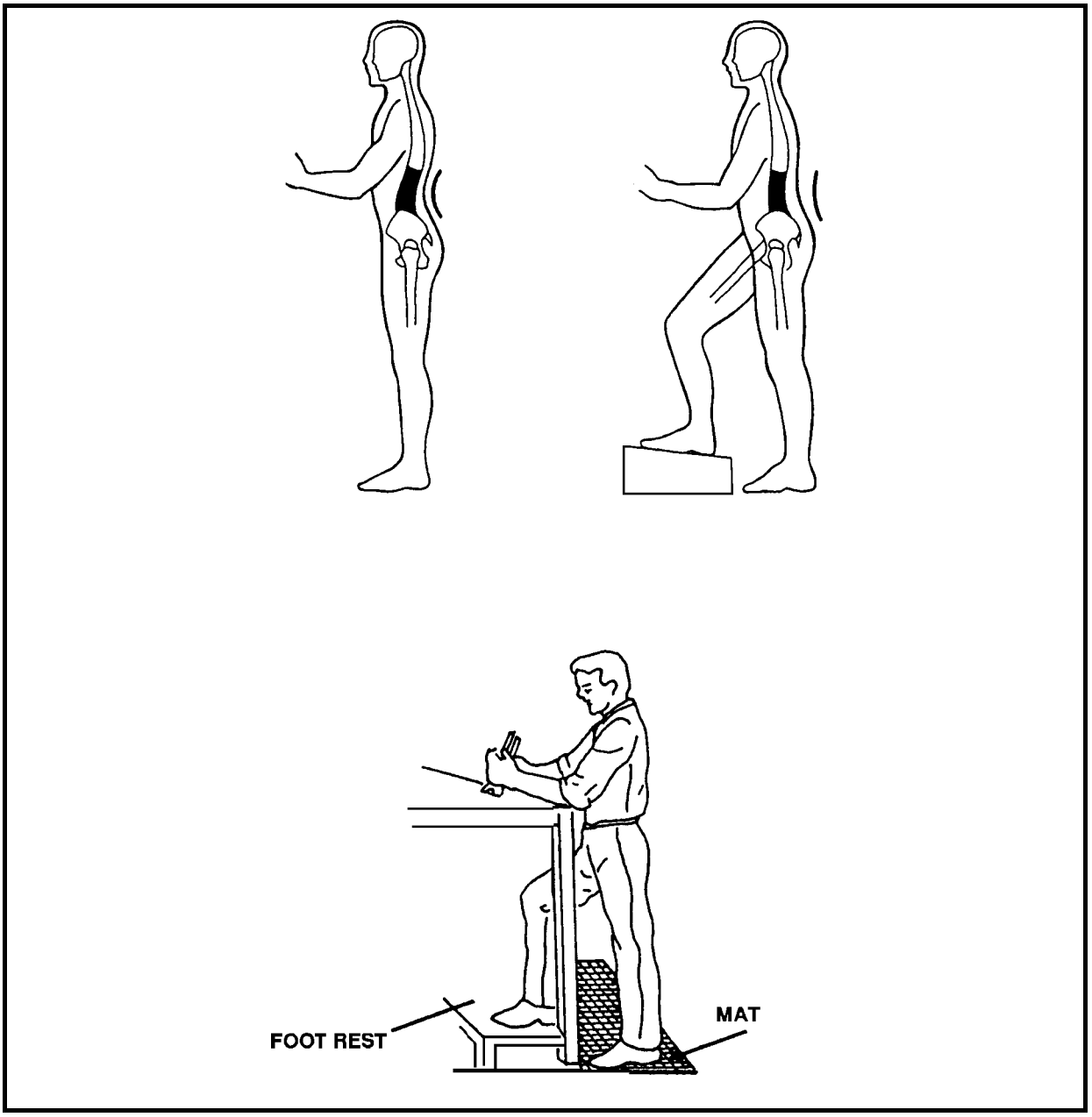


Figure 2 Standing at work. Provision of a footrest will reduce stress on the lumbar spine[5].

***Sitting at Work*[4]**

2.28 Task analysis may indicate that a sitting position is required where:

- a stable body is needed for:
  - accurate control or fine manipulation,
  - light manual work (continuous), and
  - close visual work requiring prolonged attention;
- there is limited headroom or low work level height; and
- foot controls are necessary (unless these are used infrequently or for short periods).

2.29 Seating which is correctly designed for the job and the individual will promote efficiency and comfort (see Figure 3).

2.30 General principles for the design and selection of work seats are:

- The seat height should be adjustable to the individual user. However, if adjustability is not available, footrests should be provided to enable short people to sit correctly.
- The seat width should be sufficient to accommodate a variety of users, and the edges of the seat should not press heavily into the thighs as this may impair circulation.
- The seat depth needs to be adjustable. If too deep, pressure is placed on the area at the back of the knees and circulation could be impaired. A free area between the back of the calf and the seat pan is also useful to encourage leg movement and aid standing up.
- A back rest should be provided to support the lumbar spine. Horizontal and vertical adjustment should be provided where possible.
- The seat padding should be of adequate thickness and resilience. Where hygiene and cleaning considerations allow, a non-slip covering which can 'breathe' is recommended.
- Padded armrests should be provided where armrests are desirable.
- The seat must be stable and safe from tipping or slipping. Use castors on carpets, and glides for other surfaces for mobility with some friction. Seats with a five star base are more stable than those with fewer points of support.
- All seat edges should be curved or rounded.
- A seat that rotates on its axis may be necessary for some tasks.

2.31 Most importantly, a work seat should be designed in conjunction with the workplace at which it is to be used, the job and system requirements, and the users. For example, a support seat or stool may be chosen where there is no room for a normal seat but some support is desirable. An important consideration is the distance from the seat to the work.

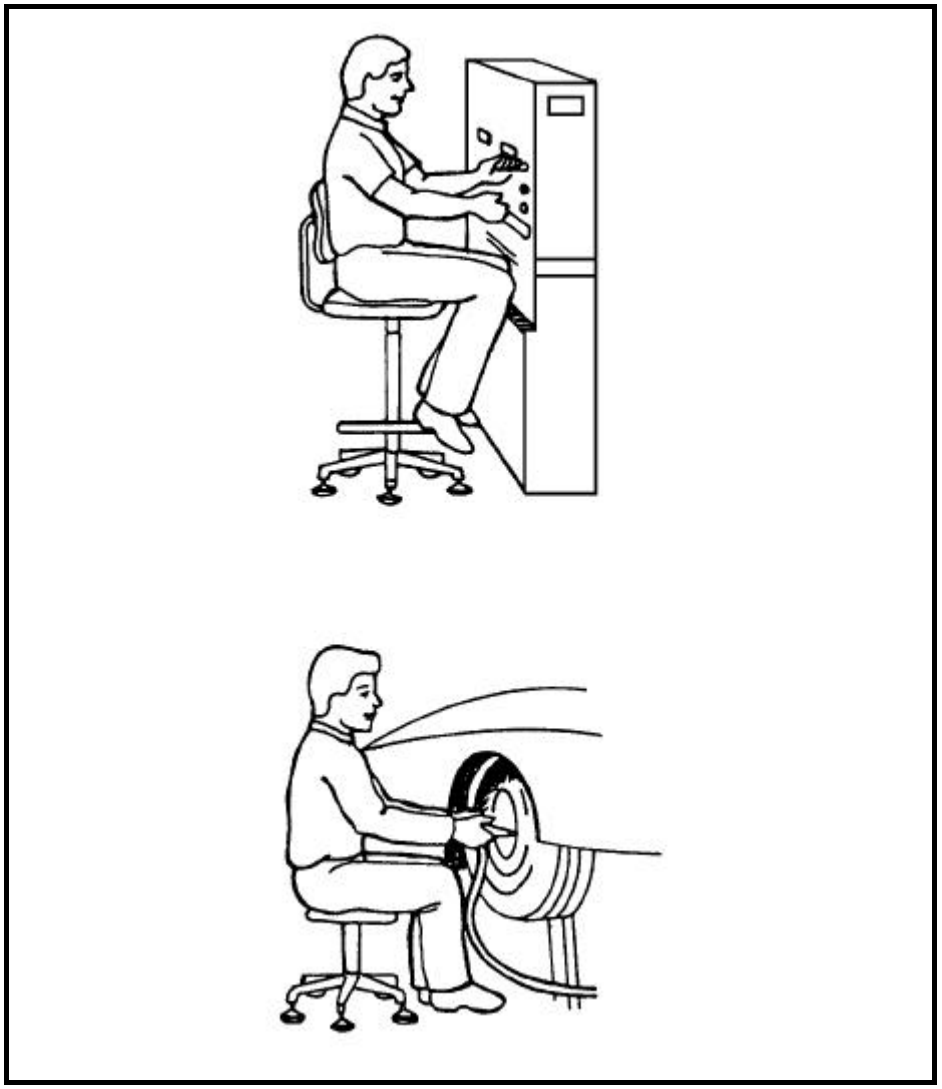


Figure 3 Seating designed for the job and the individual. A tall seat is used to obtain the correct height with a foot support on the chair. A short stool allows a person to get close to his or her work.

Work Surface Height

2.31 The ideal height of the work level is determined by:

- the type of work;
- how easy the work is to see;
- the dimensions of the target object; and
- the range, force and speed of work movements.

2.33 Figures 4 to 8 show examples of the ideal height of the work level. The elbow is used as the point of reference in each figure.

2.34 Figure 9 gives examples of work level heights for work performed while standing.

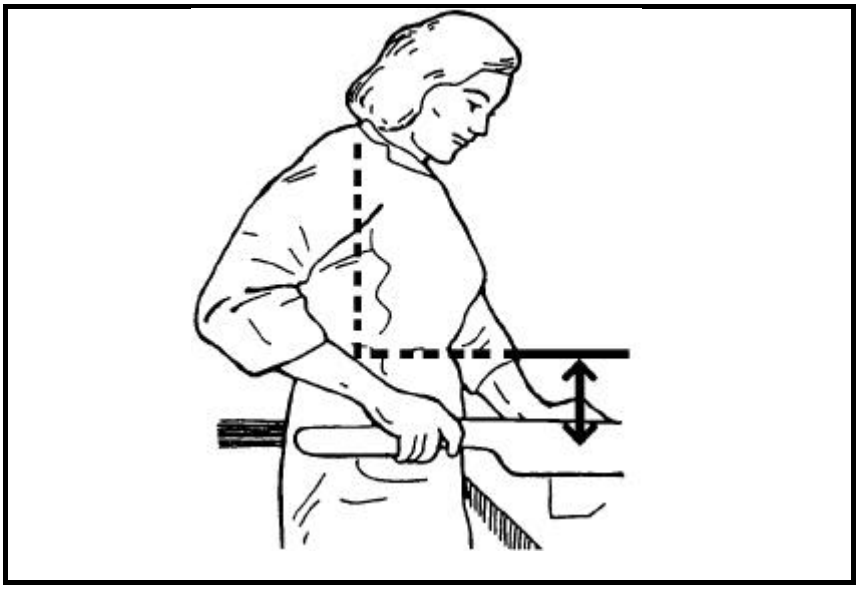


Figure 4 The work level should be below the elbow if the task requires considerable muscle strength or the use of body weight.

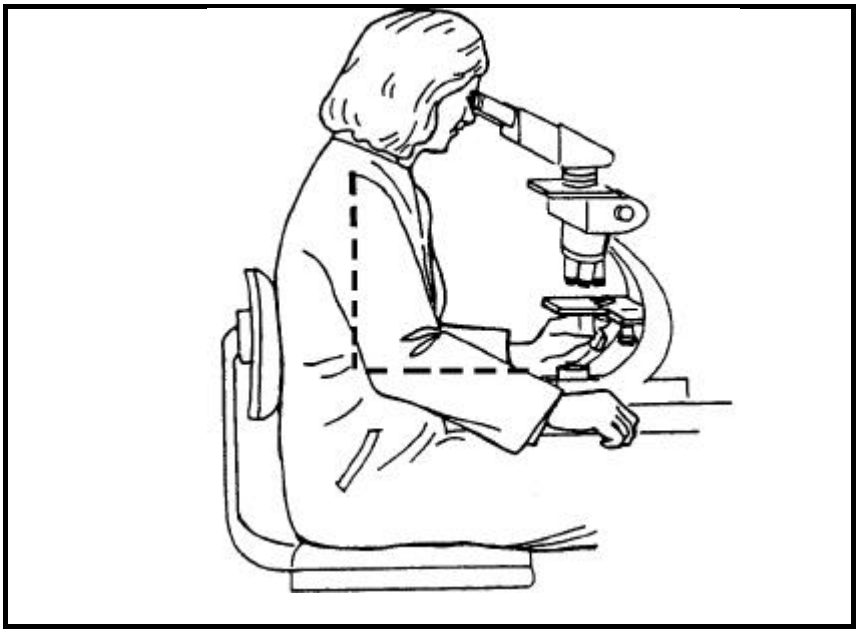


Figure 5 The work level should be slightly below the elbow if the task requires a wide range of arm movements, with the arms moving at the shoulder joint.

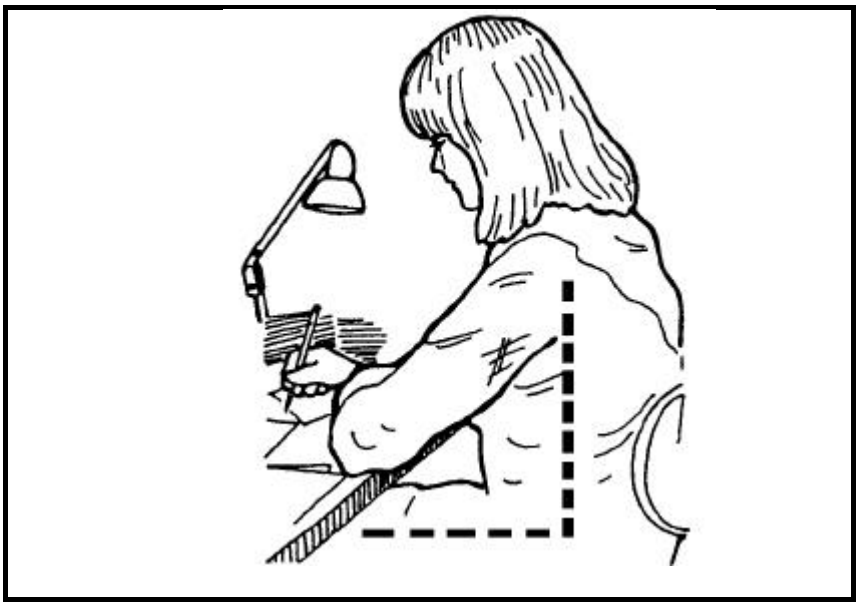


Figure 6 The work level should be slightly above the elbow if the task does not require a wide range of arm movements and the elbows may rest on the desk, for example, when writing.

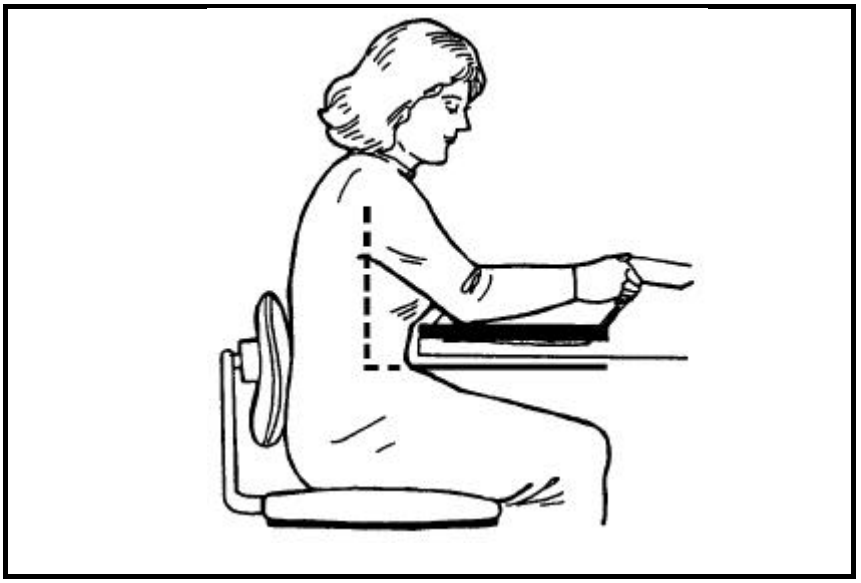


Figure 7 The work level should be above the elbow if work requiring precision is done on a level desk, for example, assembly work, as demonstrated in this figure. The work level chosen should be a compromise between the visual demands of the task and a suitable position of the arms.

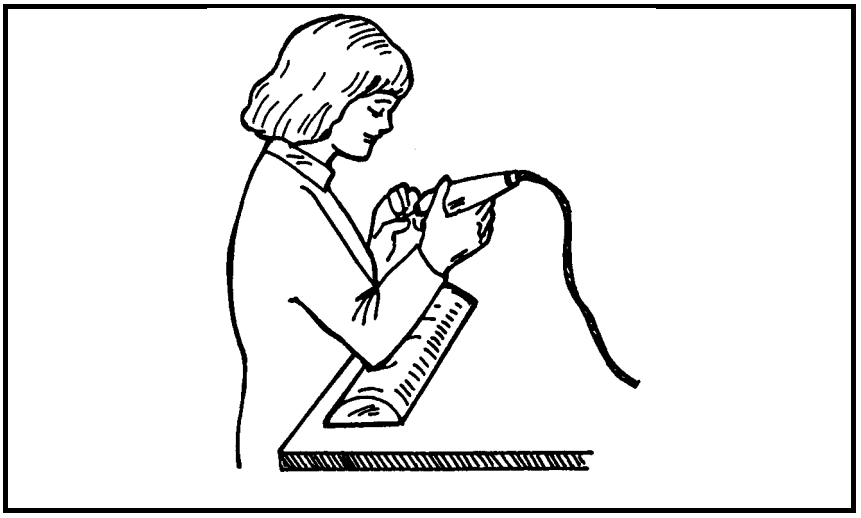


Figure 8 During work requiring great manual precision, the forearms should rest on suitably cushioned rests, which should be slightly above elbow level.

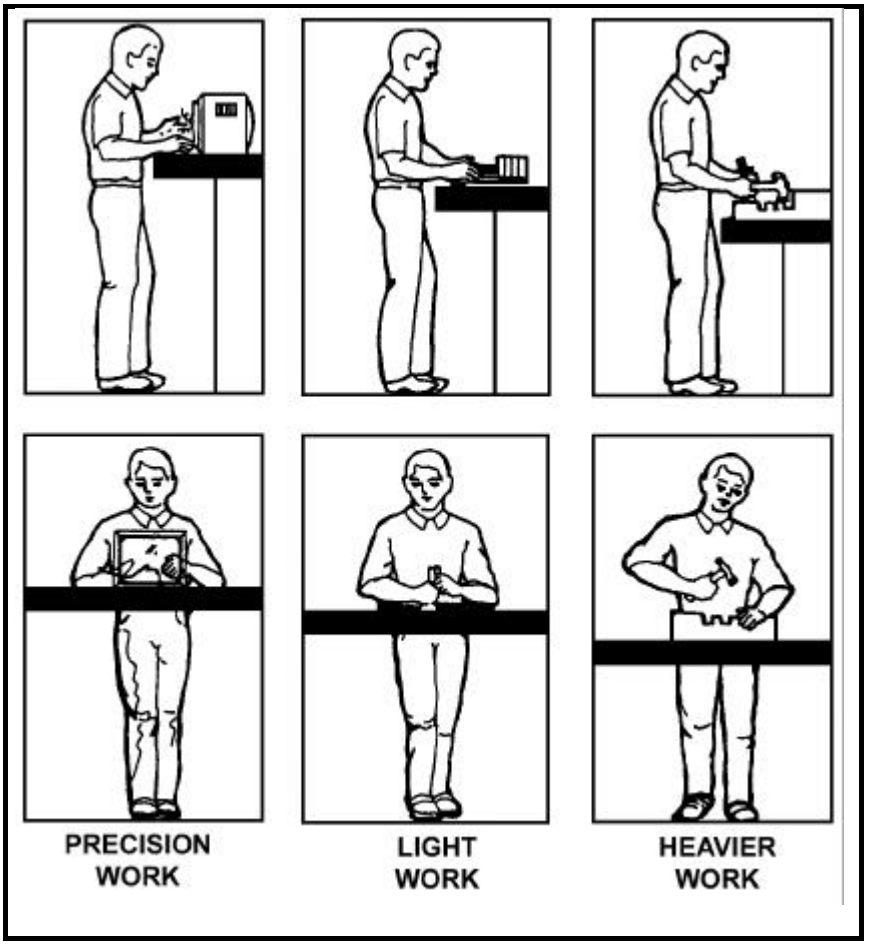


Figure 9 Work level heights for work performed while standing.

Visual Requirements

2.35 The viewing distance is determined by a number of factors, including:

- the accuracy required;
- lighting conditions;
- the task being undertaken; and
- the visual acuity of the worker.

2.36 Head and neck posture will be directly influenced by these demands. In the design of displays and controls, for example, visual requirements must be considered so that unnatural head and neck postures are avoided.

2.37 Precise manual work is also visually demanding.

2.38 The use of sloping work surfaces may be necessary for some tasks to meet visual and postural demands (see Figure 10).

Work Layout[6]

2.39 During manual work, the shoulders should be relaxed, and the upper arms close to the sides of the body. As the angle between the upper arm and the body widens, there is increasing strain on the muscles supporting the shoulder blade and the posture of the upper arm.

2.40 Static work in the shoulder muscles is increased by:

- sustained elevation of the shoulders;
- sustained elevation of the arm, the tool being held, and/or the object of work;
- wide, rapidly repeating work movement; and
- the mass of the object being held.

2.41 Reaching too far to grasp and pick things up can:

- lead to excessive movement of the trunk, neck and limbs;
- increase the probability of error; and
- increase the risk of musculoskeletal strain.

2.41 Use the following principles and Figure 11 as a guide:

- Work or controls of highest priority, highest frequency of use, longest duration of use, or requiring the application of a large force, speed or accuracy, should be placed so that the operator's upper arm and shoulder range of movement is minimised (***optimum reach zone***). This work should be positioned so that the forearm rarely needs to be held above the horizontal.
- Work activities of low priority, low frequency or short duration can be placed in the ***maximum reach zone*** still within the limits of reach.

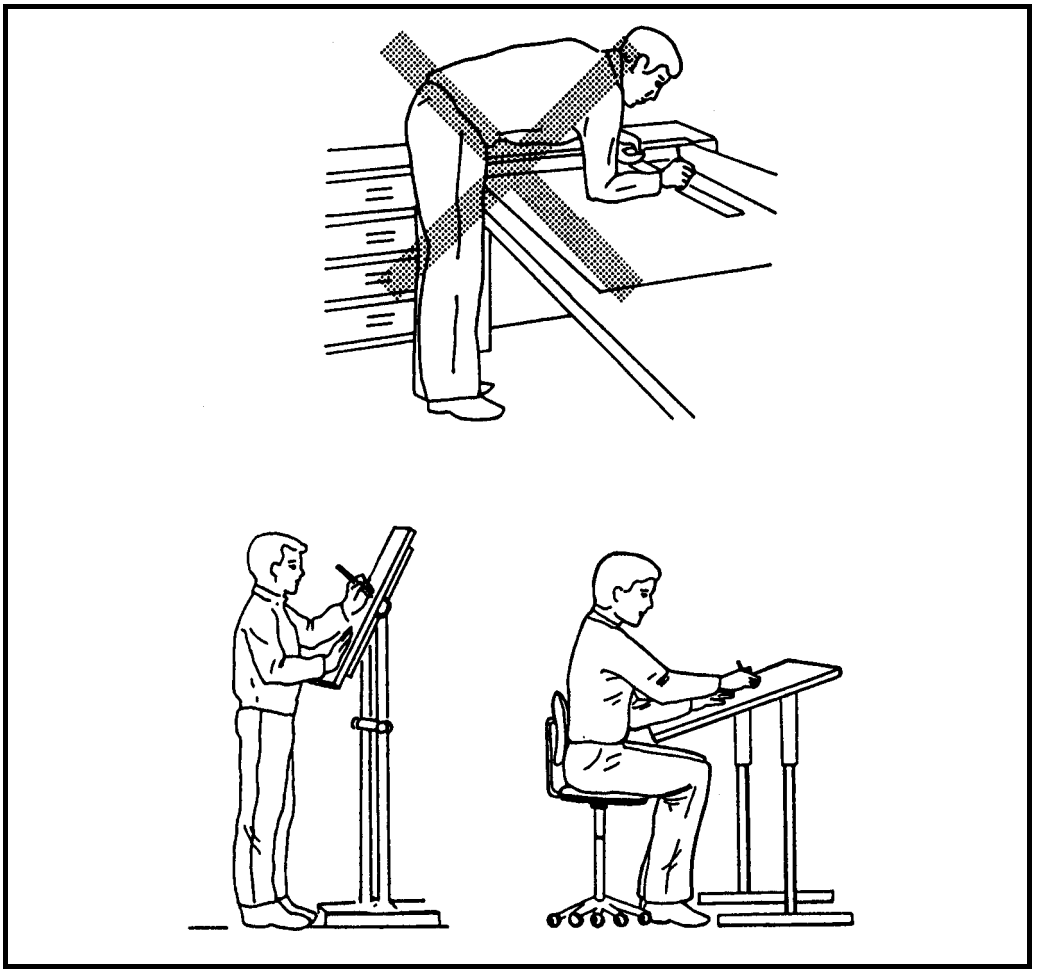


Figure 10 The use of sloping work surfaces may be necessary for some tasks to meet visual and postural demands.

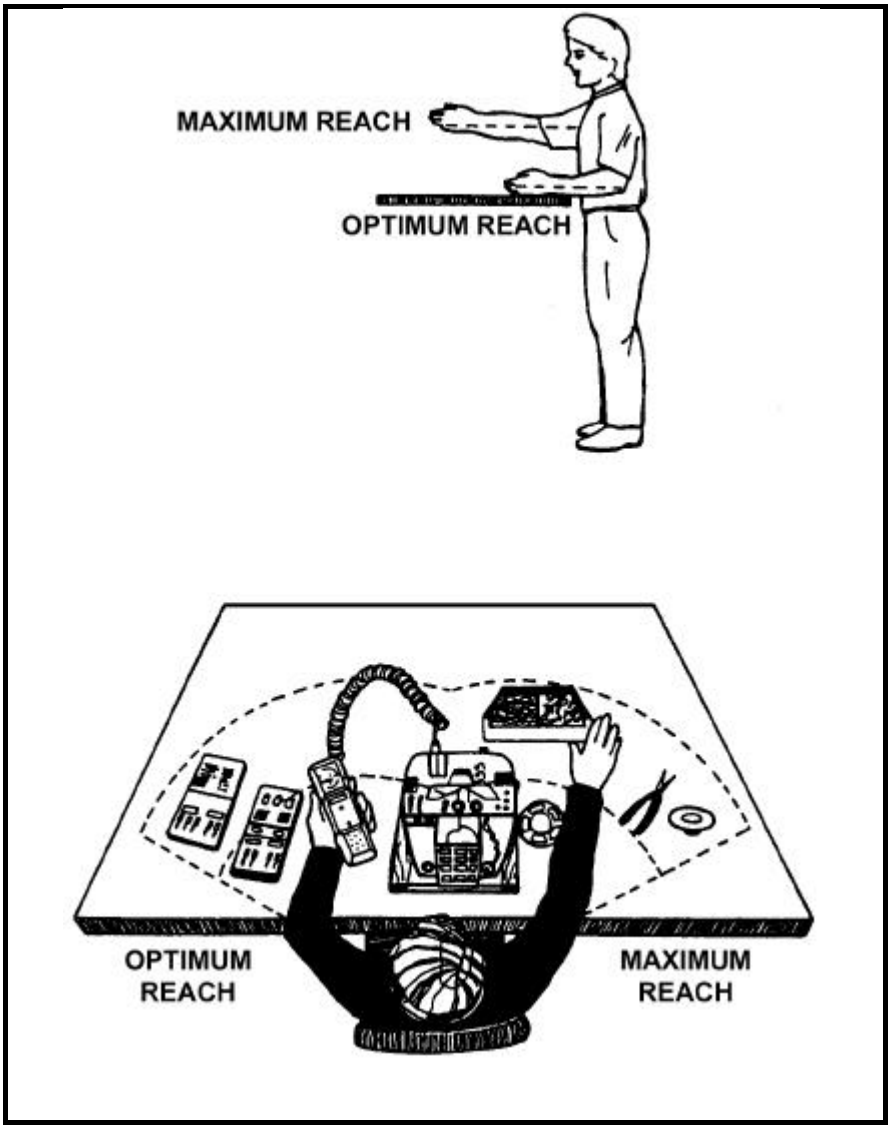


Figure 11 Work or controls of highest priority, highest frequency of use, longest duration of use, or requiring the application of a large force, speed or accuracy, should be placed so that the operator's upper arm and shoulder range of movement is minimised.

2.43 Follow the above principles of work layout and avoid the stressful and fatiguing postures shown in Figure 12.

2.44 In some situations work layout can be redesigned to facilitate better posture as shown in Figure 13.

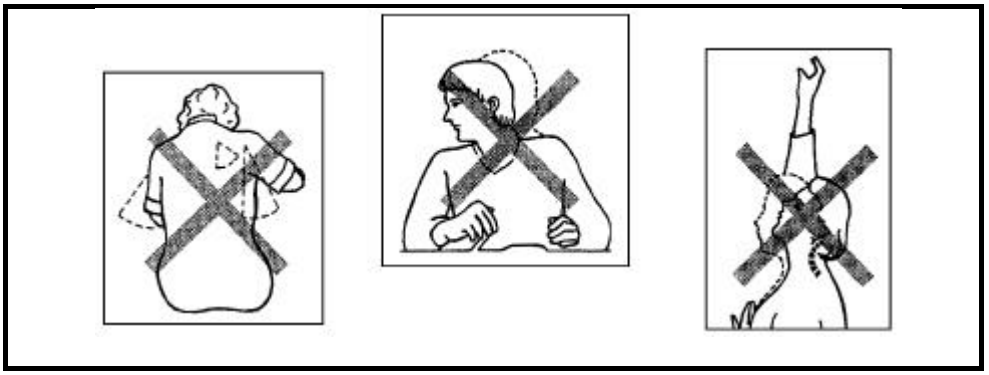


Figure 12 Avoid these stressful and fatiguing postures.

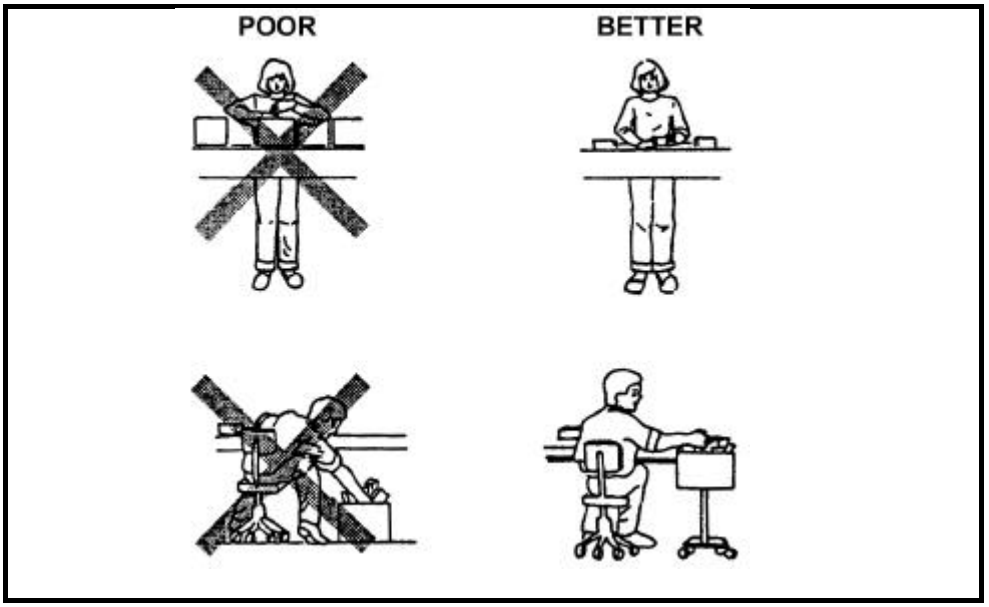


Figure 13 Examples of beneficial redesigns of work layout.

2.45 In other cases, entire workstations can be repositioned (see Figure 14).

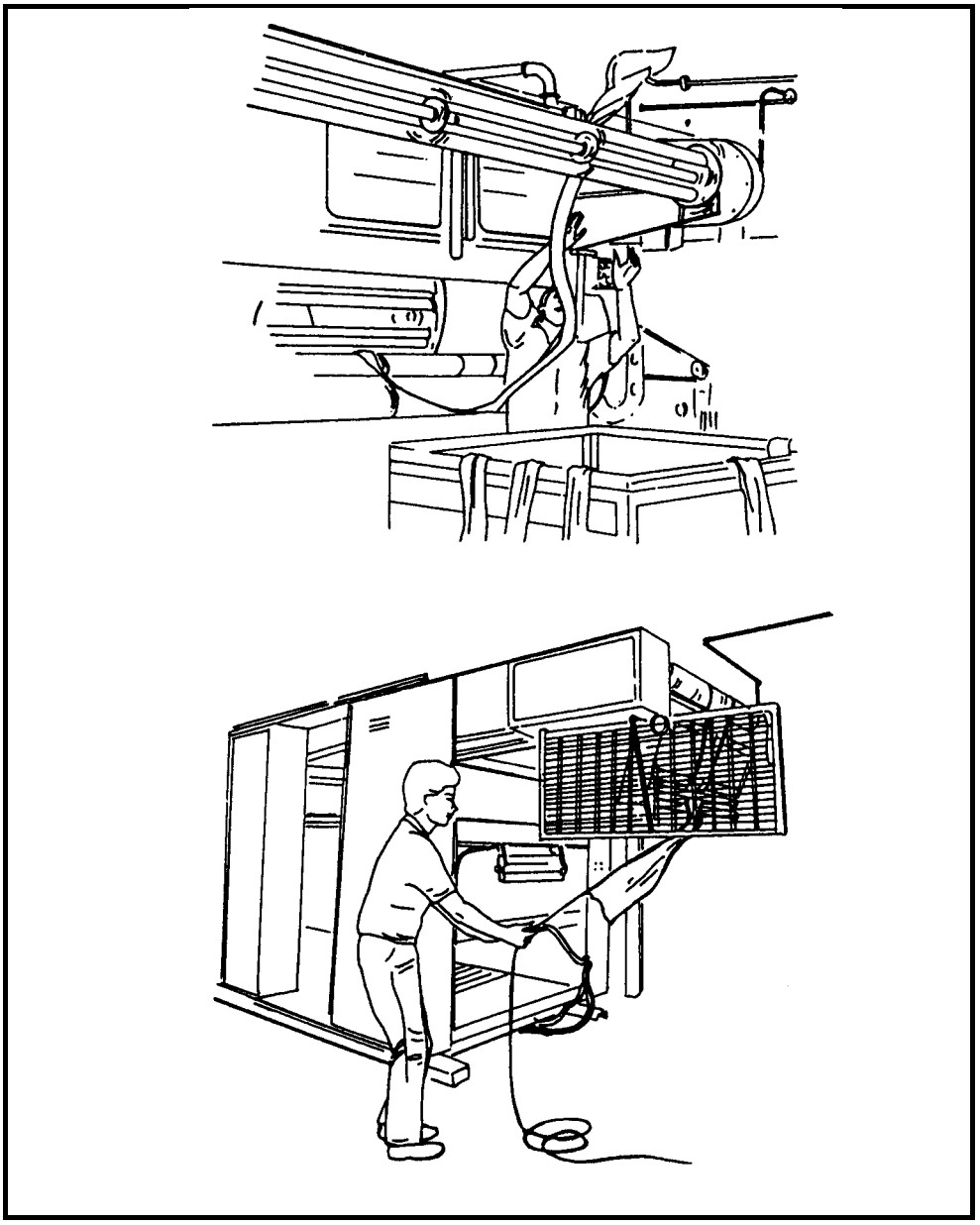


Figure 14 Repositioning of an entire workstation. Previously each fabric length was thrown over high rollers and physically pulled through the rollers. With the new system, a feeder wire is attached to the end of each fabric length and mechanically fed through the rollers.

Workloads

2.46 Use appropriate organisation and design of work systems and workplaces to control workloads which, combined with frequent movements, contribute to occupational overuse syndrome. Particularly important are the:

- weight of loads carried;
- size of loads carried;
- shape of loads carried;
- location of loads carried;
- difficulty in pushing and/or pulling loads; and
- frequency of the movements.

2.47 Some helpful design principles are illustrated in Figure 15.

Displays and Controls

2.48 The appropriate design, selection, arrangement and identification of displays and controls is essential for the correct, safe operation of machines and equipment, and will ensure correct body posture of operators.

2.48 A sensible layout of both controls and display instruments will[7]:

- make supervision easier;
- reduce the risk of confusion caused by false readings;
- reduce psychological and physical stress; and
- reduce visual and postural strain.

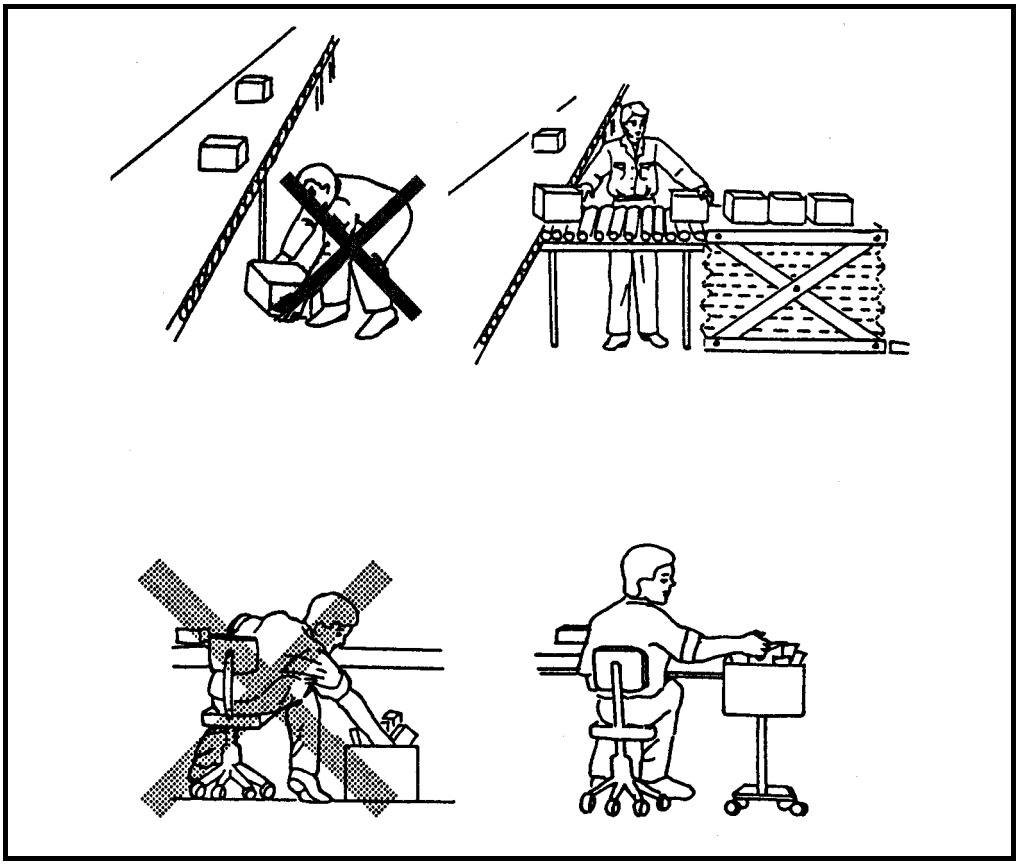


Figure 15 Reduction of postural load through workload redesign.

2.50 The following guidelines will assist in the selection and positioning of controls [7]:

- Controls should take account of the anatomy and functioning of the limbs (see Figure 16). Fingers and hands should be used for quick, precise movements; arms and feet for operations requiring force.
- Hand-operated controls should be easily reached and grasped, between elbow and shoulder height, and in full view.

- Distance between controls must take account of human anatomy. The size of knobs, switches or controls relates to whether they are operated by the fingers or the whole hand.

- Push-buttons, tumbler switches and rotating knobs are suitable for operations needing little movement or muscular effort, small travel and high precision, and for either continuous or stepped operation (clickstops).

- Long-armed levers, cranks, hand-wheels and pedals are suitable for operations requiring muscular effort over a long travel, and comparatively little precision.

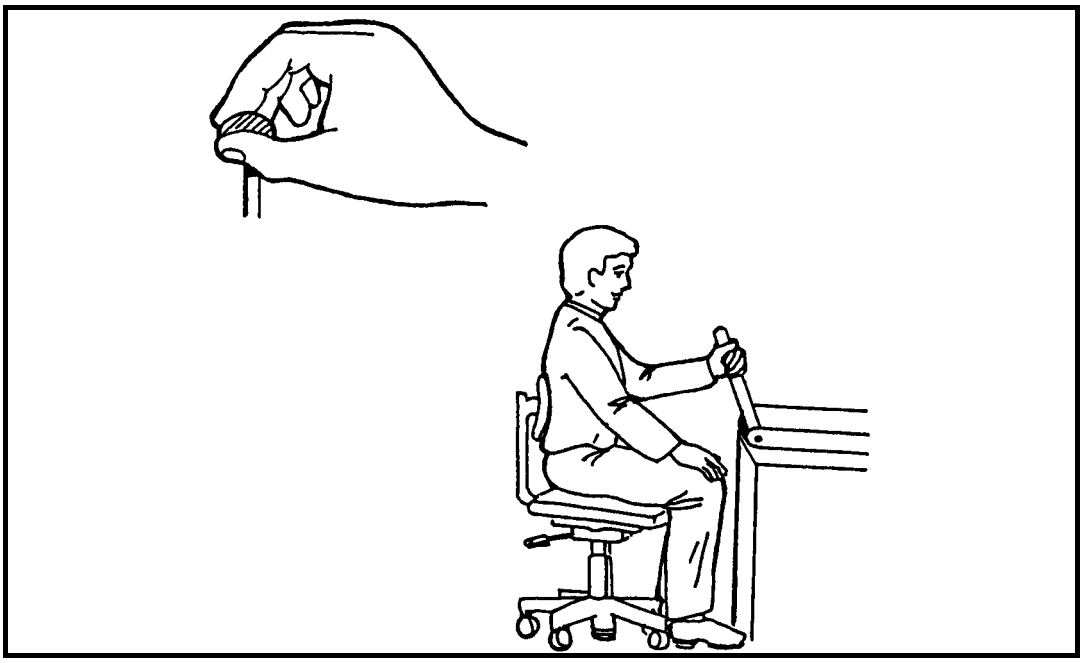


Figure 16 Controls should take account of the functioning of the limbs. Fingers and hands should be used for quick, precise movements and arms or feet for operations requiring force.

Foot Controls

2.51 Foot pedals are useful when great effort and/or speed is required.

2.52 Some helpful design principles for foot controls are:

- Where only light foot pressure is required for pedals, the operator should be seated. The pedal should be operated with the heel on the floor and the foot resting on the lower edge of the pedal (see Figure 17).
- Where heavy pressure is needed and the whole leg is brought into use, the initial resistance must be enough to support the weight of the leg resting on the pedal. Pressure should be applied with the ball of the foot, and the operator should be seated.
- Machines with foot and hand controls are not recommended if the operator stands while working. If a foot pedal cannot be avoided, it should be restricted to operating an on/off switch of the type shown in Figure 18.

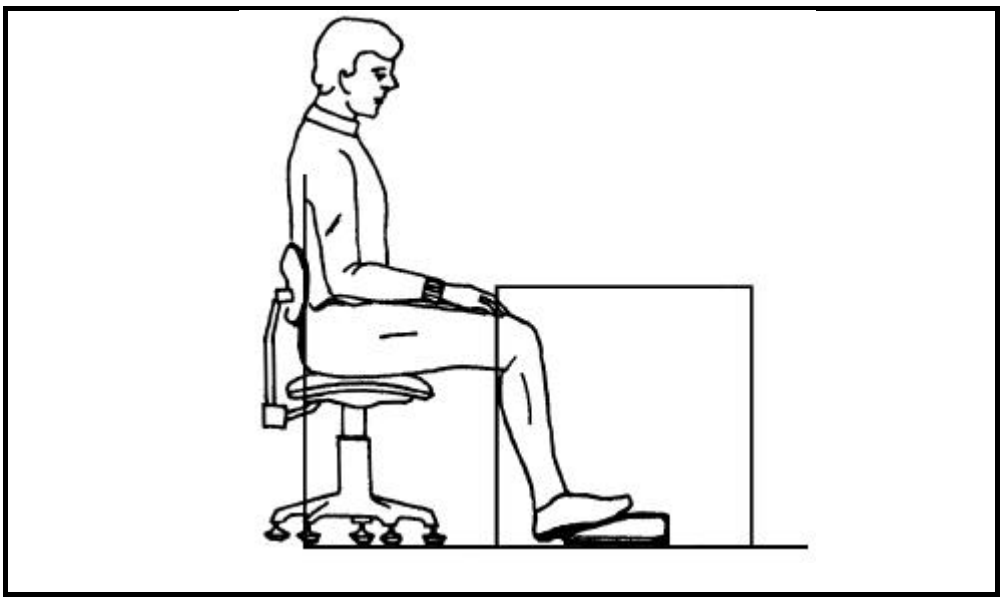


Figure 17 Pedal operation with light foot pressure.

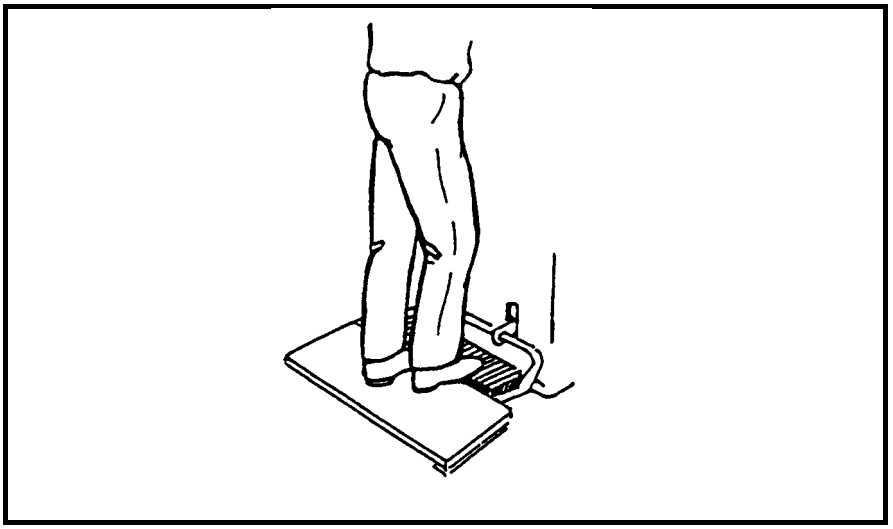


Figure 18 Pedal-operated on/off switch able to be used with either foot.

Work Tools

2.53 The overall aim in the design, selection and use of hand tools is to ensure a safe and effective relationship between the worker and the hand tool[8].

2.54 An efficient hand tool should[9]:

- be appropriate for the task to be undertaken;
- be properly proportioned to the dimensions of the user;
- be appropriate to the strength and endurance of the user;
- minimise user fatigue;
- be selected in consideration of the work level height; and
- be maintained correctly.

Work Tool Orientation and Wrist Positions

2.55 Problems can arise with prolonged use of extreme positions, repetition of movements and use of excessive force.

Hand and Arm Movements

2.56 Hand movements are defined, with illustrations, in the Glossary of Terms.

2.57 Some guidelines for hand and arm movements in the workplace are:

- The number and angular range of wrist movements in a repetitive cycle should be kept to a minimum. Holding the wrist in an extended position for long periods should also be avoided.
- Replace excessive wrist motions with a greater arm movement, where possible.
- Bending or twisting the wrist, as shown in Figure 19, should be avoided, particularly over long periods or if using heavy pressure.
- Handles on many hand-held tools can be redesigned to bend the tool rather than the wrist and are shown in Figure 20.
- Choosing tools to avoid bent wrist postures requires analysis of the work situation, with particular concern for the orientation of the work surface, as shown in Figure 21.

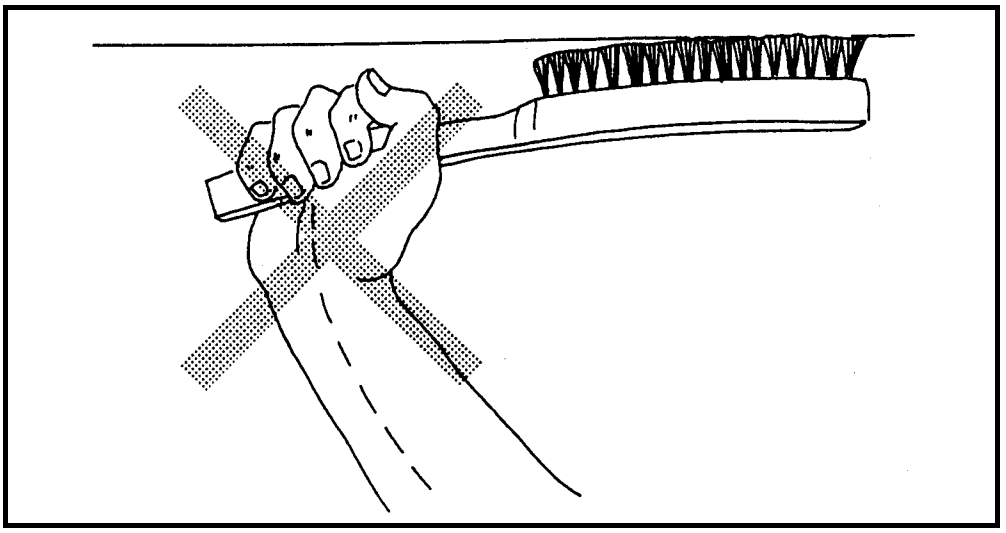


Figure 19 Bending or twisting of the wrist should be avoided.

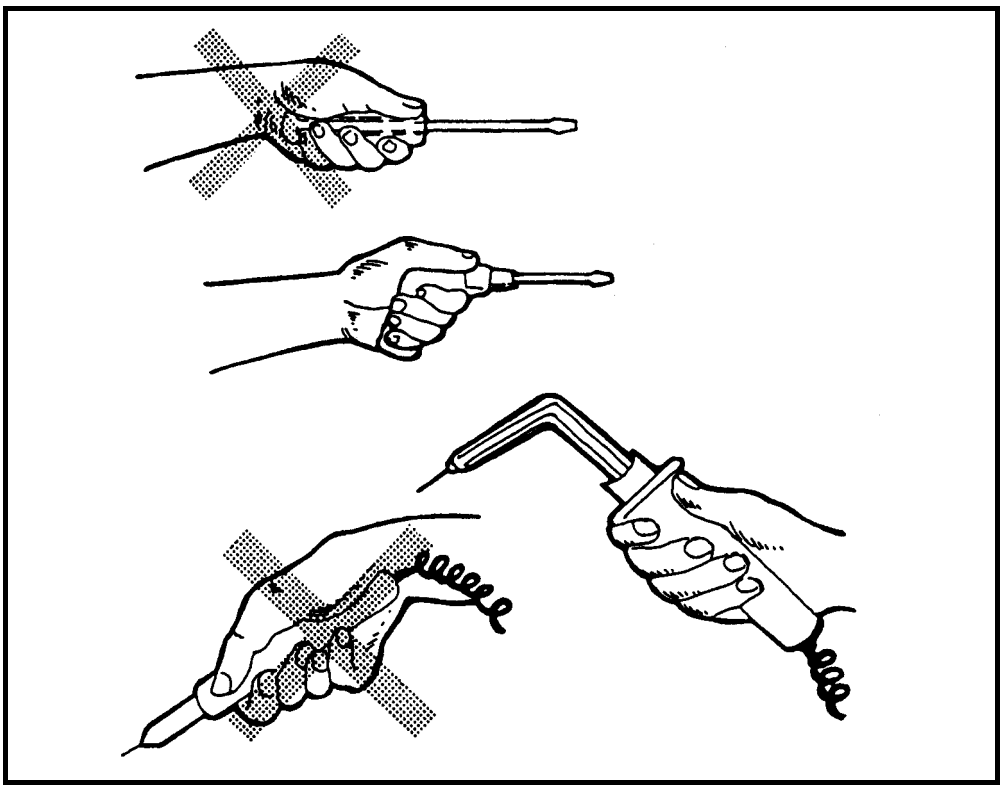


Figure 20 Examples of tool redesign.

Grip Types and Forces

2.58 Grip types are listed, with illustrations, in the Glossary of Terms.

2.59 Pinch grips should be replaced with power grips where possible. Neither type of grip should be held for a prolonged period.

2.60 Operators should be trained in the appropriate use of grips, including how to use alternate hands for tasks that require prolonged gripping.

2.61 Principles relevant to grip types are outlined in Figure 22.

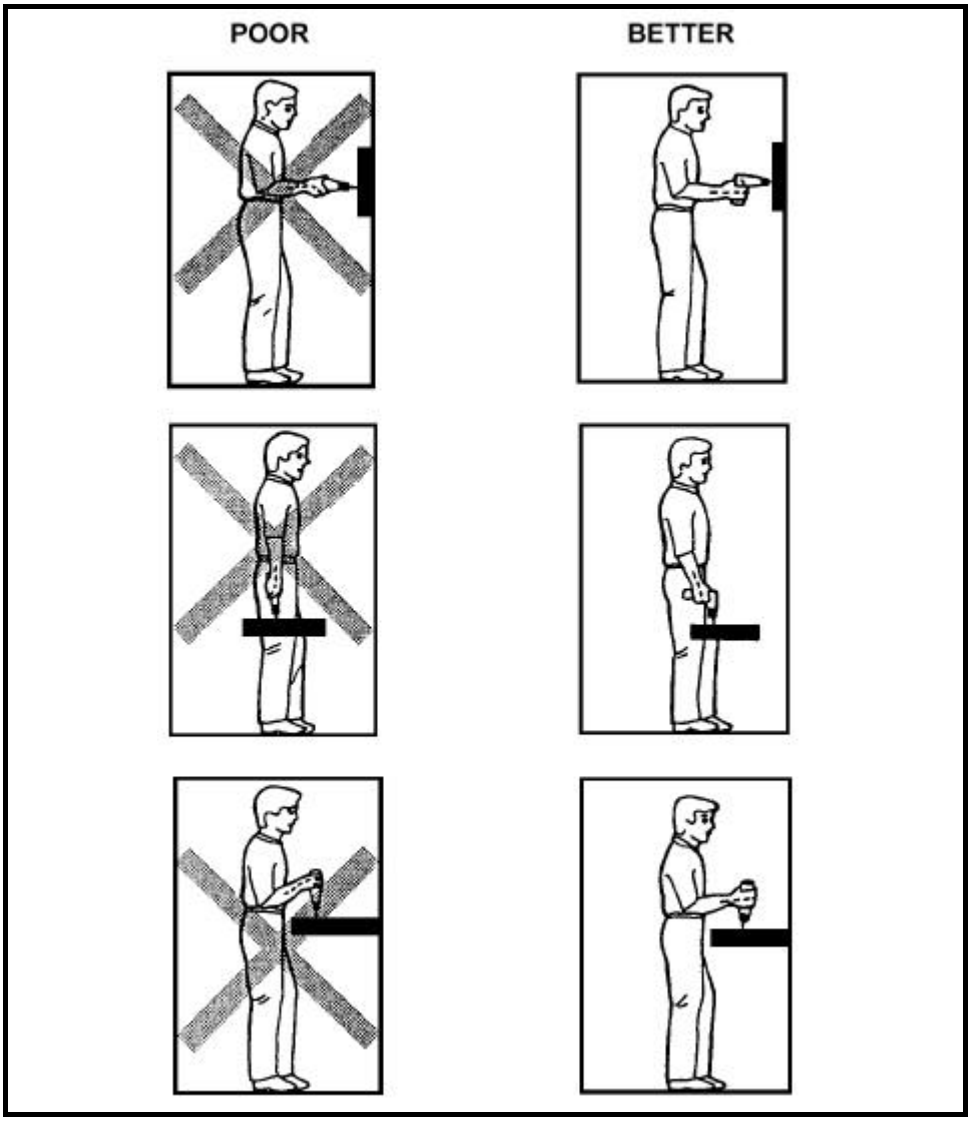
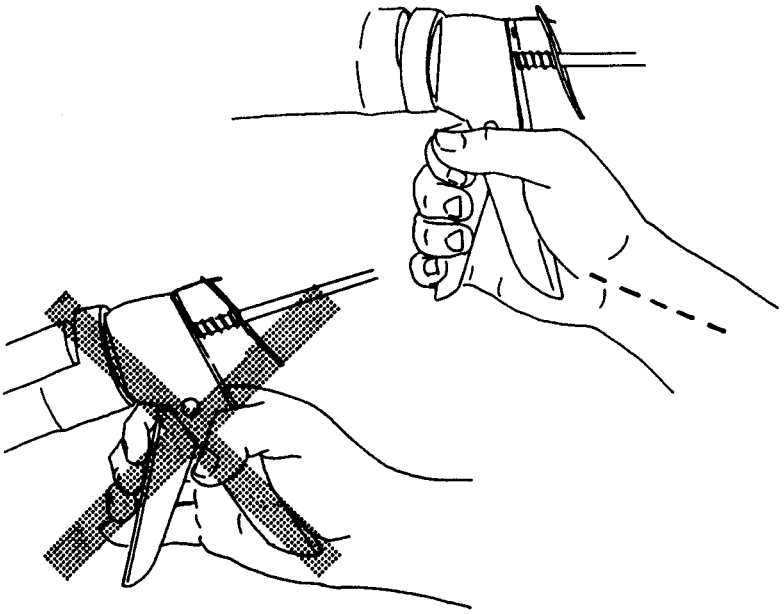


Figure 21 Orientation of work surfaces. Choosing tools to avoid bent wrist postures requires analysis of the work situation, with particular concern for the orientation of the work surface.

The need for excessive force in power grips, as in cutting heavy wires or using a caulking gun, should be avoided, but if it cannot be, care must be taken to keep the wrist straight.



Excessively wide grip spans, as in gripping wide-opening tool handles or a large object in one hand, should be avoided. In particular, thumb movement through a wide angular range and against resistance, as in using scissors to cut heavy materials, should be avoided[8].

Figure 22 Grip types.

Size and Shape of Work Tools[10]

2.62 Some principles in respect of the size and shape of work tools are:

- Operators should be able to hold the tool in one hand, leaving the other hand free for guiding.
- Tools should be lightweight and well-balanced.
- The tool handle should be easily grasped by both small and large-handed workers. The actual width for an individual tool will of course vary with its function, that is, precise versus power tools.

· Excessive sloping of tool handles, such as providing separate grooves for each finger, should be avoided.

· The tool handle should be long enough so that the end of the handle does not dig into the palm of the hand, where it may impair blood circulation (see Figure 23).

Triggers[8]

2.63 Triggers should be designed to be easily used without causing operator fatigue.

Shock Loading

2.64 The following types of shock loadings should be avoided[7]:

· repeated shocks to the hand and wrist as in the repetitive use of hammers for assembly, tugging at cloth, wires or threads; and

· using jerky movements or sustaining sharp torque reactions from hand held power tools.

2.65 Such shock loadings, while harmless in isolation, with repetition over a sustained period, may have a cumulative damaging effect[2].

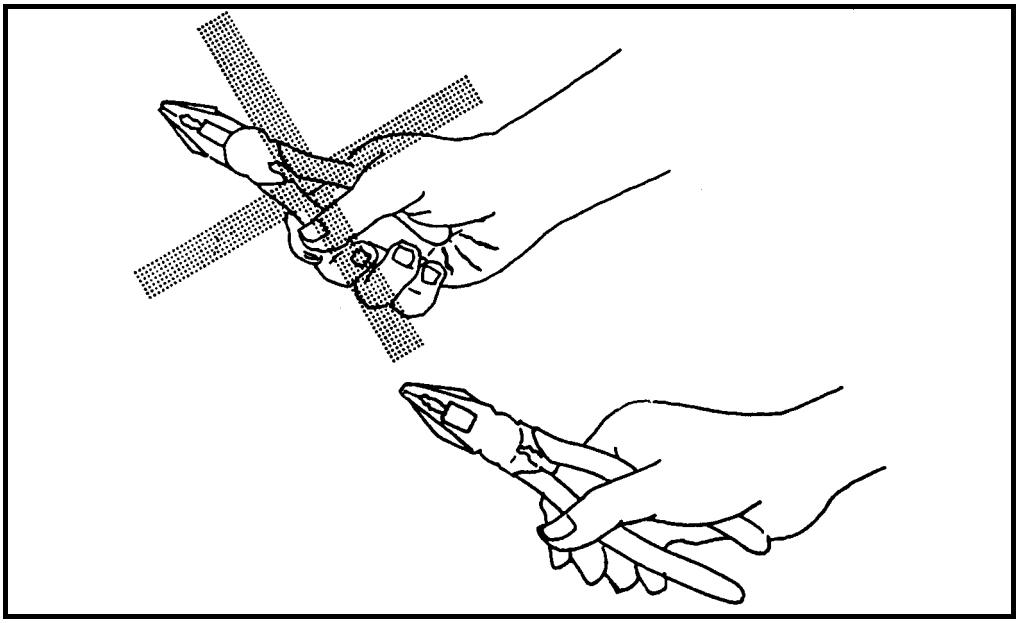


Figure 23 Length of hand tools. The tool handle should be long enough so that the end of the handle does not dig into the palm of the hand.

Vibration

2.66 Vibration to the hand and arm from hand-held power tools should be avoided[10].

2.67 Care should be exercised to minimise the transmission of vibration from hand-held power tools to the arms by isolating the source of vibration. For example, chainsaw vibration transmitted to the hands can be reduced by the use of anti-vibration mountings for the engine or handles.

2.68 If isolating the source of vibration is not possible, other methods of control, such as the reduction of exposure times, should be used.

***Balancers*[11]**

2.69 Consideration should be given to suspending power tools from balancers for relieving operator fatigue in situations involving highly repetitive work in industry. Well-designed balancers will counteract the effect of gravity and relieve the hand of torque reactions (see Figure 24).

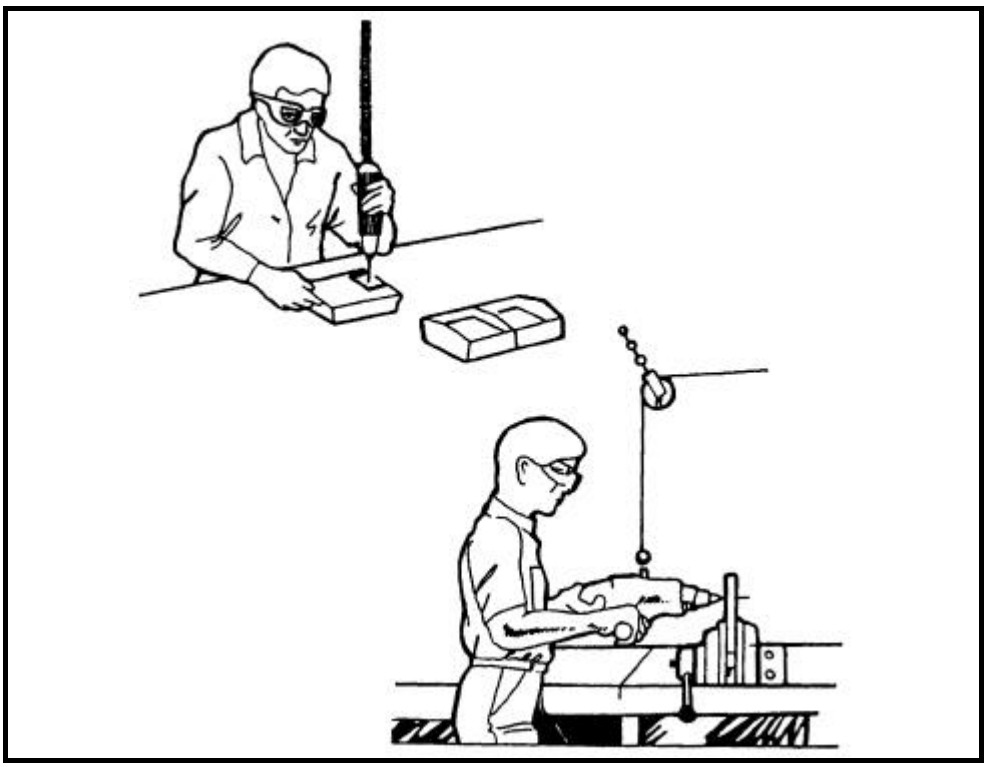


Figure 24 Use of balancers. Well designed balancers will counteract the effect of gravity and relieve the hand of torque reactions.

Physical Work Environment

2.70 The physical work environment, which includes noise, atmospheric conditions and lighting, will greatly influence the ability of the worker to perform efficiently, while minimising fatigue and musculoskeletal strain.

Noise

2.71 For worker health and efficiency, it is essential to provide an appropriate auditory environment

2.72 Noise, defined as unwanted sound, can have several adverse effects, the most severe of which is permanent hearing damage[10]. It can also[4]:

- cause temporary hearing loss;
- interfere with communication;
- mask warning signals;
- cause considerable annoyance;
- reduce mental performance;
- promote stress and increased muscle tension; and
- cause distractions and interfere with concentration.

2.73 For further information in this area, readers are referred to:

- Australian Standard AS 1269 *Acoustics - Hearing Conservation*[12]*;* and
- the National Commission's *National Strategy for the Prevention of Occupational Noise-induced Hearing Loss*[l3] [NOHSC:4004(1989)] which provides the framework for coordinated action to assess and prevent occupational noise-induced hearing loss.

Atmospheric Conditions

2.74 Poor atmospheric conditions can reduce efficiency, concentration and safety, and can also increase fatigue, stress and errors. Under severe conditions, health may be affected.

2.75 For further information in this area, readers are referred to:

- the Department of Employment and Industrial Relations' (Commonwealth) publications:
  - *Thermal Comfort at Work*[14], and
  - *Clean Air at Work*[15]; and
- Worksafe Australia's *Atmospheric Contaminants*[l6] [NOHSC:5008(1989)].

Lighting

2.76 Lighting needs vary from time to time, task to task, and from person to person. Adjustable task lighting should be provided to allow areas of low contrast and shadow to be illuminated where required.

2.77 For further information in this area, readers are referred to:

- the Department of Employment and Industrial Relations' (Commonwealth) publications:
  - *Daylight at Work*[17],
  - *Artificial Light at Work*[18], and
  - *Sunlight at Work*[19]*;* and
- Australian Standard AS 1680 *Code of Practice for Interior Lighting and the Visual Environment*[20].

TRAINING AND EDUCATION

2.78 Effective training and education programs are integral to the success of an overall strategy for the prevention of occupational overuse syndrome.

2.79 They can be used to supplement and enhance other training and education activities, such as induction training or management and supervision courses. If they are also designed in relation to the goals of the organisation's total health and safety policy and programs, they will be more successful.

2.80 The target groups requiring training are:

- managers;
- supervisors;
- designers and suppliers of equipment;
- employees;
- health and safety representatives/committees;
- union representatives;
- staff responsible for purchasing technology and equipment; and
- new employees or those newly engaged on a task.

2.81 The overall aims of training and education programs are to:

- increase understanding of both workers and managers of the health and safety implications of work practices; and

- increase the knowledge of both workers and management of hazard awareness and prevention strategies.

Types of Programs

2.82 Generally, all target groups should be provided with information on:

- the occupational health and safety policy of the organisation with regard to occupational overuse syndrome - its purpose, aims, content and application;
- causes of occupational overuse syndrome and preventive strategies;
- the development of a healthy and safe work environment and hence the prevention of occupational overuse syndrome; and
- the responsibilities of target groups in relation to occupational health and safety, both organisational and legal.

Target Groups

2.83 Each target group will require specific training and information relevant to their responsibilities and work duties.

Managers

2.84 In addition to the general information outlined above, managers should be provided with specific information on:

- the legal responsibilities of employers in relation to occupational health and safety; and
- the importance and application of organisational occupational health and safety policies and their inter-relationship with other organisational policies, such as human resource planning.

Supervisors

2.85 Supervisors should be provided with specific information, based on the organisational occupational health and safety policy, on:

- supervisory skills, including communications and human relations;
- the role of supervisors, particularly in relation to occupational health and safety;
- safe work procedures;
- normal human functioning at work and how to detect early signs of occupational overuse syndrome;
- specific responsibilities in terms of identifying high-risk tasks or unsafe practices and the supervisor's role in subsequent redesign;

- effective liaison with workers to facilitate the early detection and appropriate management of occupational overuse syndrome;
- the availability of resources to assist supervisors in fulfilling their role;
- the supervisor's role in the management of change and the introduction of new technology; and
- technical information:
  - the correct use of tools and machinery,
  - working postures, and
  - safe work procedures.

Employees

2.86 Employees should be provided with specific information on:

- safe work procedures;
- normal human functioning at work and detection of early signs of occupational overuse syndrome;
- the need for task variation and work pauses;
- reporting procedures once problems are suspected; and
- technical information:
  - the correct use of tools and machinery, and
  - working postures.

2.87 A distinction can be made between programs which address occupational health and safety issues and those which specifically deal with the technical and procedural aspects of manufacturing operations. While it is desirable that the emphasis of training and education programs be on the promotion of occupational health and safety, the success of such programs will be diminished unless workers and supervisors are appropriately trained in the technical and procedural elements of their work. Both types of programs are relevant, interdependent and should be integrated.

Purchasing Staff

2.88 Staff responsible for selecting/purchasing equipment should be provided with information on:

- the ergonomic aspects of equipment, and the means of providing for both the human and organisational needs;

- the health and safety hazards associated with equipment of low quality and the need for a preventive approach; and
- relevant regulations, standards, codes of practice and guidelines.

Health and Safety Representatives/Committees

2.89 Training programs for health and safety representatives should cover the following topics:

- the ergonomic design of the task, job and work processes which would include discussion of work rates, peak demands and work adjustment periods;
- technical information related to the equipment/technology in use;
- the health and safety hazards associated with the technology in use and the work environment in which the technology is used;
- regulations, standards, codes of practice and guidelines governing the use of the technology; and
- relevant policies of management, unions and government.

3. OCCUPATIONAL OVERUSE SYNDROME INDIVIDUAL WORK AREA CHECKLIST

3.1 This chapter provides a checklist which will assist supervisors to identify and assess problems associated with individual work areas.

OCCUPATIONAL OVERUSE SYNDROME
INDIVIDUAL WORK AREA CHECKLIST

This checklist will enable supervisors to identify problems associated with individual work areas. It may not cover all problems encountered but will provide a basis for action. It is recommended that issues identified through this checklist be brought to the attention of management so that appropriate action can be taken.

For further information on any of the issues raised in this checklist, refer to the National Occupational Health and Safety Commission's *Guidance Note for the Prevention of Occupational Overuse Syndrome in the Manufacturing Industry* [NOHSC:3015(1996)], Australian Government Publishing Service, Canberra, 1996.

Name . . . . . .

Type of work . . . . . .

Location . . . . . .

Supervisor . . . . . .

Checklist completed by . . . . . .

Date . . . . . .

Issues identified*	**Comment/action**
. . . . .	. . . . .
. . . . .	. . . . .
. . . . .	. . . . .
. . . . .	. . . . .
. . . . .	. . . . .
. . . . .	. . . . .
. . . . .	. . . . .

*** Consider all items answered 'NO' on the checklist and list issues identified.**

1. WORK SYSTEMS: ORGANISATION AND DESIGN

		YES	NO
1.1	Does the person have a variety of tasks in a work day?	☐	☐
	If YES, does the person have some control over the order in which they are done?	☐	☐
1.2	Does the person consider that the workrates are within their capacity?	☐	☐
	If NO, have they been reviewed recently?	☐	☐
1.3	Does the person have any control over the pace of work?	☐	☐
1.4	Are work cycles of a reasonable length so that work is not highly repetitious?	☐	☐
1.5	Is the workload reasonably constant? *(This Is preferable to sudden increases in workload or working overtime.)*	☐	☐
1.6	Does the person work a standard working week?	☐	☐
1.7	Is remuneration based on a flat wage? *(If bonus or incentive schemes are in operation, is the speed of production the sole criterion?)*	☐	☐
1.8	Have work pauses been taken as appropriate?	☐	☐
1.9	If the person is a new staff member, or has returned recently from leave, did he/she have a period to adjust to the workload?	☐	☐
1.10	Does the person have any opportunity to participate in decision making relevant to his/her work?	☐	☐

2. WORKPLACES: ORGANISATION AND DESIGN

Work Posture		YES	NO
2.1	Does the person have the opportunity to sit or stand at the work area?	☐	☐
2.2	Is there sufficient space to allow freedom of movement at the work area? (For example, when seated, there should be sufficient space for the person to move and stretch their legs.)	☐	☐

2. WORKPLACES: ORGANISATION AND DESIGN (continued)

Standing *If the person is required to stand while working, the following questions are relevant:*		**YES**	**NO**
2.3	**Is a footrest available?**	☐	☐
2.4	**Is the floor surface appropriate? (*The harder and less giving the surface, the more stress this places on the body.)***	☐	☐
2.5	**Is a chair or stool provided?**	☐	☐

Sitting *If the person is required to sit while working, the following questions are relevant:*		**YES**	**NO**
2.6	**Does the person find the seat comfortable?**	☐	☐
2.7	**Is it easy for the person to get into and out of the chair?**	☐	☐
2.8	**Does the seat height allow correct positioning of the legs? *(The person's thighs should be parallel to the floor with the feet resting on the floor or on* a *footrest.)***	☐	☐
2.9	**Does the backrest adequately support the lumbar area?**	☐	☐

Work Level Height		**YES**	**NO**
2.10	**If the task requires considerable strength and/or a wide range of arm movements, is the work level slightly below the elbow?**	☐	☐
2.11	**If the task requires precision, such as in the assembly of electronic equipment, is the work level slightly above the elbow?**	☐	☐

Work Layout		**YES**	**NO**
2.12	**Can most of the work be performed with the upper arms in a relaxed position close to the body?**	☐	☐
2.13	**Are all frequently handled items within easy reach?**	☐	☐
2.14	**Is the work area designed to prevent undue bending and/or twisting of the neck or trunk?**	☐	☐

2. WORKPLACES: ORGANISATION AND DESIGN (continued)

Work Layout (continued)		YES	NO
2.15	Are displays easily read from the person's usual work position?	☐	☐
2.16	Are frequently used and important controls within easy reach?	☐	☐
2.17	Are controls easily grasped and operated?	☐	☐

Work Tools		YES	NO
2.18	Are the work tools appropriate for the tasks?	☐	☐
2.19	Do tool handles fit comfortably in the person's hand? (*Consider shape, circumference, length, texture.)*	☐	☐
2.20	During its use, does the hand tool allow the person to keep his/her wrist in a neutral position?	☐	☐
2.21	Is the hand tool light-weight and balanced?	☐	☐
2.22	Are excessive grip strengths and grip spans avoided?	☐	☐
2.23	Is excessive vibration from hand held power tools avoided?	☐	☐
2.24	Are balancers used to suspend power tools where appropriate?	☐	☐
2.25	Are work tools maintained in good condition?	☐	☐

3. TRAINING AND EDUCATION

		YES	NO
3.1	Has the person received instruction in technical skills relevant to the job?	☐	☐
3.2	Has the person received training and education in occupational health and safety?	☐	☐

National Occupational Health and Safety Commission

NATIONAL CODE OF PRACTICE FOR THE PREVENTION OF OCCUPATIONAL OVERUSE SYNDROME [NOHSC:2013(1994)]

JUNE 1994

Australian Government Publishing Service
Canberra

APPENDIX 2

SOCIAL FACTORS IN WORK SYSTEM DESIGN/REDESIGN

A2.1 When work systems are being designed or redesigned, consider the following factors.

VARIETY

A2.2 People should be able to vary the tasks they do, work at different speeds and move about while carrying out their jobs. Repetitive short cycle tasks should be avoided where possible, especially if they are machine paced.

AUTONOMY

A2.3 People should be involved in decisions related to their job such as the method of work and the order in which tasks are carried out, particularly, when changes are planned.

IDENTITY

A2.4 Tasks should fit together to make a complete job, as when someone makes a complete article or product.

FEEDBACK

A2.5 Effective feedback links will allow valuable information to be passed to and from workers.

SOCIAL CONTACT

A2.6 Most, but not all, people desire to have contact with other people as part of their job. On the other hand, they also like to be able to choose to have some privacy.

ACHIEVEMENT

A2.7 People like to be able to go home at the end of the day feeling they have done a useful job and have achieved something.

OPPORTUNITIES FOR LEARNING AND DEVELOPMENT

A2.8 Although this might seem an unattainable aim in every job, it is usually possible to provide off-line opportunities for training and development.

OPTIMAL LOADING

A2.9 Too much, or too little, work can lead to strain. A balance has to be sought, but this may be difficult to achieve in practice because the right levels vary greatly from person to person.

JOB ENRICHMENT

A2.10 Job enrichment refers to the process of adding decision-making responsibility, planning and autonomy to the job. For example, in highly automated processes, there is less cycle dependence and workers may become involved in additional tasks such as planning, scheduling and quality control.

JOB ENLARGEMENT

A2.11 In job enlargement, additional tasks are added to a job in order to make the job more varied and interesting. For example, a fragmented production line job may be enlarged to a bench job in which a whole assembly is completed.

JOB ROTATION

A2.12 Job rotation involves the planned interchange of jobs among a group of workers at regular intervals in order to vary each worker's tasks. In this way, postures are varied, stressful tasks are shared and interest and versatility are increased.

A2.13 Job rotation, however, should be used only as a temporary solution until it is possible to introduce the necessary workplace design modifications to permanently eradicate hazardous tasks.

GLOSSARY OF TERMS

Consultation

Means the sharing of information and exchange of views between employers, employees and employee representatives. It includes the opportunity to contribute to decision making in resolving occupational overuse syndrome risks.

Dynamic muscle effort (work)

Characterised by a rhythmic alternation of contraction and extension, or tension and relaxation of muscles, for example, cranking a wheel. Movement occurs.

Employee

Means an individual who works under a contract of employment, apprenticeship or traineeship.

Employee representative

Includes an employee member of a health and safety committee where established in the workplace, or a person elected to represent a group of employees on health and safety matters.

Employer

Means a corporation or an individual who employs persons under a contract of employment, apprenticeship or traineeship.

Note: The definition of employer includes the ***self-employed*** which means a person who works for gain, other than under a contract of employment, apprenticeship or traineeship, whether or not that person employs others.

Ergonomics

The scientific study of the capabilities and limitations of workers in relation to a work system, machine, or set task, and in relation to the physical, psychological and social environment in which they work, with the aim of promoting the well-being, safety and productivity of those workers.

Extreme (awkward) postures

Body postures where the mechanical and physiological mechanisms of joints, muscles and soft tissues are jeopardised.

Force

Means any action that tends to maintain the position of an animate of inanimate object, to alter the position the object, or to distort it.

Grip types (see Figure 25 below)

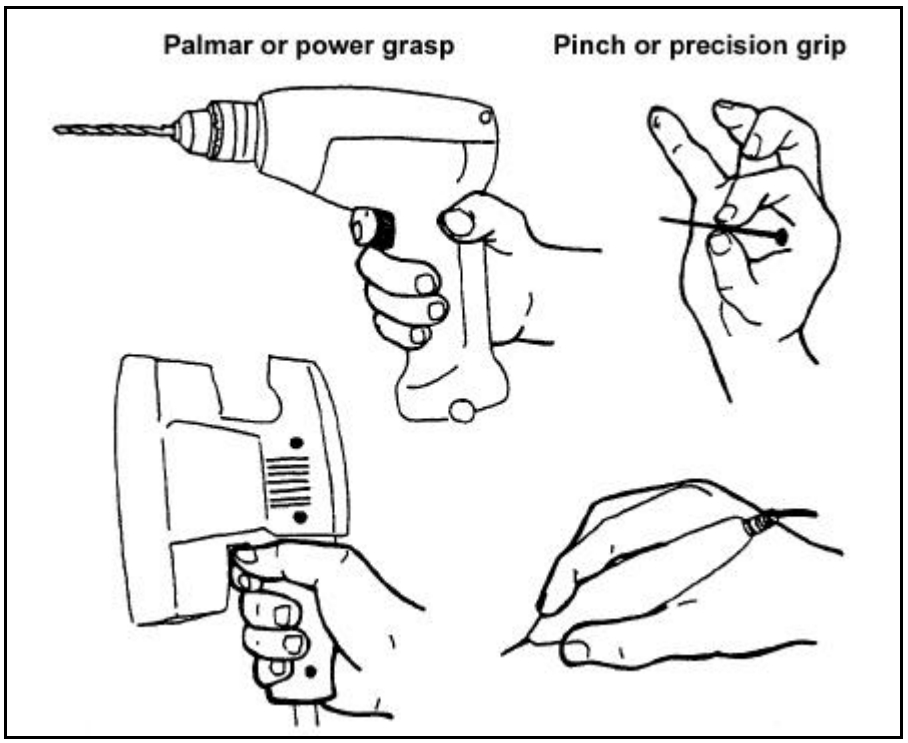


Figure 25 Grip types.

Hand and arm movements (see Figure 26)

Hazard

Means the potential to cause harm or injury.

Human factors

The capabilities and limitations of workers in relation to a work system, machine, or set task, and in relation to the physical, psychological and social environment in which they work.

Musculoskeletal system

The musculoskeletal system is comprised of bones, joints, muscles, connective tissue and the interaction of these. It provides the body with structure, support, strength, movement and protection.

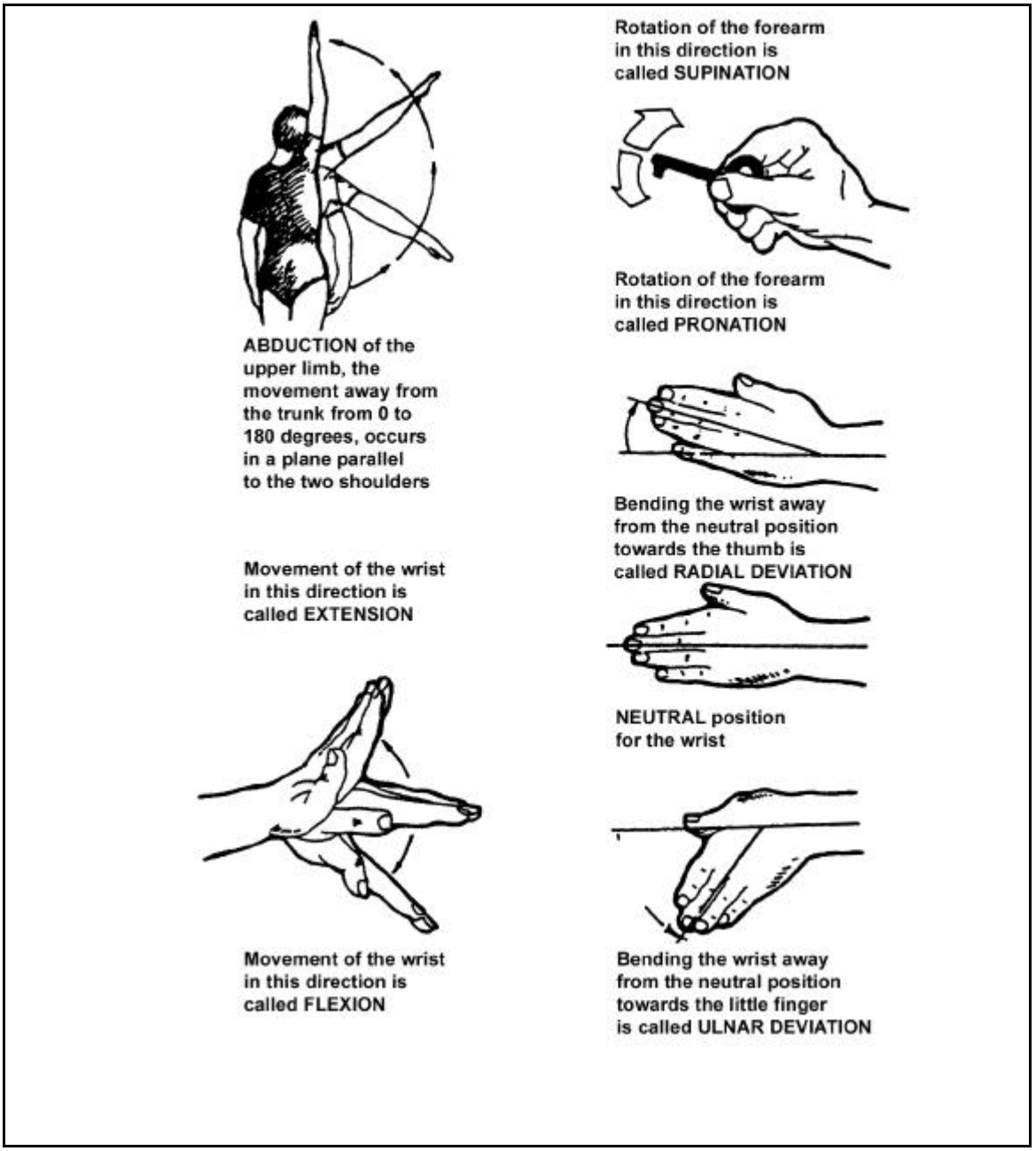


Figure 26 Terminology for hand and arm movements. (Source: Occupational Overuse Syndrome – Preventative Guidelines SAA HB10-1987, Standards Australia, Sydney)

Risk

Means the likelihood of harm or injury actually occurring.

Static muscle effort (work)

Characterised by a prolonged state of contraction of the muscles, which usually implies a postural stance, for example, supporting a weight at arm's length. Little or no movement occurs.

Weight

Means the mass of an object (expressed in kilograms).

Work cycle

The length of time provided to complete one task or subtask.

Work level

The level where the task is performed, above the work surface height, defined by the thickness or height of the equipment or the machinery used.

Work rate

The number of work cycles in a given time period. The work rate may be self-paced or machine paced.

Work surface height

The distance measured from the floor surface to the work surface such as a bench, table or conveyor surface.

Workplace

Means any place, including any aircraft, ship or vehicle, where a person works, or is likely to work, and includes any place where a person goes while at work.

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