ErgoAnalyst

Users Manual

ERGO ENTERPRISES

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Definitions

ErgoAnalyst System Terms

Acute Injury : The sudden onset of musculoskeletal injury, usually associated with manual tasks requiring high exertion and/or awkward postures.

Administrative Control : A control that requires worker compliance to reduce the risk of injury (e.g. work procedures, personal protective equipment, job rotation and training). Note: Administrative controls can be an effective risk control strategy when implemented in conjunction with design controls, however, administrative controls on their own are *not* an effective strategy for reducing the risk of injury.

Control Development Workshop : The participative session where controls are developed and evaluated for their likely effectiveness. This session occurs after the Risk Assessment Workshop and is typically led by the EA-Facilitator. Participants in this session (i.e. the 'Working Party') also include workers who perform the task, plus appropriate managers, engineers, etc as required.

Cumulative Injury : The gradual onset of musculoskeletal injury over time (e.g. days, weeks, months and/or years), which can be as a result of both the physical and/or environmental risk factors associated with a manual task.

Design Control : Also know as an Engineering Control. A control that alters the working environment so that there is a reduction in the risk of injury regardless of worker compliance (e.g. equipment modifications, changes to pre-set work speeds on a production line and use of mechanical handling equipment).

Environmental Hazard : A risk factor imposed upon the person by the external environment that can increase the risk of injury (e.g. vibration, heat, humidity, cold, uneven or slippery ground conditions, poor lighting, windy conditions, etc). Psychosocial risk factors such as stress and cognitive overload / underload are also considered to be environmental hazards.

ErgoAnalyst : The software-based musculoskeletal injury risk assessment and risk management process that is implemented using a participative ergonomic framework. It is also used to describe the associated ErgoAnalyst software.

ErgoAnalyst (EA) - Facilitator : An ErgoEnterprises authorised person who has been trained to use the ErgoAnalyst software and implement the ErgoAnalyst system.

ErgoAnalyst (EA) - Champion : A person within the business who leads the ErgoAnalyst implementation process (often this person is also an EA-Facilitator).

ErgoAnalyst Hazard Identification Card : A data entry card that can be used by workers to identify potentially hazardous manual tasks for the EA-Facilitator to consider.

ErgoAnalyst Risk Assessment Form : A data entry sheet that enables EA-Facilitators to collect descriptive information on the manual task (e.g. tools, physical demands, environmental conditions, etc) 'on-site' for later entry into ErgoAnalyst.

ErgoAnalyst Risk Assessment Tool : A data entry form that enables EA-Facilitators to collect physical and environmental assessment information about a manual task 'on-site' for later entry into ErgoAnalyst.

ErgoEnterprises : The pty. ltd. company that developed and owns the ErgoAnalyst software and system, and trains and authorises its use.

Ergonomics : Also known as Human Factors, is the scientific discipline concerned with understanding interactions within an occupational system in order to reduce the risk of injury and improve productivity.

Force : An entity that causes a change in velocity, direction and/or shape of an object. In this manual, force is typically used to describe either the internal stress within a biological tissues (e.g. muscle contraction) or the external load placed upon the body (e.g. weight of an object lifted by a person). For the purposes of this manual force and load often mean the same thing.

Group : The collection of EA-Facilitators that work together at the same work-site and/or business unit, and who also have access to share their Assessor rights with other EA-Facilitators within the Group. Note: If one Group is Linked to another Group then EA-Facilitators within either Group will be able to view (i.e. not edit) all tasks within either Group.

Hazard Identification : The procedure that recognises a manual task as potentially hazardous. These identified tasks are then put in the ErgoAnalyst Task List.

Load : A force that physically stresses biological tissues and causes them to change velocity, direction and or shape. For example, the load associated with the weight and velocity of an object lifted by a person results in physical stress on the biological tissues (e.g. muscles) used to lift the load.

Manual Handling : Involves the use of the human body to lift, lower, push, pull and/or carry loads.

Manual Task : A task that involves the body being subjected to any degree of physical and/or environmental risk factor (e.g. exertion, repetition, exposure, awkward posture, etc). Note: just about all activities are manual tasks (e.g. even sleeping because involves long exposure to limited postures), however, only tasks with a significant amount of risk are deemed to be potentially hazardous manual tasks.

Manual Task Risk Management Training : A 2-hour training session that is delivered to workers so that they can be involved in the ErgoAnalyst system. This training enables workers to understand the Participative Ergonomic process and the risk identification, assessment and control procedures.

Musculoskeletal : Any biological tissue of the body (i.e. muscle, bone, tendon, ligament, nerve or other soft connective tissue such as blood vessels).

Participative Ergonomics (PE) : A system that maximises the active involvement of workers (as task experts) in the identification of potentially hazardous manual tasks, assessment of those tasks and development and implementation of control measures to reduce the risk of injury.

Physical Hazard : A physical risk factor that can increase the risk of musculoskeletal injury (i.e. exertion, exposure, awkward posture, repetition and static postures).

Pinch Point : An area where an injury may occur when musculoskeletal tissues are 'struck-by' or 'caught-between' objects associated with the task.

Potentially Hazardous Manual Task : A manual task that has the potential to cause acute and/or cumulative musculoskeletal injury due to the inherent physical and environmental hazards associated with the task.

Risk Assessment : The evaluation of the risk of injury associated with a Potentially Hazardous Manual Task performed using ErgoAnalyst.

Risk Assessment Workshop : The participative session where the risk assessment of a potentially hazardous manual task is performed and the key injury risk factors are identified. This session is typically led by the EA-Facilitator and also includes workers who perform the task, plus appropriate managers, engineers, etc as required, who make up the workshop's 'Working Party'.

Risk Control : The change made to the physical work environment and/or operation procedures, which is designed to reduce the risk of musculoskeletal injury and/or improve productivity associated with the task.

Task List : The list of identified Potentially Hazardous Manual Tasks in the identification page of the ErgoAnalyst software.

Tissues (musculoskeletal tissues) : Any anatomical structure of the body (i.e. muscle, bone, tendon, ligament, nerve or other soft connective tissue such as blood vessels).

User : The person (typically the EA-Facilitator or ErgoAnalyst Read-Only User) who is using the ErgoAnalyst software.

Worker : A person who is a task expert for those tasks that they regularly perform.

ErgoAnalyst Software Terms

Login page : The access point for the ErgoAnalyst software located at www.ergoanalyst.com.au.

Training Page : The area where the 10 minute summary video describing the risk identification, assessment and control processes involved within the ErgoAnalyst system can be viewed.

Identification Page : The area used to identify, describe and search the Potentially Hazardous Manual Tasks in the Task List.

> **Assessor :** The person who is responsible for the task and who has full access to edit the task in the ErgoAnalyst software. Typically the Assessor is the EA-Facilitator is charge of assessing and controlling the risks associated with that task.
>
> **Attachments :** Pictures, videos, files and/or documents (with a combined maximum total of 10Mb) that are designed to aid in the description and documentation of the assessment and or control of the task. These tasks can be viewed by clicking on their associated icon.

Date Identified : The date when the task was first identified and added to the the ErgoAnalyst Task List. Note: this date can be modified as required via the associated calendar icon.

Keywords : A search term that finds all tasks containing the given key word within the body of the task description text.

Priority : The level of importance given to each task in the Task List, based upon, the level of risk and worker exposure (i.e. how often the task is performed and by how many workers). Green = Low, Yellow = Moderate, Orange = High and Red = Critical.

Search : The tab used to search for particular tasks within the current list of tasks that fit specified search criteria (e.g. level of risk, keyword or assessor). Note: These search terms filter as an inclusive 'and' Boolean operator.

Task List : The current list of manual tasks (within the current search criteria) that are (or were) potentially hazardous.

Workplace : The work area where the task is performed. This often used to designate tasks to specific work areas or work groups so that they can be quickly found via sorting and or searching the task list.

Assessment Page : The area used to assess a Potentially Hazardous Manual Task.

Awkward Posture : The physical hazard where the risk of injury increases as the body segments are placed in uncomfortable postures that increase tissue strain and decrease musculoskeletal tissue capacity.

Cognitive Overload : A situation where the mental capacity required by the task exceeds the mental capacity of the worker, resulting in an increased risk of deteriorations in task performance.

Cognitive Underload : A situation where the mental capacity required by the task is so far below the mental capacity of the worker the the resulting 'boredom' can result in a deterioration in task performance.

Exertion : A physical hazard where the risk of injury increases as the force or speed of the movement increases and is relative to the size and physical capacity of the musculoskeletal tissue bearing the load.

Cold & Heat : An ambient temperature considerably above or below a comfortable normal temperature. Note: If excessive humidity is present then the heat risk factor can also be selected to represent this increased risk.

Exposure : The physical hazard where the risk of injury increases as tasks are performed for longer durations without adequate recuperation periods because the capacity of musculoskeletal tissues decreases.

Lack of Control : The presence of an environmental constraint that only enables workers to perform the task at a predetermined speed (e.g. a production line with a set product delivery speed).

Localised Vibration : A vibration that is imposed upon the peripheral (i.e. hands and arms) extremities, which can lead to 'white finger syndrome'.

Movement Pattern : The physical hazard where the risk of injury increases as task requires repetitive movements or static postures.

Pinch Point : An environmental factor that can cause injury when a part of the body (e.g. typically the hand or arm) is 'struck-by' or 'caught-between' an external object associated with the task. This risk is assessed by the likelihood (probability) of the event and the consequence of the injury based upon the level of potential injury.

Stress : A psychosocial factor that involves an acute mental concern by the worker about the occupational task being performed.

Time Pressure : The presence of an environmental constraint that imposes time limitations that adversely alter the way in which workers perform the task.

Whole Body Vibration : A vibration that is typically exerted on the body whilst sitting or standing, which can increase the risk of lower back injury.

Control Page : The area used to develop, assess and document potential and implemented risk controls.

Action Plan : The area designed to highlight the control implementation process, and which includes implementation dates and persons responsible for the implementation.

Administrative Controls : Risk control measures that require worker compliance to be effective (e.g. work procedures, PPE and training).

Control Option : A combination of design and/or administrative controls that is designed to minimise the risk of injury.

Design Controls : Risk control measures that don't require worker compliance to be effective (e.g. mechanical aids, physical workplace design changes, etc).

Implemented Control Option : A combination of design and/or administrative controls that have been implemented in the workplace and can be risk assessed to see the resulting risk level.

Proposed Control Option : A combination of design and/or administrative controls that could be implemented in the workplace and which can be prospectively risk assessed to see the possible risk level if they were implemented.

Risk Factors to consider : The descriptions of the exact occupational factors that result in the elevated physical and/or environmental risks in the associated Hazard Profile. Note: These risk factor are detailed and should be stated as questions that direct the Working Party to consider possible effective controls specifically targeted at these risk factors.

Risk Elimination, Substitution and/or Isolation : The area where consideration of the task is done to determine if the risk can be eliminated (by no longer performing that task) or replaced with a lower risk task.

Risk Graph : The graphical representation of the injury risk level for each body region (i.e. shoulders, arms, back and legs) on a graph with a 24 point scale.

Risk Profile : The visual representation of the injury risk level for each body region (i.e. shoulders, arms, back and legs) on a human figure body map with a four point scale (i.e. green = low, yellow = moderate, orange = high and red = extreme).

1 Introduction

1.1 Purpose of this document

The purpose of this ErgoAnalyst Manual is to provide guidance for those implementing the ErgoAnalyst Participative Ergonomics system. In particular, this manual focuses on presenting detailed information on:

- The causes of musculoskeletal injury.
- How to use the ErgoAnalyst software.
- How to effectively implement the ErgoAnalyst Participative Ergonomics system.

1.2 Objectives of this document

This manual aims to provide information to help ErgoAnalyst users effectively implement the ErgoAnalyst Participative Ergonomics system. However, it is not designed to replace the ErgoAnalyst (EA)-Facilitator training given by ErgoEnterprises, but rather to support that training by providing a reference manual that can be referred to by ErgoAnalyst users. In conjunction with the EA-Facilitator training, the objective of this manual is to help EA-Facilitators understand the essential elements of a Participative Ergonomics (PE) system, clarify their understanding of the causes of musculoskeletal injury, effectively use the ErgoAnalyst software, and to enable them to more effectively implement the ErgoAnalyst system within their organisation.

The following sections of this ErgoAnalyst manual:

1. Outlines the costs of occupational injuries arising from manual tasks.
2. Outlines the responsibilities of the various individuals/groups in the workplace to reduce the risk of injury.
3. Gives detailed information on the various factors and mechanisms that can increase the risk of musculoskeletal injury. Note: This information is designed to help EA-Facilitators better train workers, deliver more accurate risk assessments, and develop more effective risk controls.
4. Gives detailed information on how to use the ErgoAnalyst software to identify, assess, control and document the injury risks associated with manual tasks. Note: A “How to use ErgoAnalyst” guideline task to help users is also available at the top of the task list within the ErgoAnalyst software.
5. Gives a detailed description of the most effective way to implement the ErgoAnalyst system. Note: Variations and logistical differences between companies may mean that slight variations in the implementation strategy presented may be appropriate.

After reading this manual users will:

- Have an broad understanding of the injury risk factors associated with musculoskeletal injury.
- Be able to use the ErgoAnalyst software to assess and effectively document the injury risk associated with a manual tasks and the controls designed to control that risk.
- Understand the relative merits of design and administrative based control strategies for managing injury risk and be able to apply the hierarchy of controls principle in the Control Development Workshops to reduce injury risk and increase productivity for manual tasks.
- Understand the phases and most appropriate methods to successfully implement the ErgoAnalyst injury risk management system in their workplace.

Although this manual is specifically designed for the trained EA-Facilitators who are implementing the ErgoAnalyst system, management and workers can also benefit from reading this manual. The ErgoAnalyst system is based upon a Participative Ergonomics (PE) approach that requires active collaboration between, workers, management and EA-Facilitators in order for the system to be successful. Therefore, one objective of this manual is to aid each group to understand their role and importance in the the reduction in occupational injury risk and improved productivity via their active participation in the ErgoAnalyst Participative Ergonomic system. Specifically, after reading this manual:

- EA-Facilitators will be able to better implement the training, risk assessments, control development and implementation workshops, and documentation phases of the ErgoAnalyst system.
- Management will have an understanding of how the ErgoAnalyst system can be used to reduce injury risk and improve productivity in the workplace and thus have an increased support of the system, which is essential for the system to be effective.
- Workers will have a better understanding of the causes of injury in the workplace and an improved willingness and ability to actively participate in the risk assessment of manual tasks and the development of effective controls.

1.3 Costs of manual task related musculoskeletal Injury

In Australia, occupational injuries resulting from manual tasks resulted in 437,852 claims in the 6 years to June 2003 (i.e. 73,000 claims per year), which represented 42% of all claims. The direct cost of these injuries over this time frame was $12 Billion, or $2 Billion per year. Furthermore, this direct cost does not include the indirect financial costs associated with lost productivity and staff retraining. Whilst these financial costs are significant and are reason enough for concern, the significant psychological and social costs to the injured workers, which although more difficult to calculate than fiscal costs, should not be underestimated.

1.4 Who is responsible for managing musculoskeletal injury risk?

According to the National Standard for Manual Tasks (2007), all people involved in work have responsibilities in relation to the management of manual task risks. Duty holders include: persons with control of a workplace (including the owner and occupier); persons with control of work (including employers, self-employed persons, labour hire company, and principal contractors or subcontractors); and persons who design, manufacture, construct or supply items, systems of work or buildings or structures used as a workplace where manual tasks are performed. Workers also have responsibilities to participative in the reduction of occupational injuries.

Duty holders have a responsibility to identify and eliminate the risk of an injury occurring as a result of performing manual tasks at work. If it is not practical to eliminate the risk, it must be minimised as far as reasonably practicable. What is reasonably practicable will depend on a number of factors such as:

- The likelihood of exposure to the hazard.
- The potential consequences of the exposure.
- What is known about the risk and how to eliminate it.
- The feasibility of elimination of the hazard.
- The availability of an effective control.
- The cost of elimination or control.

Duties apply only to the matters over which the duty holder has control. A duty holder has an obligation to protect all people who could be exposed to risk as a result of performing manual tasks at work, including workers (whether paid or unpaid), trainees, and contractors.

1.4.1 Duties of persons in control of workplaces and/or work

Persons in control of workplaces and/or work are required to identify potential hazards, assess the risks associated with these hazards, eliminate hazardous manual tasks or minimise the risk as far as reasonably practicable, and monitor and review the effectiveness of controls implemented to minimise those risks.

Persons in control of work or workplaces have a duty to consult persons in the workplace or who perform work. Consultation is required when new manual tasks are introduced, existing tasks are changed, when workplaces are altered, or new equipment is selected. Consultation is essential to the successful management of manual tasks risks, and is a central feature of participative ergonomics approaches.

Persons in control of workplaces and work have a duty to provide information, training and supervision to ensure that workers know how to do their job safely. In the area of manual tasks, this should include ensuring that workers can identify potentially hazardous manual tasks and have sufficient understanding of the risk factors involved to be able to contribute to the assessment and management of the associated risks.

Note: Training in the 'best' or 'ideal' way of handling loads does not result in sustained behavioural change and has been shown to be ineffective in reducing occupational injuries.

1.4.2 Duties of persons who design, manufacture and/or supply

Persons who make management decisions about design, manufacture or supply of products, workplaces or systems of work have a duty to eliminate or minimise risks of musculoskeletal injury posed by the product, workplace, or system involved in the performance of manual tasks. Where hazards can not be eliminated, appropriate information about the risks and conditions for safe use must be supplied.

1.4.3 Duties of workers

Workers performing manual tasks have duties to follow appropriate systems of work, use equipment provided in accordance with the instructions and training provided, take care not to put anyone else at risk, cooperate in the identification, assessment and management of manual tasks risks, and notify management of health and safety concerns (e.g. faulty equipment or any experience of pain of discomfort associated with work).

2 Manual Tasks and Musculoskeletal Injury

2.1 What are manual tasks?

Manual tasks are any task that involves a load (force) being placed upon musculoskeletal tissues (e.g. muscles, tendons, ligaments, bones, nerves, etc). Any task that has the potential to cause musculoskeletal injury from this load is referred to as a potentially hazardous manual task. Furthermore, this load is not just the result of the instantaneous force required to perform the task, but is also a cumulative function of the duration, repetition and posture required to perform the task. Traditionally, manual handling has been defined as any task that involves; lifting, pushing, pulling, carrying, moving, manipulating, holding, or restraining a person, animal, or item. However, there are many other tasks that typically aren't associated with manual handling (e.g. driving and/or sitting in heavy machinery) that can also be potentially hazardous (e.g. the whole body vibration that often occurs whilst sitting in operational machinery can result in damage to the tissues of the lumbar spine), and thus constitute a manual task that can potentially cause musculoskeletal injury.

2.2 Overview of the cause of musculoskeletal injury

Injuries occur when the load (force) on an anatomical structure (e.g. muscles, tendons, bones, etc) is greater than the physical capacity of that biological tissue to withstand that load. (Figure 2.2.1). Tissues at risk of damage due to manual tasks include bone, muscle, tendon, ligament, articular cartilage and other connective tissues, nerves, and blood vessels. The mechanisms of injury to specific tissues vary, however injuries associated with manual tasks may be generally characterised as either having sudden or gradual onset. Sudden onset (acute) injuries are associated with a relatively short exposure to forces that exceed a specific tissue's capability. Gradual onset (cumulative) injuries occur as a consequence of relatively long term exposure to force. In the latter case, the general mechanism of injury is believed to be an accumulation of micro-damage that exceeds the tissue's capacity for repair during periods of recuperation. Injuries may also occur as a combination of both general mechanisms where a history of cumulative loading leads to reduced tissue tolerance which is then exceeded by short term exposure to a relatively high force. The level of this tissue tolerance is dependent on many factors, including; the type of tissue (e.g. bone, muscle, ligament, etc), the manner in which the force is applied to the tissue (e.g. compression, tension, twisting, etc), the size of the tissue, and the level of damage that the tissue may have previously sustained.

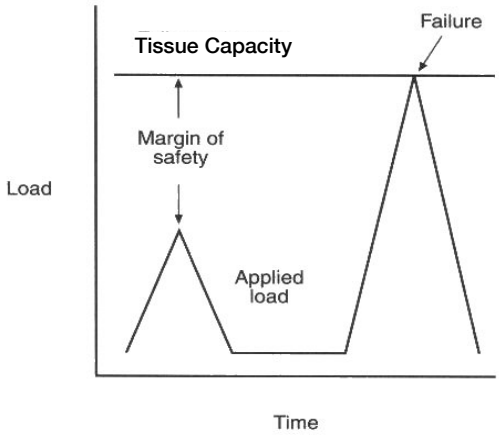


Figure 2.2.1: Whenever the load is beyond the tissue capacity (i.e. no margin of safety) then some level of damage will be sustained by that tissue.

2.3 The physical and environmental risk factors for musculoskeletal injury

In order to reduce the risk of occupationally related musculoskeletal injury, the safety margin between the load place on the tissue and the tissue capacity must be increased. Whilst it is true that tissue adapts over time to loads placed upon it, this increased tissue capacity only occurs during rest or recuperation periods after tissue loading, and will not occur unless sufficient opportunity for recovery is provided. In an occupational environment the worker often performs the same task in a repetitive manner and/or for long durations and thus it is often difficult to allow adequate tissue recuperation and adaptation to occur. Thus, the worker is far more likely to experience an overuse injury (similar to that often experienced by professional athletes), which can lead to a chronic injury rather than injury as a result of 'under-trained' tissues. In order to reduce this chance of injury, the load placed on the tissue must be minimised and/or the mechanical capacity of the tissue to withstand load must be increased. In order to do this we must first understand the various physical and environmental risk factors that can influence the load placed upon the tissues and tissue capacity. The following section details each of these various risk factors and the mechanisms by which they can cause injury by increasing load or decreasing tissue capacity. (Note:The risk assessment of each of these physical risk factors is perfomed using ErgoAnalyst).

2.3.1 Exertion

An important factor in determining the likelihood of injury to a specific body part is how much force is involved. Historically, the mass of objects being handled has been the focus, however, the tissue load involved in a task depends on a number of other factors apart from just the weight of the load. For example, in lifting and lowering tasks, the force required by the back muscles depends as much on the distance of the object from the body as it does on the mass of the object. Similarly, if the task involves pushing or pulling an object the force involved will depend on the frictional properties of the object and the surface as well as the mass of the object. Other manual tasks may not even involve the manipulation of any object at all (or an object of negligible mass), however, high internal tissue loads can still be required if the movement is performed at high speed.

If the force exerted by a body part is close to the maximum the person is capable of then the risk of sudden injury is high, and urgent action is indicated. Even if the forces involved are not close to maximum, the task may pose a high risk of injury if the body part is also exposed to other risk factors. High speed movements (e.g. hammering and throwing) are an indication of elevated risk, because high muscle forces are required to perform high speed movements, especially if the speed is achieved in a short time. Such "jerky" movements are a sure indication that high internal muscle force is involved. This risk factor also occurs when rapid changes in the direction of movement are required. The strength of muscles is in part also dependent on the speed at which they shorten, and high speed movements consequently reduce the strength of the muscles producing the movement. Another high exertion situation occurs when impact forces to strike an object or surface result in high exertion forces in the wrist and hand (see Figure 2.3.1).

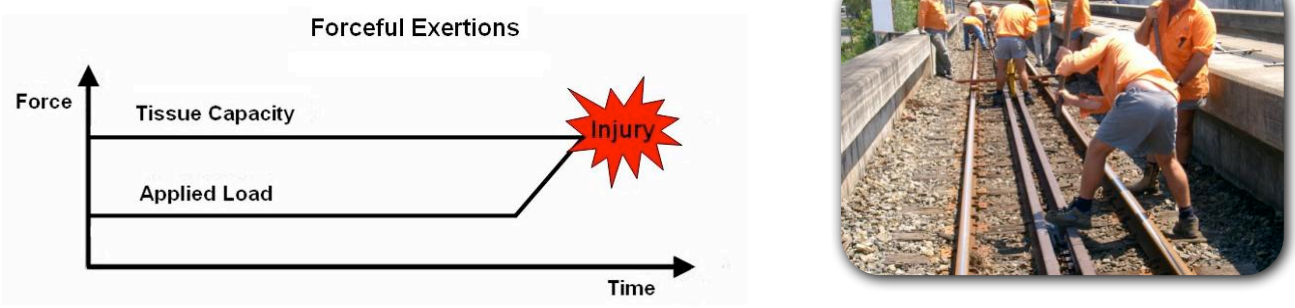


Figure 2.3.1: The effect of forceful exertions on the risk of musculoskeletal injury.

Whilst the load applied to the tissue shown in Figure 2.3.1 is below the tissue capacity (on the left of the graph) it is unlikely that an injury will occur due to the safety margin between these forces. However, once the applied load is equal to or greater than the tissue capacity some level of injury will occur (on the right of the graph in Figure 2.3.1). This applied load may occur as a result of the mass of the load, the position of the load away from the body and/or the speed of the movement. In the case of the worker driving in a ‘dog spike’ with the spiking hammer (pictured on the right of Figure 2.3.1) the high internal muscle forces arise as much as a consequence of the speed of the movement (and more specifically, the acceleration required to reach that speed) as well as the mass of the hammer (i.e. F (force) = m (mass) . a (acceleration)).

It is the magnitude of the force relative to the capabilities of the body part(s) (biological tissues) experiencing the force that is important when assessing injury risks. For example, the small muscles of the hand and forearm may be injured by relatively small forces, especially if the task also involves extremes of the range of movement at a joint. This also implies that the capability of the individual performing the work must be taken into consideration when assessing the injury risk. This is also true of the assessment of posture, in that people of different sizes may well adopt very different postures to perform the same task. Furthermore, the direction of the applied force relative to the tissue under load (e.g. compression force, twisting load, etc) also affects the relative safety margin between the force and the tissue capacity. As a general rule, it is the person performing the task who is best able to assess the level of exertion (force and speed) required to perform the task relative to the tissues involved. That is why it is important that the worker(s) who regularly perform the task are involved in assessing the risk associated with that task using a participative approach with the EA-Facilitator.

2.3.2 Exposure

The greater the period of time that a worker is continuously performing the same task in the same manner without a rest break or change in work pattern, the greater the risk of injury from the exposure (i.e. relative duration of work versus recuperation). If a task is performed continuously without a break for a long time, the tissues involved do not have opportunity for recovery, and cumulative injury risk increases. This risk of injury due to the long exposure times drastically increases if the task also involves moderate force, and/or static or repetitive movement patterns, and/or awkward postures (Figure 2.3.2). However, decreasing the risk of injury does not necessarily require the person to stop work altogether. Changing tasks can provide recovery if the second task involves different body parts and/or different movement patterns. The appropriate task exposure also depends on environmental factors such as heat, cold, and humidity that can cause fatigue and/or alter the recovery rate. The duration with which particular tissues can withstand extended periods of exposure to a load also depends upon the relative capacity of the tissues. For example, the larger tissues of the legs are more likely to be able to withstand extended periods of exposure (e.g. walking) than the smaller muscles of the hand and arm.

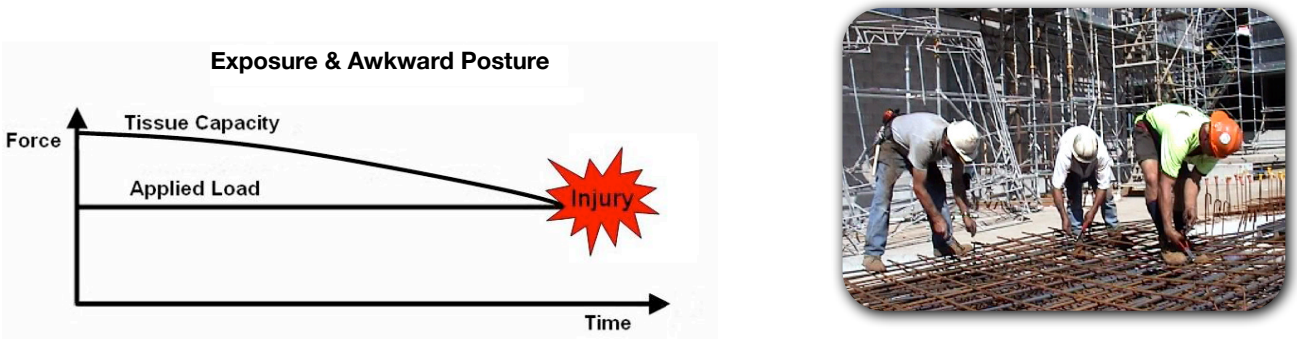


Figure 2.3.2: The effect of long exposure to awkward postures on the risk of musculoskeletal injury.

2.3.3 Posture

The postures adopted by a body region during a task also influences the likelihood of injury in a number of ways. If joints are exposed to postures that involve extremes of the range of movement, the tissues around the joint are stretched and the risk of injury is increased (Figure 2.3.2). Ligaments in particular, are susceptible to injury when stretched in extreme postures. If the exposure to extreme postures is prolonged the ligaments do not immediately return to their resting length when normal postures are regained and thus the joint stability may be compromised. Tissue compression may also occur as a consequence of extreme postures, for example, extreme postures at the wrist increases the pressure on the median nerve that passes through the carpal tunnel resulting in increase injury risk for the wrist when it is working in such extreme postures.

The strength of muscles are also influenced by the posture of the joints over which they cross. Muscles are weaker when they are stretched or shortened compared to their normal resting length, and this effect will be greatest when the joints approach the extremes of the range of movement. Consequently, one general principle of the design of work is to avoid postures which involve extremes of the range of movement at any joint.

Some non-extreme joint postures are also known to be associated with increased risk of discomfort and injury. These include; trunk rotation, lateral lumbar spine flexion, excessive thoracic spine flexion or extension; neck extension, lateral flexion or rotation; and wrist extension or ulnar deviation.

Some other postures increase the risk of injury without involving extremes of the range of movement. These can be called awkward postures, and can be defined as any posture which causes discomfort. Such postures can occur without significant deviation of the joint from neutral, especially if the orientation of the body with respect to gravity is altered. The optimal design of work aims to provide tasks which involve movements within a normal range of movement about a normal or neutral position (e.g. standing upright).

2.3.4 Movement Patterns

The optimal design of work provides tasks which involve slow to moderately paced movements and varied patterns of movement. Little or no movement at a body part elevates the risk of injury because the flow of blood through muscles to provide energy and remove waste depends on movement, and thus the functional capacity of muscles is diminished if static postures are maintained (Figure 2.3.2). Tasks which involve static postures quickly lead to discomfort, especially if combined with exposure to other risk factors.

If the task involves repetitively performing identical patterns of movement, and especially if the cycle time of the repeated movement is short, then the same tissues are being loaded in the same way with little opportunity for recovery, and tissue capacity will decease over time (Figure 2.3.4). Such repetitive tasks are likely to pose a high risk of cumulative injury if combined with moderate to high forces (or speeds), awkward postures, and/or long exposure times.

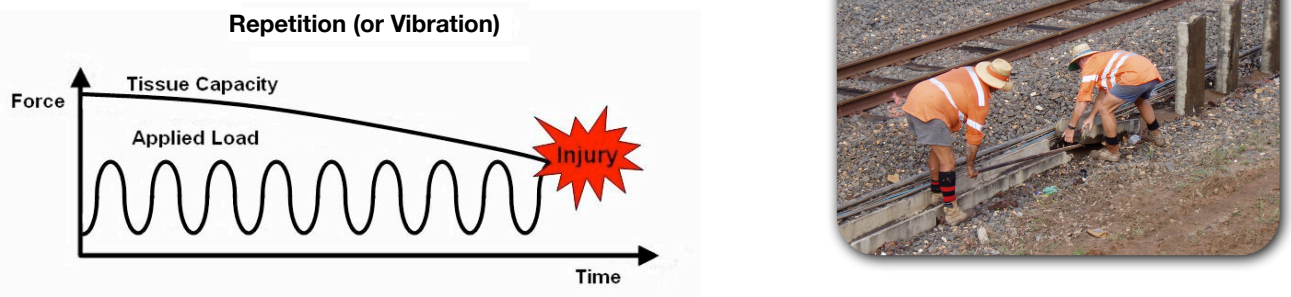


Figure 2.3.4: The effect of repetitive movement patterns (or vibration) on the risk of musculoskeletal injury.

Whilst a safety margin between the applied load and tissue capacity shown in Figure 2.3.4 may be present on earlier cycles of the task the tissue capacity will continue to fall whilst ever the cyclic load is applied without adequate recuperation periods. Thus, the same task may result in an injury over time even though the loading pattern associated with the task has not changed over time. Note: the effect of a cyclic loading pattern caused by vibration has the same effect on tissue capacity as repetitive movement patterns.

2.3.5 Vibration

Exposure to vibration in manual tasks takes two distinct types; peripheral vibration, typically associated with power tools; and whole body vibration, typically associated with vehicles (Figure 2.3.5). In both cases the vibration exposure impacts on injury risk both directly and indirectly.

Figure 2.3.5: Examples of tasks with peripheral (left) and whole body (right) vibration.

Exposure of the upper limbs, and particularly the hands, to high frequency vibration associated with power tools is a direct cause of damage to nerves and blood vessels. Effects associated with short term exposure to peripheral vibration include; temporary loss of sensation and control, and blanching of the fingers – hence the term “Vibration White Finger Syndrome”. These effects can become irreversible with long term exposure. The use of vibrating power tools is also an indirect cause of injury risk to the upper limbs because the vibration increases the force required by the upper limbs to perform the task. The degree of risk increases with higher amplitude vibration tools (e.g. hammer drills, jack hammers or tampers).

Similarly, long term exposure to whole body vibration (typically from sitting in vehicles) is strongly associated with back injury. As well as a direct effect on the back, exposure to whole body vibration also has an indirect influence on injury risk due to its fatiguing effects on the muscles of back. Again, the risk is greater when the amplitude of vibration is high (e.g. heavy vehicles, particularly with poor seat design and/or rough terrain). The mechanism of these vibration effects on injury is illustrated by the graph in Figure 2.3.4 (i.e. similar to the mechanism of injury due to repetitive movement patterns).

2.3.6 Other environmentally related causes of musculoskeletal injury

The issues presented below as contributory factors to musculoskeletal injury risk modify the degree of risk in two ways. Some of the contributory factors are characteristics of the work which commonly lead to increased exposure to the direct risk factors discussed above. Modification of these factors, if they are present, will be likely to directly reduce the injury risk. The remaining contributory risk factors are secondary risk factors that have an indirect influence on manual task injury risk.

Some environmentally related risk factors include:

Heat and humidity :

- That can cause fatigue leading to adoption of poor postures.
- That can reduce the functional capacity of muscles.

Cold :

- That can increase the internal load on tissues due to increased stiffness of tissues.
- That is a risk factor for carpal tunnel syndrome.

Time pressures :

- That can cause the worker to adopt poor postures or perform the task quickly (higher force) in order to get the job done in the available time.

Cognitive overload :

- A situation where the metal workload is greater that the mental workload capacity of the person performing the task. In this situation the person may ignore key factors and may adopt poor postures because they can't take all factors into account.

Cognitive underload :

- A situation where the metal workload is significantly less that the mental workload capacity of the person performing the task. I.e. the person is bored. In this situation the person may fail to keep their mind focused on what they are doing and thus may again adopt poor postures.

Lack of control :

- The work must keep pace with the given work cycle period (e.g. production line) or the worker is otherwise unable to control the characteristics of their work. Thus, poor postures, speed and repetition risk factors can be introduced into the task performance; and it has been identified as a psychosocial risk factor related to stress.
- Epidemiological studies have indicated a link between environments with high psychological stress and the incidence of injury.

'Pinch Point' injuries

- Whilst the previous risk factors associated with the environment can negatively impact upon the risk of cumulative musculoskeletal injury, 'pinch points' can increase the risk of acute injury to musculoskeletal structures.
- Pinch points in the environment are deemed potentially hazardous when the potential likelihood and consequence to strike the worker and/or trap the worker between the object are significant enough to cause injury.

3 ErgoAnalyst Software

3.1 Overview of the system

The ErgoAnalyst system is designed as a simple and systematic approach to identify, assess, control and document the injury risks associated with manual tasks. This process is designed to be implemented within a participative ergonomics framework, where workers, management, and EA-Facilitators work together to design targeted controls that minimise the risk of injury whilst maximising productivity of manual tasks. This participative approach is essential and recognises that:

- Workers are the best placed to assess the real level of risk associated with the task and evaluate prospective controls.
- Management support is essential to provide the financial and systems support to allow the assessments and workshops to take place and for proposed controls with suitable cost/benefit ratios to be implemented.
- EA-Facilitators (i.e. trained, knowledgeable and motivated facilitators) are best placed to deliver the educational training and effectively facilitate the risk assessment and control development processes with the workers. They are also the 'local champions' who can oversee the ongoing progress of the system to ensure positive results.

The general systematic process to implement the ErgoAnalyst system involves:

1. Training

EA-Facilitators first deliver the Manual Task Risk Management Training (ErgoAnalyst Training) to the workers so that they can participate in the identification, assessment, and control development phases.

2. Hazard Identification

Once the training has been delivered, the EA-Facilitators should then identify all appropriate manual tasks that need to be assessed in conjunction with the workers. There are many ways to identify potentially hazardous manual tasks and the ErgoAnalyst Risk Identification Cards is one way that has been designed to help collect this list. This list of potentially hazardous tasks can then be entered into the identification list section of ErgoAnalyst and prioritised in order of their assessment importance based upon the number of personnel exposed to the task, previous injury data, perceived injury risk, etc. (Note: Certain tasks may be identified as being potentially hazardous right across the business group and thus a company wide collective assessment and workshop may be warranted).

3. Risk Assessment

Next, all the appropriate data (tools, conditions, work procedures, etc) for the highest priority manual task should be collected. Assessment of these tasks can then be performed on site using this data and the ErgoAnalyst software (or paper based assessment tool) or in a Risk Assessment Workshop where controls that effectively target the highest risk factors can be developed.

4. Proposed Risk Control

Risk controls are developed during Control Development Workshops, involving appropriate personnel (e.g. workers performing the task, engineers, management), and should be run by an appropriately prepared (task data, assessment and possible controls discussed with the workers prior to the workshop) EA-Facilitator. At this workshop all controls should be discussed and appropriate controls that follow the hierarchy of control process (i.e. elimination before design or engineered controls and then administrative controls) should be proposed and developed to the maximum extent of the capabilities of those participating in the workshop. These proposed controls can be assessed and evaluated to determine if they adequately reduce the risk of musculoskeletal injury in the controls section of ErgoAnalyst. Once effective proposed controls have been specified, these controls should be entered into the proposed controls sections (attaching any diagrams or photos) of ErgoAnalyst and assessed. Action plans for the implementation of these proposed controls should be set and followed. These proposed controls, including risk reduction estimates, can be documented using the ErgoAnalyst report, and this can be used to help support the investment costs associated with these controls.

5. Implemented Risk Control

Once these controls have been implemented and have been in place and operational for a period of time, ErgoAnalyst should again be used to assess the risk associated with these implemented and operational control(s). Finally, ErgoAnalyst can then be used to document and file the entire process. Note: At each stage of the process (identification through to the implemented risk control) the Task List records the timeline progress of each task within ErgoAnalyst.

The following sections of this chapter are now designed to give more detailed information and practical hints on how to effectively use the various areas of the ErgoAnalyst software.

3.1 Logging into ErgoAnalyst

ErgoAnalyst is access via any internet browser with an enabled Flash Player plug-in at ...

www.ergoanalyst.com.au

It is recommended that at least Version 10 of the Flash Player is enabled within the browser for all components of the ErgoAnalyst software to function optimally. It is also recommended that screen resolutions at 1280 x 1024 pixels and above are used to view the software so that all of the software can be easily viewed without scrolling.

In order to login to the ErgoAnalyst system your company must first have been setup by ErgoEnterprises as its own Group with its own ErgoAnalyst database of tasks. You must also have completed appropriate EA-Facilitator training to become a qualified EA-Facilitator and have been issued your username and password. Use the issued ***case-sensitive*** username and password to login to the system at the login page (Figure 3.1a).

Figure 3.1a: ErgoAnalyst login web page at www.ergoanalyst.com.au

Once you have logged into the ErgoAnalyst system you will be taken to the animated ErgoAnalyst logo page (Figure 3.1b). This logo and flow diagram represent the basic premise of a system that constantly strives to: (1) Identify potentially hazardous manual tasks; (2) Assess the risks associated with those tasks; (3) develop Controls that reduce the risks associated with those tasks; and then (4) to ensure that those controls are not creating any new risks before identifying the next risk to control. In this way this ErgoAnalyst process (just like any other business) process seeks to constantly improve the occupational environment for the benefit of the workers, management and the company.

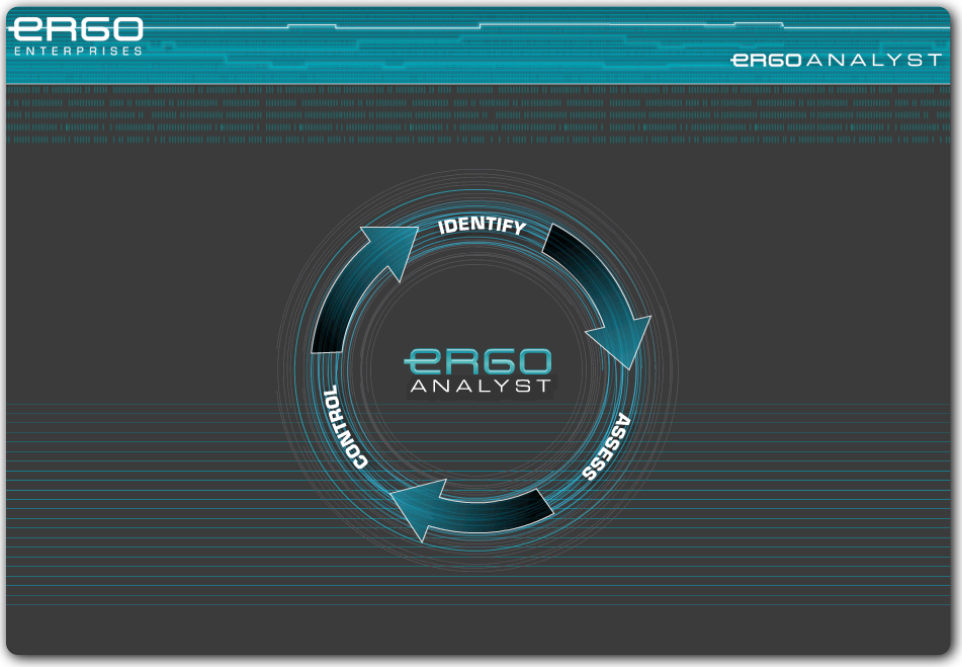


Figure 3.1b: ErgoAnalyst active logo page representing the constant ergonomic improvement cycle.

The logo page is also an ‘active’ page that will take the user directly to the Training video by clicking on the central ErgoAnalyst logo, and to the Identification, Assessment or Control pages by clicking on those words in the logo respectively. Note: Once you have entered any area of the software you can always return to this active logo page at any time by clicking on the ErgoEnterprises logo located in the top left corner of the software.

3.2 Training video

The ErgoAnalyst training video can be accessed on the Training page (Figure 3.2) at any time by either clicking on the central ErgoAnalyst logo on the opening active logo page or by clicking on the ‘1-Training’ button on the left side menu bar one you have entered the software proper (i.e. past the logo page).

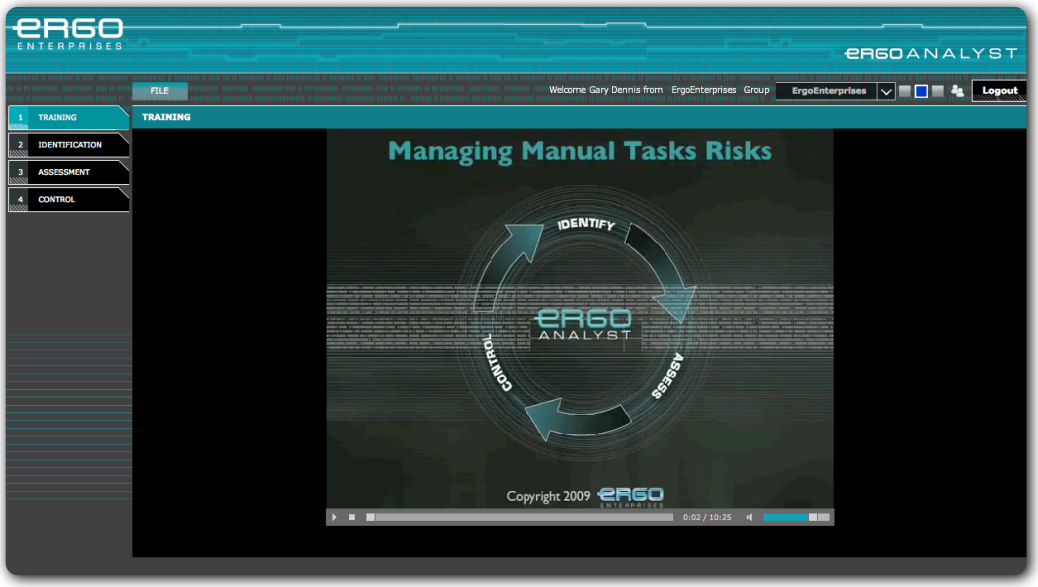


Figure 3.2: ErgoAnalyst video training page

The training video has been designed as a short 10 minute summary of the ErgoAnalyst system, including; the causes of musculoskeletal injury, risk assessment and risk control techniques and the general ErgoAnalyst process. The video can be used by EA-Facilitators as part of the Manual Task Risk Management Training and/or to provide an overview of the ErgoAnalyst system to management (or other appropriate persons). In order to play the video click on the play button on the left side of the time line at the bottom of the video. However, for best results, you should ensure that the video is fully loaded before pushing play, which is shown by the progression of the shaded area along the time line as the video is loaded to the local system from the server.

Note: Once you have entered the software proper you can log out by clicking on the logout button in the top right corner of the software. All data is automatically saved to the server as you progress through the system and at log-out, however, you can also manually save at any time by accessing the save button from the top File menu drop down list.

3.3 Identification

The Identification page of ErgoAnalyst (Figure 3.3a) is designed for two main purposes. Firstly, to collate, manage and search all the various manual tasks, and also to indicate the stage of the progress for each task (i.e. dates identified, assessed, and controlled). Secondly, the specific details of each task (i.e. task description, tools and materials, physical demands and environmental conditions) are recorded for each task so that the risks can be clearly described and so that these details can be used when developing effective controls.

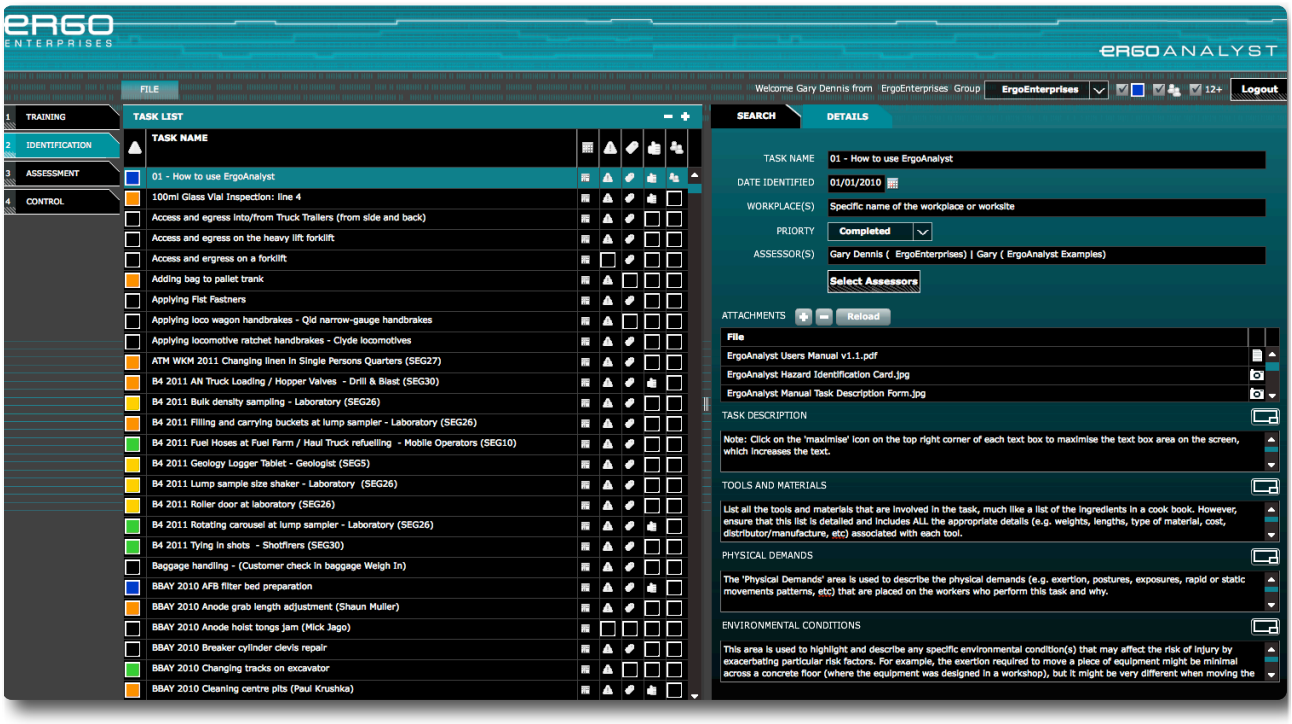


Figure 3.3a: Identification page of ErgoAnalyst – Details Tab. (Note: Task information and details on the right are associated with the selected and highlighted task in the Task List on the left).

The Task List on the left side of the Identification page lists all tasks that you have access to (i.e. all tasks that are associated with your user login). At the top right side of the identification page you will see a welcome note that determines who you are and what group or groups you belong to in a drop-down list. Clicking on the drop-down arrow and selecting a specific group will access the server and then download all tasks that you have access to from that Group. You also have option to access tasks from All Groups and My Tasks (that only returns tasks for which you are an assessor). You also have the option to include completed tasks (by clicking on the tick box next to the Blue Completed logo) and/or include reviewed (i.e. shared) tasks (by clicking on the tick box next to the 2-man icon). Upon logout the ErgoAnalyst will remember the last list you selected so that when you log back into the system it will deliver the task list as it was from your last session.

Note: As most uses will have access to a database with many tasks it is recommended that uses generally keep the My Task Group option selected without completed or reviewed tasks options selected, thereby reducing download times and making the task list more manageable.

The task list has several columns (all of which can be sorted alphabetically or chronologically by clicking on the title box for each column) that indicate:

- The priority level, displayed by the coloured box to the left of the task name. Blue = Completed task Green = Low, Yellow = Moderate, Orange = High and Red = a Critical priority level.
- The date each progress stage was reached for each task (i.e. identified, assessed, controls proposed, controls implemented and controls reviewed). Note: Resting your cursor over any of these icons will give a rollover text display of the date associated with that icon.

When first entering the Identification page ErgoAnalyst will display the search tab (Figure 3.3b) that can be used to search the uploaded task list for a task that fits specific search parameters (e.g. level of risk, keywords, etc). Before, you consider assessing a 'new' task you should perform a search of the ErgoAnalyst database to see if this 'new' task (or a similar task) has previously been assessed. If you do find a task that you wish to view, clicking on that particular task name in the Task List will automatically change the right side of the Identification page to display the details associated with the selected task. If you wish to enter a new task then click on the '+' button on the Task List title bar, which will add a task to Task list with the title "New Task' and switch to the Details tab. A pop-up window will also appear prompting the user to change the name of the 'New Task' by clicking on the Task name area at the top of the Details tab. Note: The selected task is always highlighted in the Task List, so ensure that when entering data that the correct task in the Task List is highlighted.

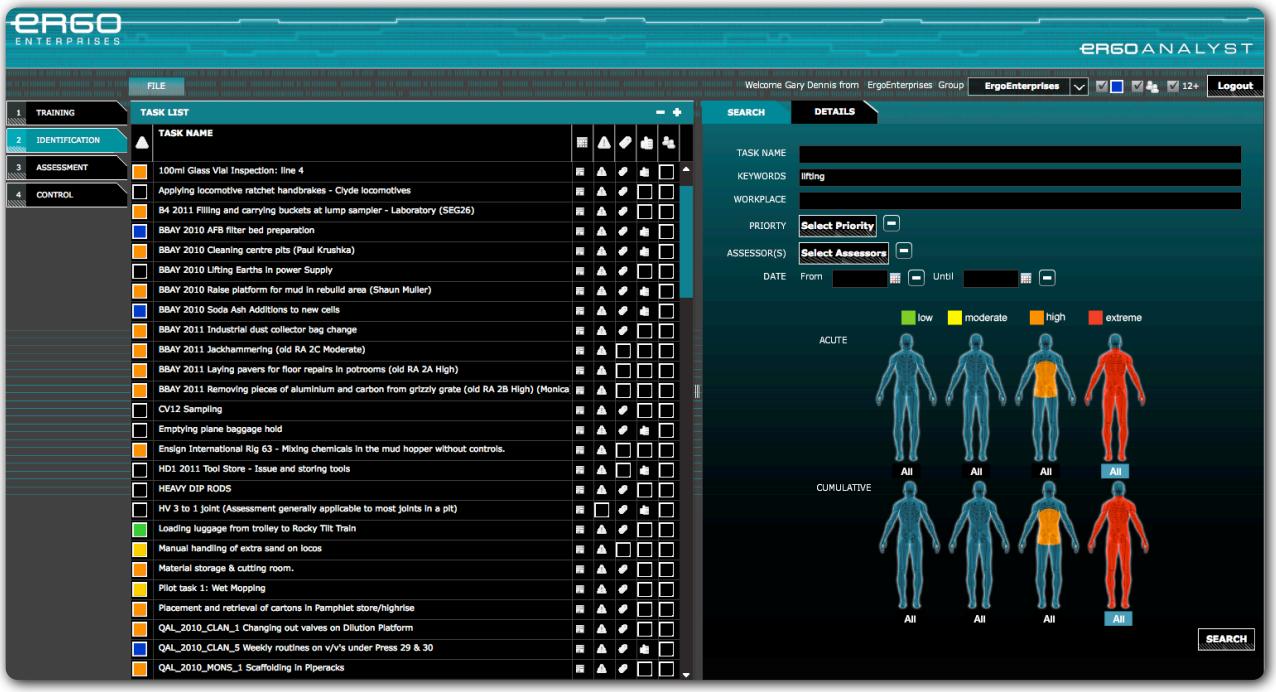


Figure 3.3b: Identification page of ErgoAnalyst – Search Tab. (The Task List can be searched by selecting the search criteria in the Search tab on the right).

The various task details sections (task description, physical demands, tools and environmental conditions) in the Details tab (see Figure 3.3a) are designed to collect as much detailed data about the task as possible. This data can then be used for many purposes, including, but not limited to:

- The data can be used to help in the development workshops when data about tool weight and length, etc might be needed when designing new controls.
- The data can be used in the generated reports to support expenditure on new controls, so that management have a clear understanding about how the task is actually performed in the workplace.
- The descriptive data may very well be important when retrospectively reviewing the way tasks were done in the past.

Thus, it is very important that the data (text and attached pictures) inserted into each area are as accurate and detailed as possible. Text is added to the text box by clicking in the box and typing the appropriate text and/or right clicking on the text box and pasting text that has been copied from a separate source (e.g. word). It is recommended that users first click on the maximise button on the top right of each text box to maximise the text box area before they enter or view text so that they can see the text more easily. Pictures and videos can also be attached to the task by clicking on the '+' button of the attachments area and following the prompts. (Note: All files attached to one particular task are limited to 10Mb in total).

It is extremely important that ALL relevant information is entered into each text box. This data entry should occur BEFORE the control development workshop so that any proposed control has all the relevant information on the task so that it can undergo effective prospective evaluation. Each of the following sections (3.3.1 – 3.3.5) will now describe the type of data that should be entered into each section of the Identification page of ErgoAnalyst.

3.3.1 Attachments

This section should be used to attach any relevant pictures, videos or files associated with the task or the controls. Ensure that you only include effective and relevant files; so consider:

- File size.
- Quality of the pictures.
- Authenticity of the pictures.
- Videos of appropriate length.
- Appropriately named files.

In order to attach a file first click on the + button. A File Upload pop up box will appear that indicates how much of the 10Mb limit you have left for that task. Clicking on the Choose File button will access your local file manager system (e.g. Explorer on a PC or Finder on a Mac) so that you can locate the file you wish to upload. Once you have selected the file you wish to upload click the Upload button and the upload will commence. Upon successful completion of the file upload the pop-up box will indicate that the upload is complete and request that you click the Reload button in the Attachments area so that the file can be uploaded from the server to be viewed in the table on your local system. The file name can be changed by clicking on the file name and changing the text.

To remove an attached file, select the file you wish to delete by clicking on the file name and then click the '-' button. A pop up box will appear asking if you are sure that you want to permanently delete this file from the server; click Yes to remove the file or No to return to the ErgoAnalyst system without deleting the file.

To view an attached file, click on the file icon in the right column of the Attachments table for the associated file you wish to view. The icon will differ depending on the type of file. For text based files (e.g. .pdf and .doc files) the icon will appear as the standard page with text icon, for picture files (e.g. .jpg) a camera icon will be displayed and for movies (e.g. .wmv and .mov) a film strip icon will be displayed. Clicking on this icon will open this file using your default application for this file (e.g. media player used to view movies files).

3.3.2 Task description

The description of the task should be given as a step by step process with as much detail as possible. Often the best place to start when filling in this section would be with the standard work procedures. These work procedures should be appropriately modified (if required) to reflect not only how the task is supposed to be done, but how the task is *actually* done on a regular basis (if there is a difference, which there often is). It may also be useful to attach pictures that may help to highlight key points of interest in the performance of the task (e.g. awkward postures). The point of this honest description of the performance of the task is not to place blame if the work instruction is not followed but to highlight the difference so that the reasons why the procedures are not followed are exposed. For example, if the task is designated as a two person task (which is a very low level control in the first place) but it is often being performed by a single person, this may reflect a poor staff ratio or a cultural attitude that can then be adequately addressed.

Note: The honest detail of how the task is regularly performed is particularly important when the report from ErgoAnalyst is being used to justify expenditure on proposed controls with management who may not be completely familiar with how the task is really done.

3.3.3 Tools and materials

This section should give detailed descriptions of the tools and materials that are as specific as possible, particularly to help in the Control Development Workshop. Descriptions should include not only the name of the tools that are used, but their, weights, lengths, overall size, energy source required (e.g. battery, generator, etc), grip angles, composition (e.g. normal or hardened steel), vibration damping components, manufacturers, etc.

3.3.4 Physical demands

The text within physical demands text box should highlight the level of exertion, awkward postures, repetitive or static movement patterns associated with the task and the level of exposure. This data should be as specific as possible. For example, the length of time the task is performed with and without breaks, the actual number of repetitions associated with the task, the force (in Newtons or kilograms) if known and the approximate angles of joints that are in awkward positions. This data may be particularly useful when determining what controls need to be put in place and evaluating how much effect they have in reducing the risk of injury (e.g. detailing the specific change in the angle of the trunk associated with a new control designed to reduce the bent over postures required to perform the task).

3.3.5 Environmental conditions

Often a new tool or work procedure that has been developed in a controlled environment such as the maintenance shed or management office is seen to be safe and productive. However, once this same tool or work procedure is implemented in the workplace the environmental conditions significantly change this level of injury risk or productivity. Examples of environmental conditions that may have this effect might include; hot, cold or humid weather; muddy, loose or unstable ground conditions; high winds and/or heights; cramped work spaces; poor lighting; etc. It is important that all of the environmental conditions that may affect health, safety and/or productivity are included in this area, along with a reason why each condition can affect the health, safety and/or productivity level of the workers.

3.4 Assessment

The Assessment page of ErgoAnalyst is where physical characteristics are rated for each major body region along with the environmental characteristics associated with the task to give the total musculoskeletal risk hazard profile associated with the task (Figure 3.4). From this Hazard Profile data ErgoAnalyst calculates the acute (sudden) and cumulative (gradual) injury risks for each body region and displays them on both a body map risk profile and an associated risk graph. To give instant and easy feedback during the risk assessment, the software updates the risk of injury to each body region in real time as the Hazard Profile is constructed via presentation of low to high risk denoted by the 'traffic light' colours of green, yellow, orange and red respectively.

Figure 3.4: ErgoAnalyst Assessment page with the descriptive Hazard Profile on the left and the resulting acute and cumulative Risk Analysis Profiles presented on the right.

Whilst the combined acute and cumulative risk profile body maps give an quick and visual indication of the risk on a four point scale (green, yellow, orange and red) for each body region (S = shoulders, A = Arms, B = back and L = legs) the associated graphs give more detail (on a 24 point scale) on the level of risks; as each region of the body map will only change from one colour to the next once it has reached the critical threshold. Therefore, care must be taken not to assume that one colour (e.g. red) is always significantly different from the adjoining colour (e.g. orange) as it may be that the risk was the just below threshold on one colour and just over threshold on the next colour. Risk evaluation made with the graphs will give a greater level of detail if required, as the graphs (acute and cumulative) have a full resolution of the risk assessment scale. Note: The calculated level of risk (green to red) should *not* be used as cut offs to indicate that the task is 'safe' or 'unsafe' and thus denote if action is required. Rather, these assessments indicate the current risk associated with a task and should be used to; (1) help to focus the controls on factors that will effectively reduce the risk, and (2) quantify the level of risk reduction in proposed or implemented controls.

To insert the risk level (colour) on the body maps for each risk factor (exertion, exposure, posture and movement) simply click anywhere on the body region (i.e. shoulders, arms back or legs) you wish to assess. A pop up list of options with associated colours will appear and you simply select the most appropriate description from this list. There is also a help option on this list that when selected will bring up a pop-up help box specifically tailored to help the risk assessment for that specific risk factor and body region.

When assessing the task, be sure to only consider the specific risk factor you are assessing (e.g. when considering the exertion level don't factor in the repetitive nature of the task, just consider the required exertion level). All body regions for each physical risk factor should be assessed, along with each of the environmental risk factors, in order for the acute and cumulative risk profiles to be representative of the real risk of musculoskeletal injury to each body region fro that task. The assessment is best performed by assessing the level of risk for all body regions on one risk factor (e.g. exertion) before moving onto the next risk factor (e.g. exposure). Note: The shoulders, arms and legs can all be assessed either symmetrically (both sides have the same risk) or asymmetrically (different levels of risk on the left and right) if one side of the body is *consistently* exposed to a different level of risk. Once both the physical and environmental characteristics have been assessed you should then click the 'Completed' button to finalise the date the assessment was completed, which will be added to the Task List. Note: This date can be changed at any time by clicking on the calendar icon and selecting the appropriate date, or you can clear the assessment date by double clicking on the date and then pushing the delete key followed by return on your keyboard.

3.4.1 Evaluating environmental risk factors

As well as physical risk factors, there are a number of environmental characteristics that can affect the level of musculoskeletal risk. These factors are included in the 'environmental characteristics' section at the top of the 'Assessment' page of ErgoAnalyst (see Figure 3.4). The environmental characteristics considered by ErgoAnalyst include; heat, cold, stress, cognitive underload, cognitive overload, time pressure, lack of control, whole body vibration, localised vibration and 'pinch point' injury risks; each of which is described in Section 2.3.6. Heat, cold, stress, cognitive underload, cognitive overload, time pressure and lack of control environmental risk factors are assessed in ErgoAnalyst as being either present or not present (i.e. no intermediate levels). Localised and whole body vibration (described in Section 2.3.5) are assessed as either low moderate or high risk on a pop up box. Whilst the pinch point risk is assessed via a popup probability-consequence risk matrix.

To indicate that a heat, cold, stress, cognitive underload, cognitive overload, time pressure and/or lack of control environmental characteristic is present simply click on the required environmental characteristic 'tick box'. You can turn toggle between the factors being present or not by simply clicking on the box again. After clicking on either whole body vibration or localised vibration a pop-up box will appear with a level of risk from low (green), moderate (yellow) or high (orange) levels. The the higher the amplitude and frequency of the vibration the greater the level of risk. For example, the jarring of the hands that occurs when using a striking implement such as a sledge hammer might be considered a low (green) vibrational risk factor, whilst using a pneumatic drill or using a jackhammer might be considered to be a high (orange) risk factor. Note: Both vibrational risk factors can be cleared by clicking on the blue 'Clear' option in the pop-up box.

The level of 'struck-by' and/or 'caught-between' injury risk for the arm is entered by first clicking on the pinch point 'tick box'. Once selected a probability-consequence risk matrix will popup allowing the user to define the level of risk. Once the level of maximum reasonable consequence and probability of a possible event associated with the task are determined (using the guidelines listed below) the user can then click on the appropriate cell of the matrix, which will then close the matrix and display pinch point hazard profile (i.e. green = low, yellow = moderate, orange = high and red = critical/extreme) as a colour on the hand illustration. This assessment will also be included in the algorithm calculating the acute injury risk profile for the arm on the right side of the screen.

The **consequence** of a struck-by or caught-between event is determined using the following guidelines:

Minor	- first aid only
Medium	- medical treatment
Serious	- lost time injury
Major	- severe irreversible damage (e.g. amputation)

The **probability** (likelihood) of a struck-by or caught-between event is determined using the following guidelines:

Unlikely	- happens < than 1 per 10 years
Possible	- happens < 1 x per year
Likely	- happens 1-2 x per year
Certain	- happens > 2 x per year

Note: The **consequence level** (i.e. minor, medium, serious or major) can increase with:

- Increasing kinetic energy from objects with greater mass and/or velocity.
- Increasing potential energy as a result of an object with greater mass and/or height above the person.
- Objects with sharp edges and/or greater pressure due to the object acting over a small area of tissue.

Note: The **probability level** (i.e. unlikely, possible, likely or certain) can increase with:

- Previous history of incidents
- Decreased concentration on the task due to; time pressures, complacency, frustration, fatigue, etc.
- Eyes not on the task due to; poor visibility, poor access, visual distraction, etc.
- Miss communication due to; noise, multiple persons doing the task, low skill level, limited access, etc.

3.4.2 Evaluating physical risk factors

The information in this section is designed to give guidelines to help in evaluating the level of risk for each body region and for each physical risk factor. Whilst the workers performing the task are best placed to evaluate the level of risk, the examples given in the tables below might help the EA-Facilitator to 'guide' their evaluation. Note: A help menu is given at the bottom of each risk factor pop-up menu for every body part. Facilitators should understand that these assessments are not definitive and the opinion of the worker must be the best guide to assess the level of risk (i.e. guide don't assess).

3.4.2.1 Exertion

The exertion experienced by each body region should be assessed relative to the capacity of the tissues in that region. For example, the tissues of the back and legs are likely to be able to withstand more force than the smaller tissues of the wrist. Higher exertion risk is associated with high force and/or high speed movements where the load on the tissues becomes closer to their maximum tissue capacity.

Table 3.4.1.1: Guidelines for assessing the Exertion risk

Level of Risk	Assessing body regions
Low force or speed 	**Shoulders** The shoulders do not rotate quickly or lift heavy loads during the movement. Typically, the load in the hand is low and the arms are working by the side. **Arms** The hands are not required to grip or hold an object (or an object of negligible mass) and the speeds of movement of the hand and arm are slow. **Back** The back is in a relatively upright posture and the load or force in the arms is negligible. (Note: even with no load an unsupported bent over back will generally experience at least a moderate force). **Legs** Although the legs support the significant weight of the upper body even when the person is not carrying a load, relative to the capacity of the legs normal unloaded standing or walking would generally be considered a low risk for the legs.

Moderate force or speed, but well within capability 	**Shoulders** Relative quick movements of the shoulder are required or the shoulders are required to support moderate loads in the hands with that arms in a relatively neutral (i.e. approx. by the sides) position. **Arms** The hand is required to hold an object throughout the task with moderate gripping force; or the arms are lifting, pushing or pulling with a moderate force or performing moderately rapid movements. **Back** The back is held in a slightly stooped posture or is required to generate a moderate force to maintain stability so that the limbs can perform the task. Or alternatively, the back is required to continuously move with moderate speeds. **Legs** The task is performed in a squatting position for a period of time with no load, or whilst walking on uneven ground whilst carrying a substantial load, or when the task requires the person to jog regularly over prolonged periods in order to get the task done.
High force or speed, but not close to maximum 	**Shoulders** Movements that require the arms to be rapidly raised; or when holding moderately heavy loads above the head or with outstretched arms. **Arms** The hand is required to hold an object with substantial force during the task (e.g. hammering) or significantly high forces or speeds are required by the arms. **Back** The combination of the weight and distance of the load on the upper body requires high muscular exertions of the muscles of the back, or very rapid extensions of the back are required to perform the task. **Legs** The task is performed in a squatting position whilst the person is holding or lifting a substantial load.
Forces or speeds close to maximum 	**Shoulders** Very rapid movements of the shoulder are required with substantial force; or very heavy loads are required to be lifted over head or held with the arms fully outstretched either to the side or in front of the body. **Arms** The hand is required to grip the load/tool with a maximal; or near maximal force whilst performing the task, and/or the arms are holding or lifting a very heavy load, particularly if it is done quickly. **Back** The combination of the weight and distance of the load on the upper body requires extremely high muscular exertions of the muscles of the back, or very rapid extensions of the back with significant load are required to perform the task. **Legs** The task is performed in a squatting position whilst the person is holding or lifting a substantial load and/or extreme squatting force is required to lift a very heavy load from the ground.

3.4.2.2 Exposure

The risk of injury due to task exposure occurs because the capacity of musculoskeletal tissues decreases as tasks are performed for longer durations without adequate recuperation periods. The exposure of each body region can be equated to the duration that each body region is continuously exposed to the other physical hazards without recuperation. Remember, it is the exposure of tissue to load that induces adaptation during periods of rest. Whilst the exertion, posture and movement patterns will likely be different for each body region, often the exposure rating will be the same for the entire body, as the entire body is typically involved in performing the task. However, there maybe some situations where only particular regions of the body are given recuperation periods whilst other body region are not given adequate time to recuperate.

Table 3.4.1.2: Assessing the Exposure risk

Low	Moderate	High	Extreme
			
Task performed infrequently for short periods	**Task performed regularly, but with many breaks or changes of task**	**Task performed frequently, without many breaks or changes of task**	**Task performed continuously for the majority of the shift**

3.4.2.3 Posture

Awkward postures increase the risk of musculoskeletal injury because the physical capacity of biological tissues is reduced when they are shortened or stretched compared to their resting length. Additionally, those tissues can also experience increased tensile load when stretched beyond their resting length. Examples of some issues that can increase the risk of injury in awkward postures include; a reduction in the capability of muscles to produce force, increased passive tensile strain of the ligaments, and reduced blood flow so fatigue sets in more quickly. Table 3.4.1.3 is designed to give some general guidelines for the assessment of awkward postures for each body region.

Table 3.4.3.1: Guidelines for assessing the posture risk

Level of Risk	Assessing body regions
Low 	**Comfortable postures within a normal range about neutral** **Shoulders** The arms are working by the sides of the person or at around waist height in front of the body. **Arms** The wrist is not deviated far from a normal position or the elbow is not fully flexed whilst the arms are required to generate force. **Back** The back is in an upright posture. **Legs** No full squatting is required during the task.
Moderate 	**Uncomfortable postures, but not approaching an extreme range of motion** **Shoulders** The arms are working at approximately shoulder height. **Arms** The wrist is deviated into a flexed, or extended potions or the elbow is fully flexed whilst the arms are required to generate force. **Back** The back is bent over up to approximately 30 degrees from an upright position or has a moderate degree of twist. **Legs** A full squatting position is required to perform the task.
High 	**Postures approaching an extreme range of motion** **Shoulders** The arms are working above head height. **Arms** The wrist is fully deviated into an extreme flexed, or extended position. **Back** The back is fully stooped i.e. more that approximately 60 degrees, (note: a lumbar curvature of the spine will be present), or has a high degree of twist. **Legs** The legs are held in extremely uncomfortable positions to support the body during the task and/or an external force is pushing the legs into an extremely rare and uncomfortable posture.

3.4.2.4 Movement

The risk of musculoskeletal injury is less when the task involves movement patterns that are 'normal' (i.e. not at extreme ranges of motion or at high speeds) and varied (i.e. the movement pattern is not cyclical). If the task requires static body postures to be held for extended periods of time then fatigue and tissue capacity is reduced, increasing the risk of injury. Likewise, if repetitive movement patterns are required to perform the task (particularly ones that are performed quickly and with short cycle times) then the risk of injury will be increased as fatigue and tissue strain are more likely and little time for tissue recuperation is possible. Table 3.4.1.4 is designed to give some general guidelines for the assessment of movement patterns and their associate level of risk for each body region.

Table 3.4.4.1: Guidelines for assessing the risk associated with the movement pattern

Level of Risk	Assessing body regions
Low 	**Varied movement patterns** **Shoulders** The arms are not held in static positions nor are repetitive movement lifting, pushing or pulling movement patterns present. **Arms** Holding a static position of the wrist whilst the posture is normal is not usually a high risk unless a large force is also needed to hold it in this position. **Back** Either upright postures or a varied combination of upright and bend over postures are used to perform the task. **Legs** Whilst walking involves a repeated similar movement pattern, this generally would be considered a low risk as the legs have been conditioned for this walking pattern.
Moderate 	**Little or no movement, or repeated similar movement patterns** **Shoulders** The shoulders are holding the arms in a static posture at or above shoulder height, or the shoulders are used to perform the task repetitively. **Arms** The arm(s) or wrist(s) are required to statically hold a load or perform the task repetitively. **Back** The respectively flexes and extends to perform the task (e.g. numerous lifting tasks) but not with an extreme cycle time, or the back is held it a static bend over posture for a period of time. **Legs** Repetitive cycles beyond normal walking movement patterns are required. (E.g. extensive use of ladders).

High 	**Repeated identical movement patterns** **Shoulders** Highly repetitive movement patterns of the shoulder are required to move the arms during the task in the same way. **Arms** Highly repetitive movement patterns of the arms or wrists are required to move the arms during the task in the same way. **Back** The back is used to lift multiple loads with short cycle times (i.e. < 30 seconds). **Legs** Generally the legs would have to be exposed to extreme levels of running and/or ladder climbing and /or squatting movement patterns to have this high (orange) risk ratting for this risk factor.

Whilst the guidelines in the four tables above are accurate, the risk assessment is ultimately performed via a collaborative approach between the workers who perform the task and the EA-Facilitator who has been trained to understand the causes of injury. Thus, deviations from these guidelines are possible (as not all circumstances can be considered in these tables) if the EA-Facilitator considers that these deviations in the assessment give a more accurate assessment of the injury risk associated with the task.

3.5 Controls

When developing controls to reduce the risk of injury and improve the productivity of the task, the principle of 'Hierarchy of Controls' should always be followed. This principle indicates that a better reduction in injury risk will always be achieved if we:

Design the task around the people rather than the people around the task!

Controls should always focus on implementing workplace design changes before administrative controls. Specifically, the hierarchy of controls should look at; eliminating the task, substituting the task for a task of lower risk or introducing design-based controls (e.g. mechanised plant) before administrative controls such as available personnel, workplace procedures, job rotation, PPE (Personal Protective Equipment) or training are considered.

Note: Administrative controls such as 'manual handling training' are not an effective risk control strategy (extensively documented in the literature) and should only be used in conjunction with design controls as an effective injury risk control strategy.

As well as following the hierarchy of controls principles, any proposed control should be targeted at reducing the risk associated with specific risk factors for specific body regions. Thus, it is important to expressly identify the specific risk factors that controls need to address before launching into the control development process.

3.5.1 Risk factors to consider

The first (top) text box on the Controls page of ErgoAnalyst is designed to give the EA-Facilitator and workshop team an area to expressly indicate which risk factors they are attempting to address with the proposed controls. This section should always be filled out *in detail* before launching into the control development process (e.g. brainstorming possible solutions) so that all persons involved in the workshop can focus on the specific risk factors they are trying to control.

Whilst the coloured human figures in the bottom left Hazard Profile tab of the Controls page of ErgoAnalyst may give an indication of where controls need to be focused (Figure 3.4.1) the text entered into the Risk Factors to Consider text box should specifically state the factors that lead to these risk ratings and thus the specific issues that need to be addressed in order for a control to effectively reduce the risk of injury. It is preferable if the text within the 'Risk factors to consider' text box are stated as questions so that those questions help the working group (i.e. EA-Facilitator, workers, engineers, etc participating in the control development workshop) to clearly focus on the type of control solutions that need to be implemented. Examples of text that would be entered into the Risk factors to consider text box are given below.

Example questions to enter into the Risk factors to consider text box (based around Figure 3.4.1):

- How can the heavy exertion required by the shoulders to lift the 20kg cement bags be eliminated or reduced?
- How can the awkward bent over posture of the back required to lift the 20kg cement bags off the back of the pallet be improved?
- How can the repetitive lifting movements required by the upper body to lift 280 cement bags out off the storage pallet be eliminated or minimised?

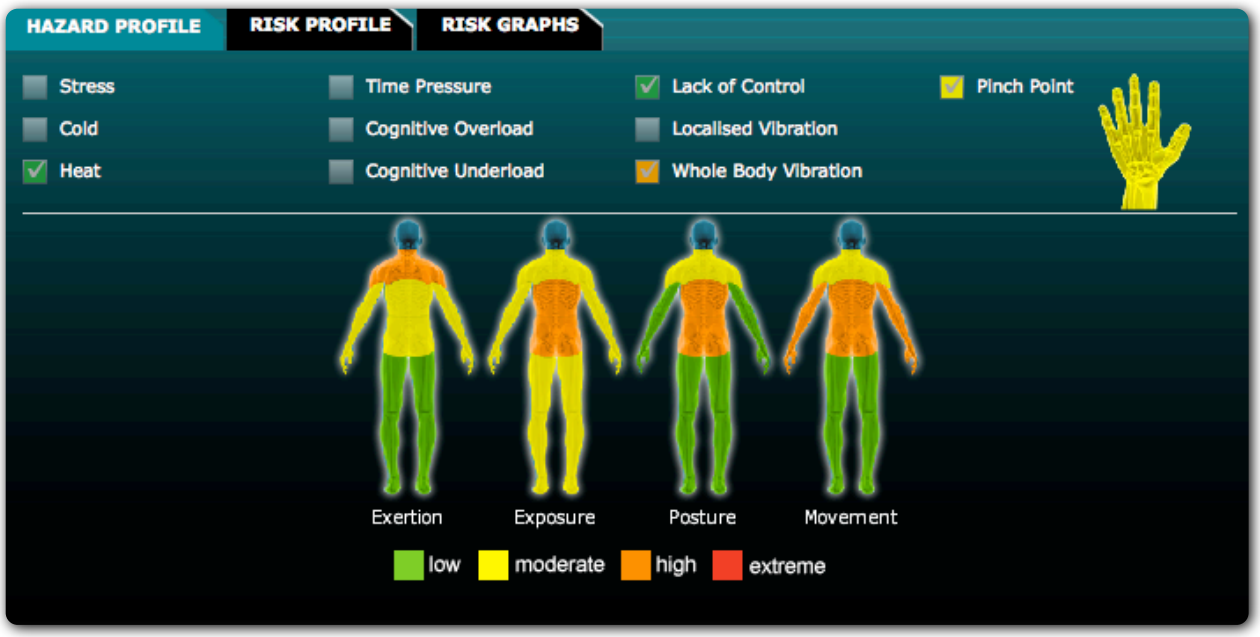


Figure 3.4.1: Hazard profile tab in the controls section used to help develop the 'Risk factors to consider'

3.5.2 Eliminating the risk

The most effective way of reducing the risk of musculoskeletal injury is to eliminate the task or substitute the task for a different task with lower risk. Before developing and assessing any possible design or administrative controls the EA-Facilitator should always ensure that elimination has been properly considered. An important question to ask is "Why are we doing this task in the first place?". If there is not a good reason for doing the task then elimination must be seriously considered. Once this question has been properly considered then click the appropriate 'Yes / How' or 'No / Why' button and then detail either, how the task is going to be eliminated or why it can not be eliminated. Only after elimination has been considered can you start to propose and assess design controls.

Note: Ensure that you have a very good explanation of why elimination is not possible if you are not going to eliminate the manual task. This is a legal requirement, as well as being a good risk control management practice.

If elimination is possible, then a control option named 'Elimination' should be added to the Risk Control Option table via the + button on the top right side of the Control page (see Figure 3.5.5). Note: If the task is eliminated then the hazard profile assessment of the elimination control remains clear (i.e. do not colour the human figures green just leave them blank/blue) as the risk is reduced to zero. However, if elimination of the task is not possible then possible design and administrative controls should be brainstormed and then the most effective combinations of controls should be added to the Risk Control Option table.

Each risk control option added to the Risk Control Option table (i.e. one or more) can be comprised of one or a combination of controls. For example control option 1 might include doing A, B and C; whilst control option 2 might include doing B, C and E. The details associated with each control option are then entered into the associated design or administrative text boxes (i.e. the text in each box doesn't change as you switch between the proposed and implemented control option) before being evaluated as proposed controls.

3.5.3 Design controls

Design controls are those control measures that reduce risk by altering the working environment, and thus do not require compliance from workers to be effective. After adding or selecting the appropriate control option all controls associated with this control option that are designed to modify the working environment to better suit the worker should be entered into the Design Controls text box. This information should be as detailed as possible and should include information such as, lengths, weights, materials, manufacturer details, etc.

3.5.4 Administrative controls

Any control measures that requires the workers to adopt work practices to suit the task should be entered into the Administrative controls text box. Whilst administrative controls are never as effective at reducing risk as engineering controls; because they require compliance by the workers, they should still be considered as part or an overall strategy to reduce risk and improve productivity. Typical administrative controls that might be entered into the Administrative controls text box may include new work instructions, provisions of new PPE, or job rotation schedules. Maintenance of tools and mechanical aids is also an administrative control. Note: Often these less effective control measures may be used to control risk in the short term whilst more effective design controls are being implemented. However, care must be taken not to let these short term measures develop into less effective controls measures in the long term.

3.5.5 Assessing injury risk associated with controls

The assessment of the proposed or implemented controls is done by clicking on each of the four body regions (i.e. shoulders, arms back and legs) for each of the four risk factors and then inserting the most appropriate assessment for that risk factor and for that body region, just as it was performed in the Assessment page. The environmental characteristics should also be assessed in the same manner as when doing the initial assessment. (Note: Ensure that the correct 'Proposed' or 'Implemented' button in the Control column of the Risk Control Option table is selected before starting your analysis). The reason that both proposed and implemented controls can be assessed separately is so that proposed controls can be assessed to examine the level of risk reduction that is expected before any costs associated with the implementation of these controls are incurred.

In order to complete the proposed risk control an Action Plan for at least one control option must be completed. The Action Plan is accessed in the Action Plan tab attached to a proposed control option (Figure 3.5.5). I.e. each control option has its own action plan which should be completed with significant detail to ensure implementation of that control is successful. Clicking the 'Completed' button on the Action plan will date stamp the task in the Identification list as having a proposed control. As each of the controls are developed and implemented then the progress slider in the Action plan can be periodically used to indicate the current progress that has been made on implementing each proposed control option.

Once the controls have been implemented and are in operation for a period of time (to ensure that the workers have become familiar with the new processes) the implemented control can then be reassessed to see if those proposed expectations in risk reduction were met, exceeded or need more work. After completing the implemented control assessment the user should then click the relevant 'Implemented' button on the Hazard Profile tab so that ErgoAnalyst can date stamp the implementation of the control for that task in the Task List.

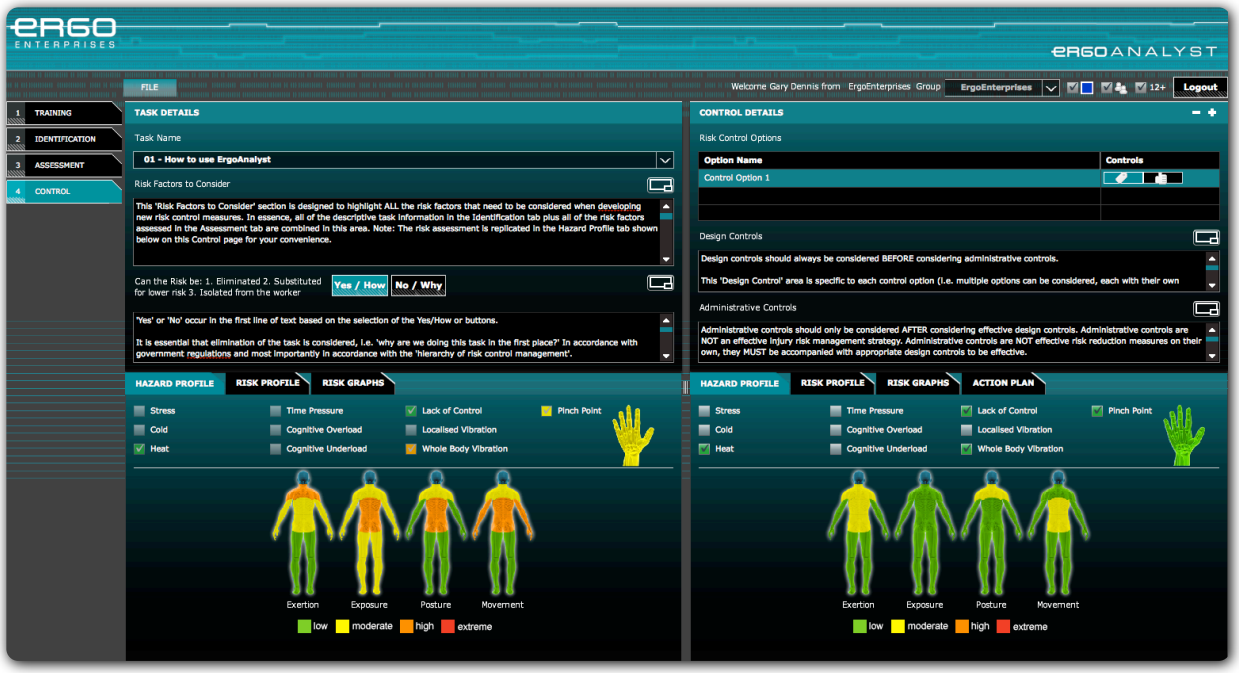


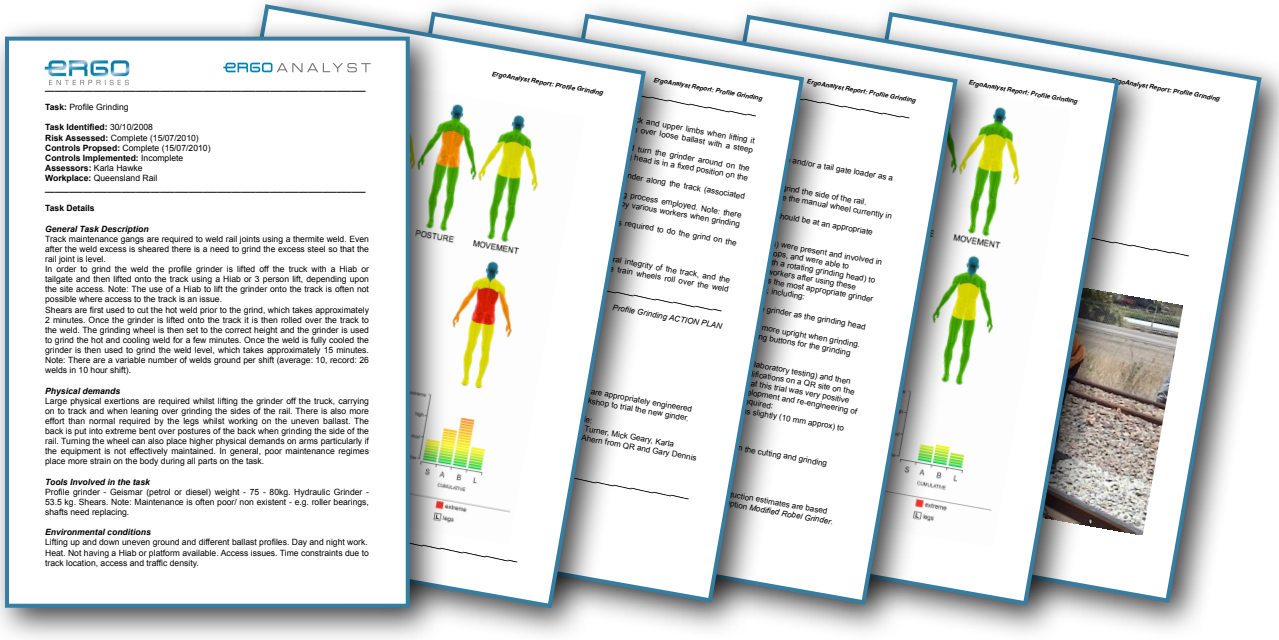
Figure 3.5.5: ErgoAnalyst Controls page.

3.5.6 Comparisons and reports

At any stage during the identification, assessment and/or control phases a report detailing all information about the chosen task can be generated (in .pdf format) through ErgoAnalyst (Figure 3.5.6). To generate the report click on the file menu button and select 'Print Task Report' from the drop down list. A pop-up box will appear asking which control options (if any are available) that you want to include in the report. Tick off the options that you want to include and click generate. ErgoAnalyst will then work with the server to generate a report that includes; all text information, visual representations of all risk assessments, percentage risk reduction estimates for the proposed and implemented controls (if completed) and any attachments for that task. Picture attachments are included as pictures within the document whilst document files (e.g. .pdf, movies, etc) are included in the report as a active link. Clicking on the active link in the .pdf document will access the secure database and download the file to the local system for viewing.

Note: It very important that Assessors responsible for particular tasks periodically generate reports and save them as .pdfs on their organisations local computer systems so that they can maintain records of these assessments and controls into the future.

Task lists that display all tasks in the current list, including all date stamped data can also be generated from the file menu by clicking on the 'Print Task List Option'.


ERGO ENTERPRISES ERGOANALYST

Task: Profile Grinding

Task Identified: 30/10/2008
Risk Assessed: Complete (15/07/2010)
Controls Proposed: Complete (15/07/2010)
Controls Implemented: Incomplete
Assessors: Karla Hawke
Workplace: Queensland Rail

Task Details

General Task Description
Track maintenance gangs are required to weld rail joints using a thermite weld. Even after the weld excess is sheared there is a need to grind the excess steel so that the rail joint is level.
In order to grind the weld the profile grinder is lifted off the truck with a Hiab or tailgate and then lifted onto the track using a Hiab or 3 person lift, depending upon the site access. Note: The use of a Hiab to lift the grinder onto the track is often not possible where access to the track is an issue.
Shears are first used to cut the hot weld prior to the grind, which takes approximately 2 minutes. Once the grinder is lifted onto the track it is then rolled over the track to the weld. The grinding wheel is then set to the correct height and the grinder is used to grind the hot and cooling weld for a few minutes. Once the weld is fully cooled the grinder is then used to grind the weld level, which takes approximately 15 minutes. Note: There are a variable number of welds ground per shift (average: 10, record: 26 welds in 10 hour shift).

Physical demands
Large physical exertions are required whilst lifting the grinder off the truck, carrying on to track and when leaning over grinding the sides of the rail. There is also more effort than normal required by the legs whilst working on the uneven ballast. The back is put into extreme bent over postures of the back when grinding the side of the rail. Turning the wheel can also place higher physical demands on arms particularly if the equipment is not effectively maintained. In general, poor maintenance regimes place more strain on the body during all parts on the task.

Tools Involved in the task
Profile grinder - Geismar (petrol or diesel) weight - 75 - 80kg. Hydraulic Grinder - 53.5 kg. Shears. Note: Maintenance is often poor/ non existent - e.g. roller bearings, shafts need replacing.

Environmental conditions
Lifting up and down uneven ground and different ballast profiles. Day and night work. Heat. Not having a Hiab or platform available. Access issues. Time constraints due to track location, access and traffic density.

ErgoAnalyst Report: Profile Grinding

POSTURE MOVEMENT

S A B L

Profile Grinding ACTION PLAN

Figure 3.5.5: ErgoAnalyst Report

Note: One of the strengths of the ErgoAnalyst on-line system is the ability to search the database for solutions to potentially hazardous manual tasks. Whilst users can easily search all tasks within their own Group (or linked Groups), they can also see tasks that have been authorised to be shared with other ErgoAnalyst users outside of their group once proper authorisation is obtained by the company and the task has been reviewed by ErgoEnterprises. As tasks are completed with effective controls it is anticipated that more and more of these task will be shared so that this vial information can be communicated for the benefit of all without having to 'reinvent the wheel' every time you have a manual task issue that need resolving. *I.e. Please consider submitting tasks for sharing to ErgoEnterprises.*

4 Implementing the ErgoAnalyst System

4.1 Overview

The main purpose of implementing the ErgoAnalyst Participative Ergonomic system is to develop effective controls that will reduce the risk of injury whilst maintaining or improving the productivity in the workplace. In order to reach this aim it is essential that effective controls are actually implemented. Even if lots of risk assessments are performed and/or some low level controls are implemented, it is highly unlikely that there will be improvements in the health, safety and productivity aspects associated with the workplace unless effective elimination and/or design-based controls are implemented.

The following sections are designed to highlight the essential elements required to successfully implement the ErgoAnalyst system during all implementation phases. These phases are:

1. Setup & Preparation
2. Training
3. Risk Identification
4. Risk Assessment
5. Risk Control
    - Development
    - Implementation
6. Risk Review & Documentation

The essential elements in each of these phases will now be discussed.

Note: Whilst these phases are designed to be implemented in a chronological order, there is certainly some overlap between each phase, and the risk identification, assessment, control and review phases are designed to be repeated for each new task and for previously controlled tasks that may need even further risk reductions.

4.2 Setup and Preparation Phase

Before implementation of the ErgoAnalyst system is even contemplated it is essential that the system is well understood and that a significant level of support (and emotional 'buy-in') for the system is obtained. As well as the 'sign-off' from management to initiate the system, it is also essential that the relevant people and sections (e.g. managers, supervisors and workers) who are going to be involved in the system understand what the object of the system is, how the system works, and their responsibility is to ensure it is successful. This initial setup phase is not insignificant and does require a reasonable amount of work. However, the benefit of this initial effort is that the future success of the system is significantly increased with less effort required to 'sell' the benefits of the system during the the implementation phase.

As the saying goes: "The more sweat in training the less blood in battle!"

The following bullet points highlight the minimum processes and outcomes that should be achieved prior to the initiation of the ErgoAnalyst system within the organisation. These include:

Ready

- Effective presentation of the entire ErgoAnalyst system to all the appropriate managers within the organisation by ErgoEnterprises (or appropriate internal) staff.
- The level of implementation (e.g. initial pilot within an area or group wide launch) is decided upon and the official sign-off to start the ErgoAnalyst system is obtained.
- The appropriate staff member(s) within the organisation are given the responsibility to develop, implement and oversee the system, known as the ErgoAnalyst (EA)-Champion(s) (often EA-Facilitators).
- A full implementation strategy for the implementation of the ErgoAnalyst system is developed by the EA-Champion(s) in conjunction with expert and experienced ErgoEnterprises staff. This implementation plan should include:
    - Developing the company specific goals of the system.
    - Identifying the persons to be involved in the system and developing their roles and responsibilities.
    - Developing budgets and timelines.
    - Identifying the KPIs and linking them to all roles.
    - Developing a detailed plan for the implementation processes and schedules to 'role out' the system.

Aim

- Business specific training materials developed for the organisation by ErgoEnterprises.
- Develop an appropriate and organisation specific communication strategy (e.g. communication to the workers at each stage, how is support for the system *shown* by management, etc).

Fire

- Launch of the program; i.e. training, software licensing, identification of potentially hazardous tasks, development of the risk register, etc, all of which is detailed in the following sections.

4.3 Training Phase

To ensure the best outcome, it is essential that all persons involved in the ErgoAnalyst injury risk management system can effectively contribute to its success. To enable this effective and active participation in the system both the EA-Facilitators and the workers need to be trained. EA-Facilitators are the most critical persons to the ongoing success of the system and thus they need to be highly trained so that they can; deliver the manual task risk management training to the workers, develop and maintain the risk register, facilitate effective risk assessment and control development workshops, and most importantly champion, oversee and implement the system within the business. A summary of the EA-Facilitator training course, and the Manual Task Risk Management Training course (delivered to workers) is given below.

4.3.1 ErgoAnalyst (EA)-Facilitator Training Course

The EA-Facilitator training is delivered by ErgoEnterprises via a 3-day intensive course. This course is designed to give practical skills to the prospective EA-Facilitators so that they can deliver all aspects of the ErgoAnalyst system. Thus, the three days focus on; core anatomical and biomechanical knowledge, the causes of musculoskeletal injury, core ErgoAnalyst implementation skills, and hands on practice delivering the training and facilitation sessions. At the end of the course attendees become authorised EA-Facilitators and are issued ErgoAnalyst user licences. The EA-Facilitator course includes:

- Overview of Participative Ergonomics (PE) and how it works.
- Essential functional anatomy and biomechanics.
- Presentation of the real causes of acute and cumulative musculoskeletal injury.
- In-depth analysis of the 5 causes of musculoskeletal injury
  (i.e. Exertion, Exposure, Awkward Posture, Moment Patterns and Environmental characteristics).
- Detailed training in the implementation of all phases of the ErgoAnalyst system.
- In-depth ErgoAnalyst software training.
- Practice assessing manual tasks in ErgoAnalyst.
- Demonstration and practice delivering the Manual Task Risk Management Training (delivered to workers) plus focus group analysis of that delivery.
- Facilitations skills training.
- Demonstration and practice delivering control development workshops plus focus group analysis of that delivery.

Note: Additional, training is also available to enable these EA-Facilitators to train their own EA-Facilitators within the company, via a 'train-the-trainer' course.

4.3.2 Manual Task Risk Management Training Course

The Manual Task Risk Management Training is delivered by the EA-Facilitators (or ErgoEnterprises staff as required) to workers via a 2-hour training session. The material to deliver this training session is given to EA-Facilitators as part of the EA-Facilitator training course. This training is designed to enable those workers to participate in the ErgoAnalyst system. After this 2-hour training those workers should be able to understand the ErgoAnalyst - Participative Ergonomics system and their role in the system, identify potentially hazardous manual tasks, and actively contribute to the assessment and control development workshops sessions to control the risk of injury from manual tasks. The content delivered in this 2-hour Manual Task Risk Management Training session includes:

- Overview of Participative Ergonomics (PE) and why it is essential.
- Overview of the ErgoAnalyst system and the implementation in the workplace.
- The costs of manual tasks injuries.
- The real causes of acute and cumulative musculoskeletal injury.
- The 5 causes of musculoskeletal injury
  (i.e. Exertion, Exposure, Awkward Posture, Moment Patterns and Environmental characteristics).
- Practice assessing manual tasks using ErgoAnalyst.
- The control development process and the 'hierarchy of controls'.
- Data collection of current potentially hazardous tasks.
- Summary and presentation of the implementation process.

Note: This type of training in manual task risk management is more effective at reducing the risk of injury than traditional manual handling courses that focus on lifting technique training and/or worker attributes.

4.4 Identification of Potentially Hazardous Tasks Phase

Before embarking on the risk assessment and control development phases, a detailed list of potentially hazardous manual tasks should be developed. From this list, those tasks that are chosen to be assessed in the near future using ErgoAnalyst should then be added to the Task Identification list in the software and the priority level for these tasks should be set (i.e. critical = red, high = orange, moderate = yellow or low = green). It is recommended that a high (orange) priority level is set for tasks that are need be assessed ASAP (based upon the perceived high level of injury risk), whilst the extreme (red) priority level is reserved for tasks where an imminent danger of injury is perceived and immediate action is required. The priority level for a potentially hazardous manual task should consider not only the acute and cumulative injury risk level but also; the number of people performing the task, how often the task is performed, if injuries have been associated with the task in the past, the current associated productivity level, if a solution is readily available, etc.

The list of potentially hazardous manual tasks can be generated from information obtained from a variety of sources, including (but not limited to); an existing risk register, ErgoAnalyst Hazard Identification Cards, tasks identified by workers during a training session, workplace observation, tasks which have been associated with injuries in the past, etc. Once tasks have been added and prioritised in the ErgoAnalyst Task List then they should be systematically assessed (and controls developed as required) according to their priority level.

Note: A central determination and administration of which EA-Facilitator(s) are to assess which tasks may be required to avoid tasks being assessed more than once (unless required); as the task risk controls developed by one group can be shared across the business (via the on-line ErgoAnalyst database), maximising the utility of resources.

4.5 Risk Assessment Phase

Once a task has been chosen by (or assigned to) a particular EA-Facilitator, the risk assessment of that task can take place. This risk assessment phase involves the collection of all relevant information about the task and the facilitation of the Risk Assessment Workshop. It is *essential* that the EA-Facilitator has collected *all* information (e.g. task details, pictures, videos, etc) about the task so that they are well prepared *before* facilitating the Risk Assessment Workshop.

Prior to facilitating the Risk Assessment Workshop the EA-Facilitator should have gone 'on-site' to view the task, taken appropriate pictures and/or videos and discussed the task with the workers who perform and/or supervise the task. To ensure that good data about the task is collected, the EA-Facilitator needs to have developed an excellent rapport with the workers performing the task. After discussing the issues associated with the task (e.g. durations, speed, maintenance, workplace design, etc) with trained representative worker(s), the EA-Facilitator should then take appropriate pictures and/or videos that demonstrate the key issues associated with the task (e.g. awkward postures, repetitive movement patterns, etc). It is important to take more pictures and/of videos than required so that the best ones can be used. It may also be appropriate for the EA-Facilitator to use the paper-based ErgoAnalyst assessment tool to assess the task at this time; although allowing the workers to visualise the acute and cumulative injury risks using the ErgoAnalyst software at the Risk Assessment Workshop provides much better 'buy in' from the workers. The EA-Facilitator also needs to collect any quantitative information about the task (e.g. weights and lengths of tools, manufacturers, costs of equipment, etc), either on-site or at a later stage (e.g. via manuals or searching the internet) so that all the appropriate information can be entered into the ErgoAnalyst software. This task description information needs to be *very* detailed (as described in sections 3.3.1 to 3.3.5) so that both the risk assessment and the risk controls take all factors associated with the task into account.

The people involved in the Risk Assessment Workshop should include both the 'ErgoAnalyst-trained' workers who are familiar with the task being assessed and appropriate supervisors and/or managers who oversee or who are responsible for the task, as well as the EA-Facilitator who facilitates the workshop. If a standard representative committee is routinely used for the Risk Assessment Workshop then all workers should know who their representative is on this committee so that they can 'have a say' in the assessment (and control) of tasks relevant to them through their representative. The persons chosen to be part of the Risk Assessment Worksop (and who will also be part of the following Control Development Workshop) should be people who are willing to actively participate in a constructive and positive manner and who are outcome focused. It is essential that the correct people are chosen to be part of the Risk Assessment Workshop.

To get the best results, the Risk Assessment Workshop itself should be conducted in an area where all the workshop participants (sometimes known as the 'Working Party') can focus on the task without distractions. Therefore, an appropriate room with a projector and internet connection (for the software) should be used and participants should commit to the time designated for the workshop session and turn off their mobile phones. It is essential that the EA-Facilitator 'takes charge' of the session so that an effective outcome is achieved in a timely manner. Although each EA-Facilitator may wish to facilitate the Risk Assessment Workshop in a manner that best suits their style, the list below outlines the typical chronological order of activities that has produced the best results from these workshops in the past.

The EA-Facilitator should facilitate the Risk Assessment Workshop by:

1. Introduce the session and conduct all appropriate safety briefings.

2. Outline the purpose of the workshop and present any relevant history on the task (e.g. injury statistics).

3. Review the task description (e.g. where and when performed, duration, repetitions, weights, etc) and show a video and/or picture(s) of the task as appropriate.

   Notes:

   - This review can be done via ErgoAnalyst and/or summarised on a single presentation slide.

   - Ensure that everyone generally agrees with the task description and/or make changes as necessary.

4. Facilitate the assessment of the physical and environmental risk factors associated with the task in ErgoAnalyst whilst the Assessment page is projected so that everyone can easily see it.

   Notes:

   - It is important that the EA-Facilitator *facilitates* the assessment done by the participants (i.e. the assessment is done by the participants not the EA-Facilitator who is there simply to guide the assessment process as required).

   - Assess all body regions for each risk factor, starting with exertion before moving to the next risk factor (e.g. exposure), so that participants focus on each risk factor separately. For example, when assessing posture just rate the risk associated with the posture without considering other risk factors.

   - The help menu at the bottom of the assessment pop-up box (and/or this manual) can help EA-Facilitators guide the assessment done by the Workshop participants. You may also wish to hand out paper copies of the paper-based assessment tool to help the participants.

5. Once you have finished the assessment, review the acute and cumulative risk with the participants to ensure that it accurately reflects the risk of injury, and make adjustments if necessary.

   Notes:

   - This visual representation of the acute and cumulative risks can help the workers to see possible future injuries based upon the risks associated with current task conditions and thus it is very effective at getting worker 'buy in' to commit to developing a solution.

- Ensure that you also look at the risk graphs as well as the risk body map profiles as the graphs give greater precision on the injury risks levels.

6. If the injury risk level warrants intervention, the EA-Facilitator should then highlight the major causes of the unacceptable risk from the Hazard Profile and then collaborate with the workshop participants to describe exactly what factors contribute to these particular elevated risk factors. These specific causes should then be entered in to the 'Risk Factors to Consider' text box (either straight away or recorded on a white board and entered into the software after the workshop).

   Notes:

   - The 'Risk Factors to Consider' should be entered as questions that direct the participants to consider how to reduce the risks associated with particular risk factors. For example, if the exertion and posture for the back was red for a task that involved unloading 200 bags of cement then the associated Risk Factor to Consider might be something like ... "How can the heavy exertion and awkward bent-over and twisted posture of the back when unloading 200 20kg bags of cement off a 1200mm deep pallet be eliminated or minimised?"

7. Once the specific Risk Factors to Consider have been highlighted the EA-Facilitator should get the workshop participants to brainstorm possible solutions to reduce these specific injury risk factors. All these possible solutions should be written on a whiteboard and then (once the list is completed)narrowed down to the best probable solutions. Appropriate workshop participants should volunteer to investigate and/or trial the various probable solutions before the Control Development Workshop.

   Notes:

   - Whilst the brainstorming of controls can take place in the Control Development Workshop (rather than in the Risk Assessment Workshop), it is more likely that more refined controls and actions plans will be developed if probable controls are able to be trialled *before* the Control Development Workshop.

   - It is important that the EA-Facilitator sets the 'ground rules' for the brainstorming session before asking for ideas from the participants. These 'ground rules' should include; everyone has the opportunity to contribute, there is no evaluation of ideas until a full list is developed, everyone listens to the person who is talking, etc.

   - To narrow down the 'possible control list' to a 'probable control list' the EA-Facilitator (in collaboration with the participants) may want to first remove any obviously impossible and/or impractical solutions, then categorise solutions as either short, medium or long term solutions, and then group solutions together to form one or more complete solution package. It is the job of the EA-Facilitator to help the participants 'see' the combination of solutions that may have the greatest ability to reduce the risk of injury and to 'assign' the trialling of these solutions(s) to the various participants so that they can evaluate them before the 'Control Development Workshop'.

Note: It is best to have a 1 - 3 week break between the Risk Assessment Workshop and the Control Development Workshop so that the probable control solutions can be evaluated (by workshop participants, the EA-Facilitator and other appropriate persons as required, e.g. engineers, managers, etc), and so that other appropriate persons (e.g. engineers) can be invited to the Control Development Workshop if required.

4.6 Risk Control Phase

The risk control phase is the most critical phase in the whole ErgoAnalyst process. Even if very good risk assessments and workshops are conducted, *there will be no reduction in the risk of injury and/or improvements in productivity unless effective risk controls are actually implemented*. Risk assessment alone does not reduce the risk of injury. Therefore, this control phase is focused on developing effective controls and ensuring that these controls are actually implemented.

The control development phase is best broken down into two sub-phases: (1) the development of proposed controls and; (2) the implementation of those controls. The development of proposed controls involves the on-site evaluation of probable controls brainstormed in the Risk Assessment Workshop, and then the prospective assessment of those controls in the Control Development Workshop. The implementation phase involves the development of a detailed action plan in the Control Development Workshop, and then following up on that action plan (by the EA-Facilitator and/or other persons responsible for the actions) to ensure that the controls are implemented and reassessed using ErgoAnalyst.

4.6.1 Control Development Phase

The control development phase is focused around the Control Development Workshop. However, in order for effective controls to be developed in this workshop there is some critical preparation to be done prior to the workshop during the 1 - 3 week 'break' between the two workshop sessions. During this time the EA-Facilitator (and any other appropriate persons, e.g. managers, engineers, etc) should actively collaborate with the workers on-site to discuss and/or trial the probable controls identified in the Risk Assessment Workshop. This collaboration should also highlight the need for any additional persons to be invited to the Control Development Workshop. For example, if a control requires equipment to be modified, then a mechanical engineer might also need to be invited to the Control Development Workshop so that any engineering issues can also be addressed at the same time. The EA-Facilitator should also collect all the appropriate information about the probable controls (e.g. costs, effectiveness if trialled, weights, dimensions, construction materials, etc) so that they can take this information to the Control Development Workshop.

Note: The more preparation that is involved before the Control Development Workshop the more likely that effective controls and action plans will be finalised in that workshop, and thus the more likely that the controls will be implemented in a timely manner and with less additional effort.

Although each EA-Facilitator may wish to facilitate the Control Development Workshop in a manner that best suits their style, the list below outlines the typical chronological order of activities that has produced the best results from these workshops in the past.

The EA-Facilitator should facilitate the Control Development Workshop by:

1. Introduce the session and conduct all appropriate safety briefings.
2. Outline the purpose of the workshop and present any relevant history and/or update on the task.
3. Review the task as it has been performed and show a video and/or picture(s) of the task as appropriate.

4. Show the ErgoAnalyst risk assessment of the task and highlight the specific risk factors that needed to be controlled.

5. Update all participants on your on-site discussions and observations of the probable controls that have been evaluated and/or trialled since the Risk Assessment Workshop.

6. Open up the discussion for all workshop participants to comment on the proposed controls until a consensus is reached on the best control solution package(s). Note: This 'control solution' could include a multiple number of probable control measures (modified if necessary) in the one overall solution .

7. Detail all the Design- and Administrative-based controls within each control solution on a whiteboard that can be entered into ErgoAnalyst after the workshop. Note: This information should be very detailed and include all relevant information (e.g. workstation design modifications, dimensions, weights, manufactures, costs, etc).

8. Facilitate the assessment of each proposed control solution option in the Control page of ErgoAnalyst (enter a new control option by clicking on the '+' button on the Control Details title bar) by assessing the environmental and physical risk factors in the Hazard Profile tab. Note: Ensure that you have selected the Proposed (i.e. not the Implemented) control option button in the Controls column of the Risk Control Options table before performing the assessment.

9. Compare the acute and cumulative risks associated with each assessed prospective control option vs the acute and cumulative risks associated with the assessment of the 'uncontrolled' (i.e. current) task.

   Notes:

   - The Risk Profile tabs can be used to quickly and easily visualise and compare the relevant risks between the current and prospective controls via the coloured body map. However, the body map only represents risks in 4 distinct categories (i.e. green = low, yellow = moderate, orange = high and red = extreme), whilst the risk Graphs tab can be used to compare the risks with a greater resolution for each body segment on the risk graph with a 24 point scale.

   - There is no distinct safe cut off point that determines if a task is safe or should be controlled. Rather the risk analysis data should be viewed as a continuum to determine the relevant level of risk reduction associated with each control option.

10. The most effective control option (or options if short and long term controls are to be implemented in stages) should be selected and an appropriate and detailed action plan (including; persons, actions, deadlines, accountabilities, etc) developed and entered into the Action Plan tab.

    Notes:

    - Whilst most companies will have their own action plan system for implementing controls the ErgoAnalyst action plan in the Action Plan tab of the control page is designed to give the essential elements of the action plan tied into each specific control option.

    - The action plan is different for each control option. As controls are implemented the percentage slider in the action plan should be periodically adjusted to show the level of implementation currently achieved.

- If a control option is not to be implemented but you want it in the system to show that it was considered (as maybe it might be implemented at a later stage) then the action plan should detail why this control option is not to be implemented at this stage.

- If a task can be eliminated and or substituted for a task with lower risk (i.e. YES is activated in the 'Can the task be eliminated' area) then this control option should be added to the control option table and the human figures and environmental hazards are left blank (i.e. 100% risk reduction) and the action plan for the elimination of this task should be completed.

4.6.2 Control Implementation Phase

Once the Control Development Workshop is completed and the action plans for implementation are set it is then the responsibility of the EA-Facilitator (and/or other persons responsible for the task) to ensure that the controls are implemented in a timely manner. One of the important factors that can help this implementation process is a clear, transparent and regular communication process. Once the EA-Facilitator has entered all of the relevant information into the ErgoAnalyst software they should print out the report (with the appropriate control options included) and ensure that all workshop participants have access to this report (via email, safety boards, etc). It may also be important to delivery this report and any additional information (e.g. costings, purchase requisitions, etc) to the relevant manager if the controls require new equipment and/or procedures.

Although work may have begun to implement the controls it is still essential that the EA-Facilitator follows up during each stage of the control implementation process to ensure that timely progress is being made and that the controls are being developed/implemented as envisioned by the working party. Therefore, it is important that the EA-Facilitator (or appropriate person) constantly communicates with the workers and management to keep them informed on the progress of the control and to get feedback on any control prototypes, as required. Pictures and/or videos of the control should be taken periodically during the development process and made accessible to the Working Party, as required.

Once the final control is fully implemented and is operational for a period of time (i.e. until the workers are familiar with the control and feel comfortable using it), then the ErgoAnalyst implemented risk assessment can be conducted. Often this assessment can be conducted on-site with some or all of the original working party, but if necessary the working party should be reconvened for a short meeting to reassess the implemented control. In order to assess this 'controlled task' it is best to show pictures and/or videos of the task being performed both before and after the implementation of the control(s). The assessment of the implemented control can then be done in the Hazard Profile tab (ensure that you click on the Implemented control button in the Controls column) of the ErgoAnalyst Controls page. The Risk Profile, Risk Graph and report can all be used to assess the level of injury risk reduction (or increase) associated with the 'risk controlled' task.

If the risk reduction level is considered adequate for the time being (i.e. there is always the opportunity to come back and review and reduce the risk further in the future as part of a constant improvement process, particularly as technology improves) then the 'Completed' button should be clicked and the action plan slider set to 100%. Additional pictures and/or video should also be taken once the control is implemented and attached to the task in the Attachments section of ErgoAnalyst.

4.7 Risk Documentation and Review Phase

Once a task is fully completed (for now) the priority level should be set to Blue = Completed. The complete risk report must also be printed and saved as a .pdf document within the company records. An example of a finalised ErgoAnalyst report (for the 'How to use ErgoAnalyst' task) is given in the Appendix. Note: Once a task is completed it will no longer show up in the task list unless the Blue Task Completed tick box is selected.

Periodically, tasks that have previously been 'controlled' should be reviewed to examine if the 'minimised' acute and cumulative risk levels have been maintained. It may also be valuable to re-evaluate these previously 'controlled' tasks to determine if they are still 'best practice' and/or if new technologies now enable further risk reduction or elimination to occur.

To help this documentation and review process the task list can also be sorted and printed so that the chronological progress on all tasks (and/or selected tasks on a filtered list, e.g. high priority, high risk, etc) can be determined. First, select the appropriate task list by narrowing the list with the search filter (if required) and/or sorting the list via the priority level or chronological progress (i.e. date identified, assessed or controlled) by clicking on the appropriate Task List column icon. Then print the Task List by selecting that option from the File menu drop down list. The active task list will then print to the default browser in .html format with all the dates (i.e. identified, assessed, controlled and reviewed) in the printed task list. This list can also be sorted post printing in the browser.

Note: The reviewed option must be activated by ErgoEnterprises (after receiving the appropriate company authority), which also enables sharing of this task between all Groups who use ErgoAnalyst.

Appendix

Sample ErgoAnalyst Report - ‘How to use ErgoAnalyst’

This sample ErgoAnalyst task can be found at the top of the Task List within the ErgoAnalyst software, and can be printed as a report by selecting the ‘Print Task Report’ from the File menu drop down list. A slightly modified format version of this report is presented below. This ‘How to use ErgoAnalyst’ task and the associated report is designed to help EA-Facilitators correctly input all of the appropriate information into each area of the ErgoAnalyst software.

ERGO ENTERPRISES ERGO ANALYST

Task:	01 - How to use ErgoAnalyst
Priority:	Completed
Task Identified:	01/01/2010
Risk Assessed:	02/02/2010
Controls Proposed:	03/03/2010
Controls Implemented:	05/05/2010
Assessors:	Names of the EA-Facilitator(s) who have editing rights to the task.
Workplace:	The specific name of the workplace or worksite.

Task Details

Task Description

Note: Click on the 'maximise' icon on the top right corner of each text box to maximise the text box area on the screen, which also increases the text size.

The "General Task Description" should describe the task in as much detail as possible. You can start with the 'Standard Work Procedure' for the task if you like, but ensure that the task description reflects how the task is 'actually done' not just how the task is 'theoretically done' in the work procedure. Note: You should also include any other relevant information in this area, such as why the task was chosen, etc.

Think of this task description as a recipe for how the task is regularly done on a step-by-step basis. This information could also be important to convey to those who are less familiar with the task (e.g. upper management) how the task is actually performed. The task description is also an important step that can help those assessing the risk (e.g. the workers) to systematically identify all the issues that need to be considered when assessing the task. It might also beneficial to attach a

photo, short video or associated document relevant to the task if appropriate in the 'Attachment section' (total 10Mb limit for all attachments per task). However, make sure that any pictures or videos that are attached to the task are appropriately labelled (i.e. the file name is appropriate) and is of appropriate for the analysis. Make sure any file that you upload will really help others viewing the task to understand the issues associated with the task. Don't upload any picture or video unless it clearly shows the person(s) performing the task and the associated physical risks factors.

In order to upload (or delete) a file click on the + (plus) or - (minus) sign above the "Attachment" section. To view the file click on the appropriate icon (camera or photos, film strip for videos, etc) associated with each file and located in the right column of the "Attachment" section. Click on the attachment's file name itself to change the file name and/or delete the attachment.

Note: This task has been locked so you only have viewing and not editing rights.

Tools and Materials

List all the tools and materials that are involved in the task, much like a list of the ingredients in a cook book. However, ensure that this list is detailed and includes ALL the appropriate details (e.g. weights, lengths, type of material, cost, distributor/manufacture, etc) associated with each tool.

Note: You can list these tools by bullet point if you wish. Just use the - (hyphen) on your keyboard to denote each new bullet on a new line.

Physical Demands

The 'Physical Demands' area is used to describe the physical demands (e.g. exertion, postures, exposures, rapid or static movements patterns, etc) that are placed on the workers who perform this task and why.

For Example:

- Large muscular exertions and awkward postures are required by the back to lift each 20kg bag of concrete, particularly those that are located at the back of the storage palette, when the required reach distance can be up to 1.5 meters.
- Approximately 200 x 20 kg bags of concrete are lifted every hour for the four hour duration of the task (i.e. 800 bags = 16 tons over the four hours).
- Each lifting movement is performed at a relatively high speed because; (1) the force required is large and (2) a large number of bags (i.e. 800) need to be lifted in a limited period of time (i.e. 4hours).

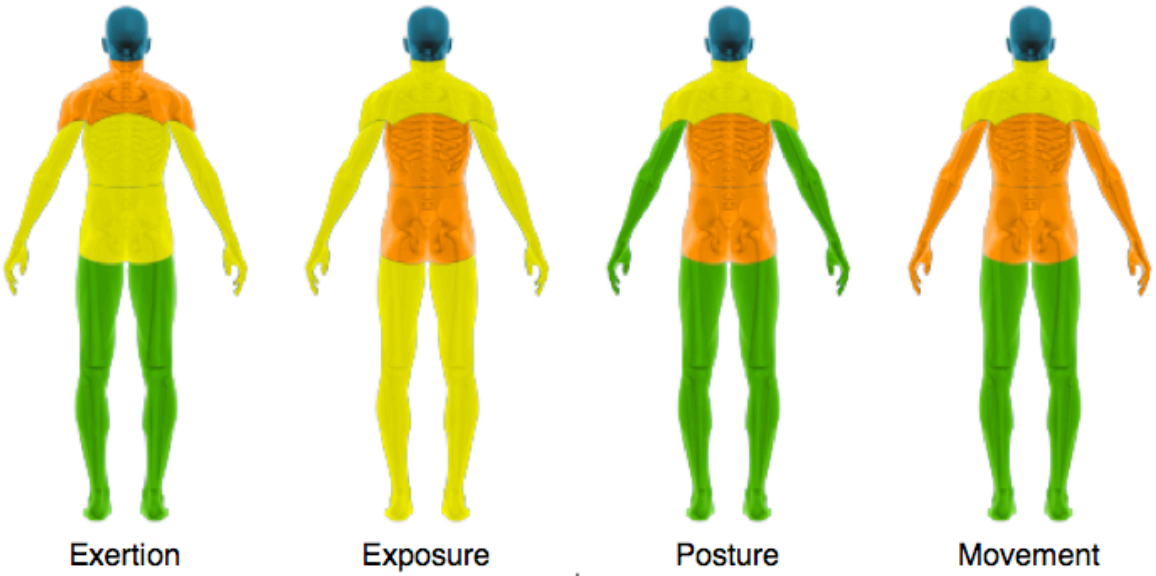
Environmental Conditions

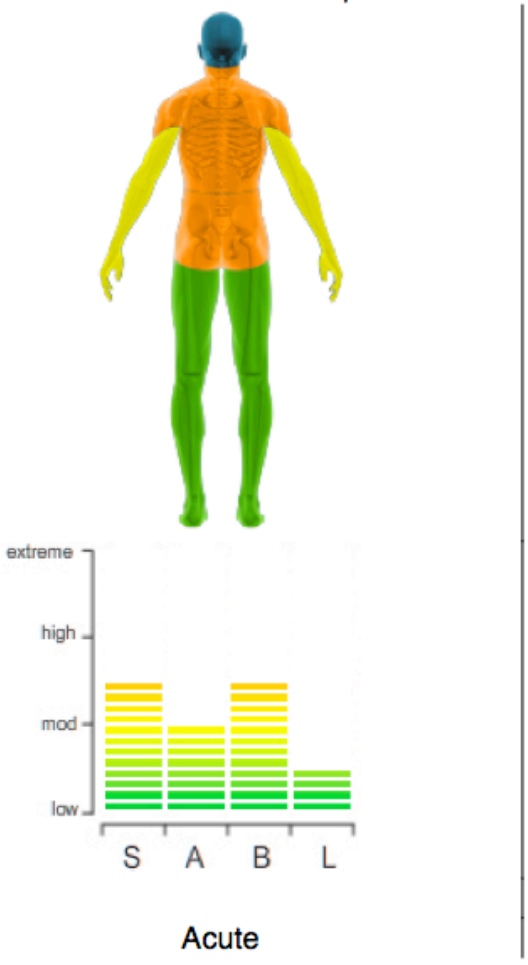
This area is used to highlight and describe any specific environmental condition(s) that may affect the risk of injury by exacerbating particular risk factors. For example, the exertion required to move a piece of equipment might be minimal across a concrete floor (where the equipment was designed in a workshop), but it might be very different when moving the same piece of equipment across uneven ground outside as is often the case at the worksite.

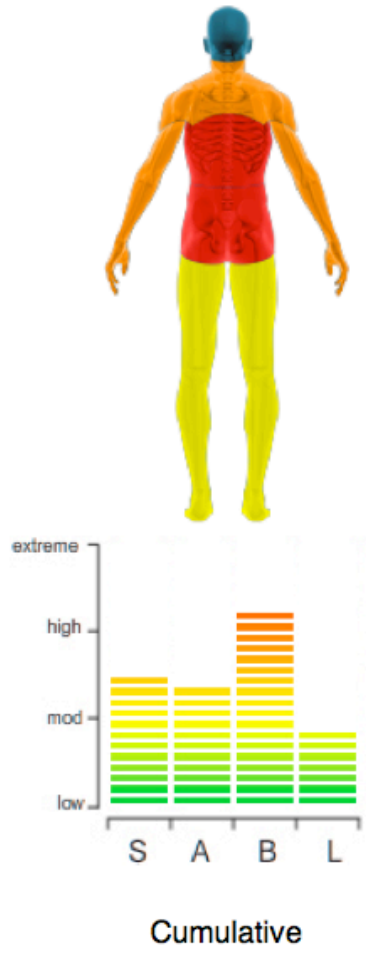
Environmental factors to consider might include; heat, cold and/or humidity, ground conditions, lighting conditions, wind (particularly if objects with large surface areas are being handled), the time given to perform the task, the lack of control over the pace of work, the condition of the equipment (e.g. poor maintenance schedules affecting the operation of the equipment), etc.

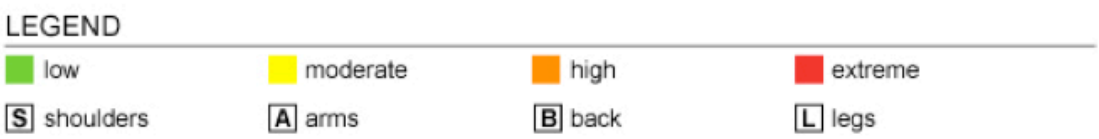
Note: Any relevant information related to the Pinch Point analysis should also be included in this section.

Risk Analysis: 01 - How to use ErgoAnalyst









Environmental Factors

- Heat
- Lack of Control
- Whole Body Vibration

Pinch Point

Risk: Moderate

Consequence: Minor

Likelihood: Likely

Risk Factors Considered

This 'Risk Factors to Consider' section is designed to highlight ALL the risk factors that need to be considered when developing new risk control measures. In essence, all of the descriptive task information in the Identification tab plus all of the risk factors assessed in the Assessment tab are combined in this area. Note: The risk assessment is replicated in the Hazard Profile tab shown below on this Control page for your convenience.

Make sure that ALL the physical and environmental risk factors are described in detail in this section, including WHY these risk factors are present. The risk factors listed here should help the workers involved in the control development workshop(s) to maintain focus on developing controls that are targeted at removing the specific risk factors that have the greatest ability to improve the health and productivity of the worker.

It is preferable for these risk factors to be stated as questions so that they they help focus the workshop participants on developing solutions that target the specific risk issues.

For example:

- How can the prolonged static flexion of the trunk required when welding on the low height of the workbench (500 mm) be eliminated or improved so as to reduce the injury risk to the lumbar spine?
- How can the high injury risk on the back due to the high exertion, exposure and repetitions caused by repetitively lifting 800 20 kg cement bags in a four hour duration be eliminated or reduced? Bulk handling of the cement should be considered.
- etc

Can the task be eliminated?

Note: 'Yes' or 'No' occurs the first line of text based on the selection of the ‘Yes/How’ or ‘No/Why’ buttons.

It is essential that elimination of the task is considered, i.e. 'why are we doing this task in the first place?' In accordance with government regulations and most importantly in accordance with the 'hierarchy of risk control management'.

BEFORE considering possible design or administrative controls serious consideration MUST be given to how that task might possibly be eliminated and thus remove all the associated injury risk. Often elimination can also lead to improved productivity as workers can be redistributed to other tasks. Note: Task elimination does not necessarily mean that the process no longer occurs just that workers are no longer involved in performing the task.

If the task can be eliminated then click 'YES' (above) and then give a detailed description of exactly HOW the task will be eliminated and over what time period. If the task is to be eliminated you also need to add a control option in the Control Option List (and call it Elimination) and then complete all of the control description and action plan, but leave the risk assessment blank to indicate that a 100% risk reduction is achieved by this elimination control.

If the task can not be eliminated then click 'NO' (above) and then give a detailed description of exactly WHY the task can not be eliminated. It is especially important to document that elimination has been considered even if it is not possible for legal compliance reasons and so that future reviews of this task can track the reasons why particular control measures were or were not implemented.

Control: Control Option 1

Engineering Controls

Design controls should always be considered BEFORE considering administrative controls.

This 'Design Control' area is specific to each control option (i.e. multiple options can be considered, each with their own control descriptions and associated assessment). All of the design controls for this specific option that are to be prospectively assessed (and then reassessed upon implementation if appropriate) should be included in this area. As the risk control strategy for this task progresses, more detail should be added to this section (e.g. why this control was not implemented, changes to the designs, consultation with manufactures, etc) to give a full picture of what happened to the design controls that were part of this specific control option.

This 'Design Control' area should describe IN DETAIL exactly what design control(s) are being proposed (and then later implemented if appropriate), including; tool design, weights, lengths, construction materials, manufacturer, implementation period, costs, etc.

Notes:

1) The proposed ('clipboard') and implemented ('thumbs up') icons associated with each control option are used to switch between the proposed and implemented assessment of each control option. However, all of the design and administrative descriptions with each control option are conveniently associated with the whole control option and don't change when switching between proposed and implemented assessment.

2) Once proposed control(s) have been prospectively assessed and the appropriate control option(s) have been selected an action plan for implementation needs to be developed before the proposed controls can be considered to be effectively 'Completed' and checked-off and date stamped in the Task List on the Identification page. The Completed button can be found at the bottom of the Action Plan tab.

3) Once controls have been effectively implemented and assessed this re-assessment can be checked-off as being completed by clicking on the 'Implemented' button in the bottom of the Hazard Profile of an Implemented assessment.

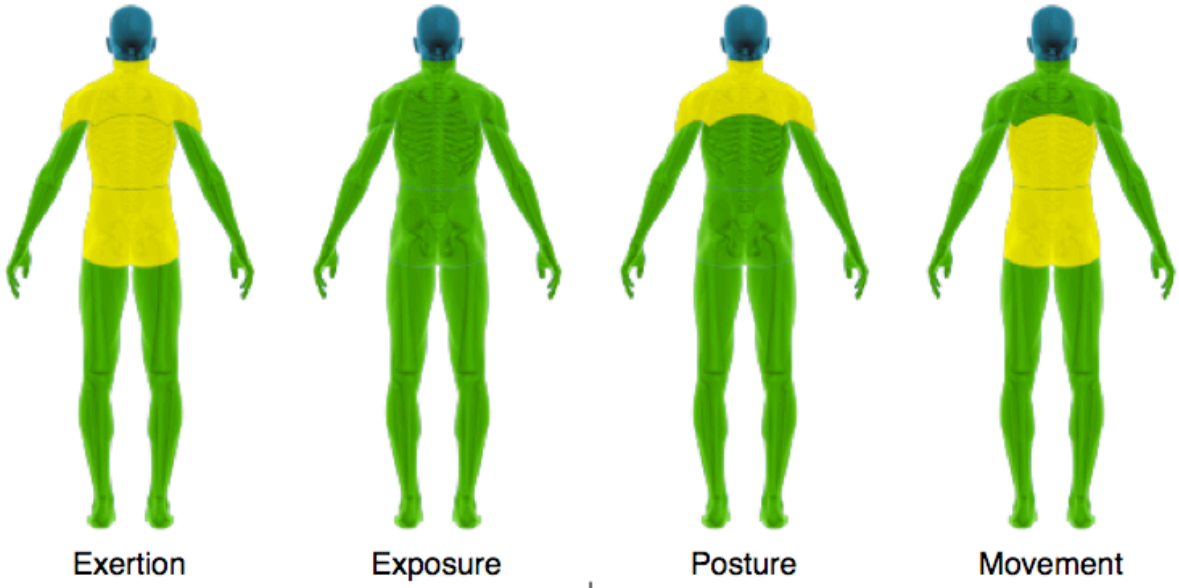
Administrative Controls

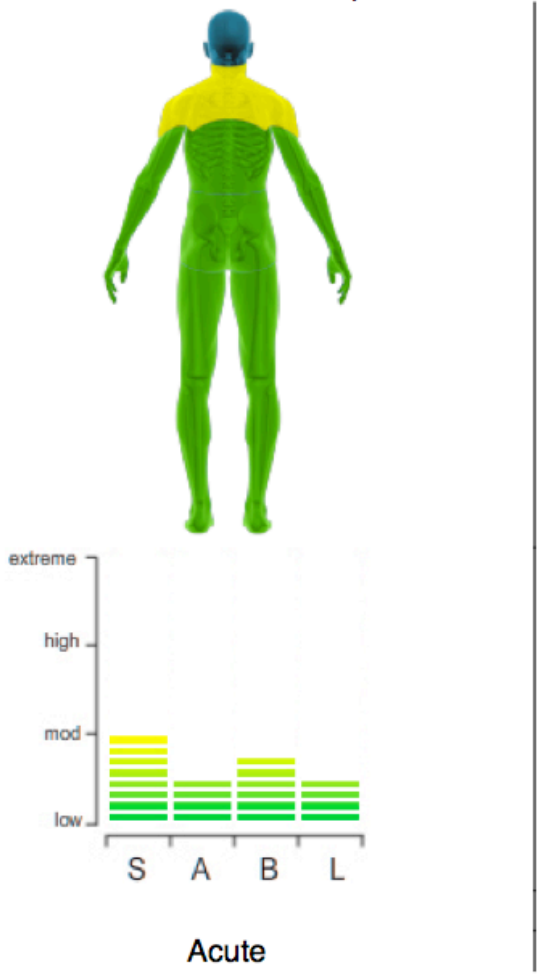
Administrative controls should only be considered AFTER considering effective design controls. Administrative controls are NOT effective risk reduction measures on their own, they MUST be accompanied with appropriate design controls to be effective.

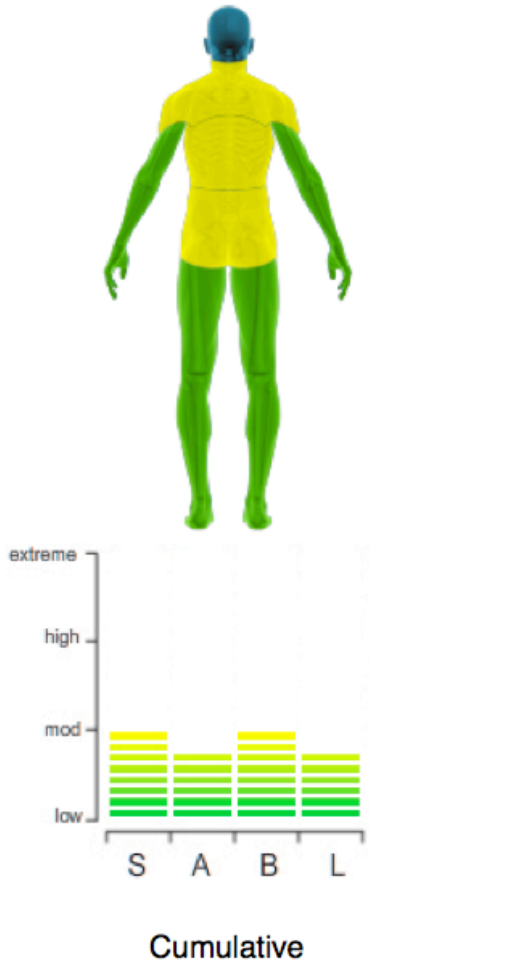
This 'Administrative Control' area is specific to each control option (i.e. multiple options can be considered, each with their own control descriptions and associated assessment). All of the administrative controls for this specific option that are to be prospectively assessed (and then reassessed upon implementation if appropriate) should be included in this area. As the risk control strategy for this task progresses, more detail should be added to this section (e.g. why this control was not implemented, changes to the procedures, consultation with management, etc) to give a full picture of the what happened to the administrative controls that were part of this specific control option.

This 'Administrative Control' area should describe IN DETAIL exactly what administrative control(s) are being proposed (and then later implemented if appropriate), including; operating procedures, required personal protective equipment (PPE), maintenance schedules, specific worker training, staffing levels and contingencies for low staffing levels, etc. (Note: administrative controls such as; lifting technique training or advice to 'take care' to avoid 'human error' are NOT effective administrative control options).

Proposed Control Risk Analysis: Control Option 1







Proposed Control Risk Analysis (Continued): Control Option 1

Environmental Factors

- Heat
- Lack of Control

Pinch Point

Risk: Moderate

Consequence: Minor

Likelihood: Possible

Proposed Control Risk Reduction Estimates: Control Option 1

Acute Risk Reduction Estimates

Shoulders:	33%
Arms:	50%
Back:	50%
Legs:	0%

Cumulative Risk Reduction Estimates

Shoulders:	33%
Arms:	45%
Back:	56%
Legs:	14%

Action Plan to Implement Effective Control

Contact: The person in charge of overseeing the implementation of the control. Typically this would be the EA-Facilitator.

Email: The email address of the contact person.

Phone: The phone number of the contact person.

Due Date: 29/08/2011

Plan:

In order to complete a proposed control you MUST develop a specific action plan for at least one control option that is designed to help ensure that a control is implemented. Remember, if a task is assessed and is deemed hazardous and the controls are not implemented then the risk has not changed and the assessment has been a waist of time.

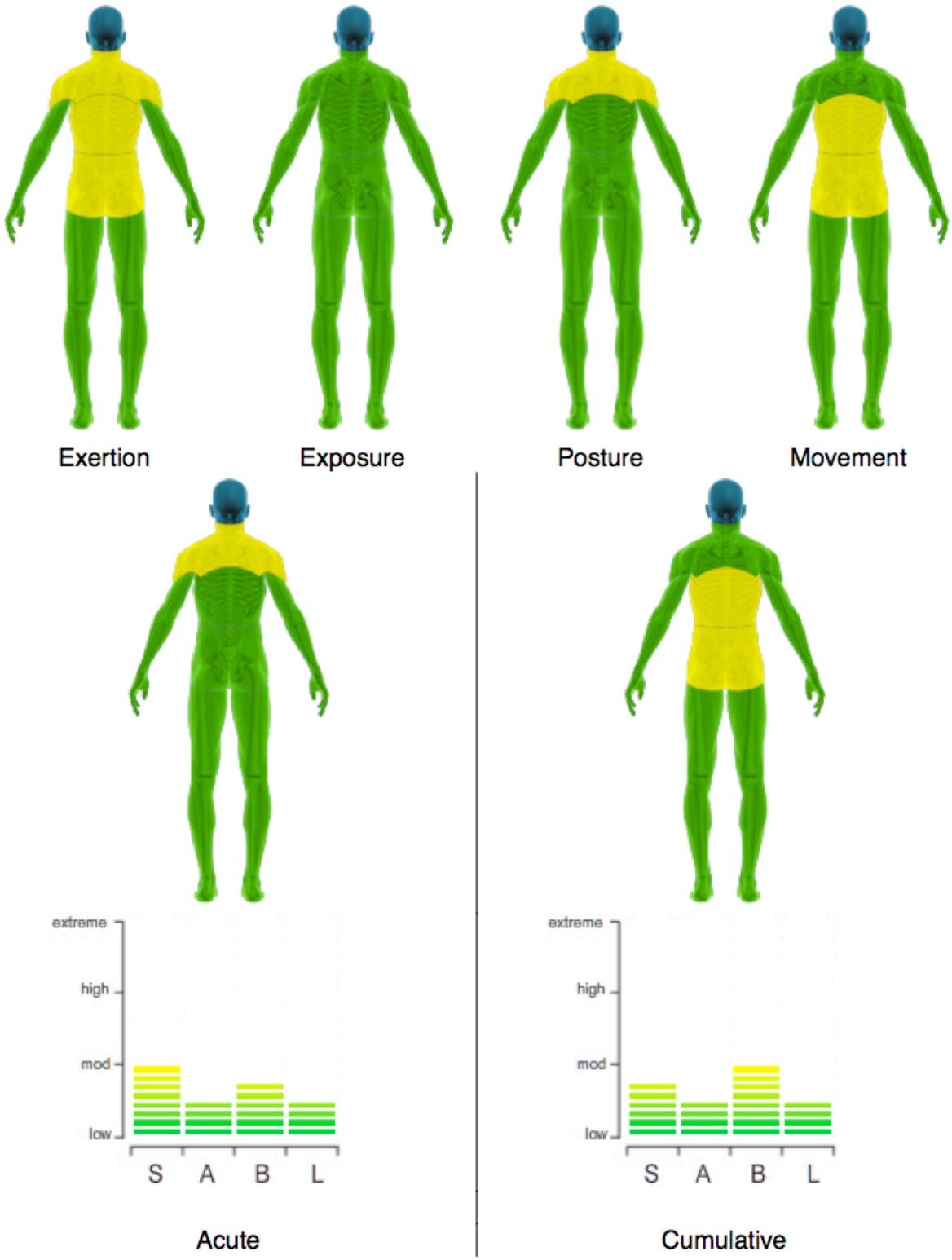
NOTE: Each control option has its own specific action plan. For proposed controls that are not to be implemented then the associated action plan for that control should state the that control is not to be implemented and why it is not to be implemented, at least at this stage. I.e. this area can be used to justify which controls are to be implemented (or not implemented) so that others can examine the task and the controls that were considered at a latter stage.

The action plan(s) you develop and enter in this area are NOT designed to replace the action planning system that exist within the company. The action plan within ErgoAnalyst is designed to enable any user to see the type of controls that were considered and what associated actions were associated with each proposed control all in the one place.

The details entered in the action plan should include; the people responsible, the actions that they are to undertake, the time-line that the actions are to be completed by and when it is expected that this control will be implemented and reassessed using ErgoAnalyst.

Progress: 100%

Implemented Control Risk Analysis: Control Option 1



Implemented Control Risk Analysis (Continued): Control Option 1

Environmental Factors

- None

Pinch Point

Risk: Moderate

Consequence: Minor

Likelihood: Possible

Implemented Control Risk Reduction Estimates: Control Option 1

Acute Risk Reduction Estimates

Shoulders:	33%
Arms:	50%
Back:	50%
Legs:	0%

Cumulative Risk Reduction Estimates

Shoulders:	50%
Arms:	64%
Back:	56%
Legs:	43%

Appendix: Task Attachments

All files, documents, pictures and/or videos are attached here!

Pictures are displayed directly in the Appendix (with full page width), whilst files, documents and videos are displayed as active links to the associated files. Clicking on these file links (in an active .pdf format) will automatically connect to the appropriate secure ErgoAnalyst server database (as long as internet access is available) and download the file to the local computer system to be viewed on the local computer with the appropriate default program (e.g. videos viewed in the Media Player on a PC).

Task Attachment: ErgoAnalyst Hazard Identification Card.

Manual Task Hazard Identification Card

ERGO ENTERPRISES

Task Name : Workplace : Date :

Task Description/Issue :

Risk Factors present :

- ☐ High exertion
- ☐ Static postures
- ☐ Awkward postures
- ☐ Long durations without a break
- ☐ Frequent movements of similar movements
- ☐ Whole-body or localised hand-arm vibration

Control ideas :

Circle Body Parts at Risk

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Task Attachment: ErgoAnalyst Manual Task Description Form

Manual Task Description Form

ERGO ENTERPRISES

Task :

Date :

Assessor :

Workplace :

Task Description :

Tools and Materials :

Physical Demands :

Environmental Conditions :

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Task Attachment: ErgoAnalyst Manual Task Assessment Tool

Manual Task Risk Assessment Tool

ERGO ENTERPRISES

Environmental Hazards :

		Whole-body vibration	Localised vibration
☐ Stress	☐ Cold/Heat	☐ Low	☐ Low
☐ Time pressures	☐ Cognitive overload	☐ Moderate	☐ Moderate
☐ Lack of control	☐ Cognitive underload	☐ High	☐ High

Physical Hazards :

Risk Level	Exertion	Exposure	Posture	Movement
Green	Low force and speed	Task performed infrequently for short periods	Comfortable postures within a normal range about neutral	Varied movement patterns
Yellow	Moderate force or speed, but well within capability	Task performed regularly, but with many breaks or changes of task	Uncomfortable postures, but not approaching an extreme range of motion	Little of no movement, or repeated similar movement patterns
Orange	High force or speed, but no close to maximum	Task performed regularly, but without many breaks or changes of task	Postures approaching an extreme range of motion	Repeated identical movement patterns
Red	Force or speed close to maximum	Task performed continuously for the majority of the shift	NA	NA

Body Part	L Exertion	R	L Exposure	R	L Posture	R	L Movement	R
Shoulders								
Arms								
Legs								
Back								

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