MANUFACTURING AND AGRICULTURE

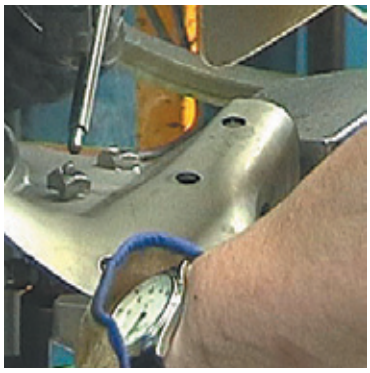
WORKSAFE VICTORIA

MANUAL HANDLING IN THE AUTOMOTIVE INDUSTRY

March 2005

A GUIDE TO MANUAL HANDLING

WorkSafe's expectations for safe work practice.



CONTENTS

Acknowledgments

WorkSafe Victoria would like to acknowledge the following contributors to this publication:

Motor Vehicle and Parts Industry OHS Forum

Australian Industry Group

Victoria Employers Chamber of Commerce and Industry

Australian Manufacturers Workers' Union

Electrical Trades Union

National Union of Workers

Department of Innovation, Industry and Regional Development

Australian Workers' Union

Plastics and Chemicals Industries Association (PACIA)

Australian Liquor Hospitality and Miscellaneous Workers' Union

Organisations providing images

Abcor Pty Ltd

Ford Motor Company of Australia Ltd

Dana Australia P/L

GTS Industries Pty Ltd

Plexicor

HPG Engineering

Special thanks to all who participated in the publication development workshop.

INTRODUCTION

The Victorian motor vehicle and parts (MV&P) manufacturing industry incorporates many diverse sectors ranging from component manufacture (including trailer and body building) through to vehicle assembly.

The industry is a crucial contributor to the Victorian economy, with more than $2.1 billion in annual output and employing about 42,000 workers.

When it comes to occupational health and safety, unsafe manual handling is a major contributing factor to workplace injuries in this industry.

Manual handling covers a wide range of activities such as lifting, pushing, pulling, holding and carrying. It includes repetitive tasks such as packaging, assembling, using hand tools and operating machinery and equipment.

In the MV&P industry, manual handling is the primary cause of musculoskeletal disorders (MSD), such as sprains and strains and joint disorders, which account for more than half of all injury claims.

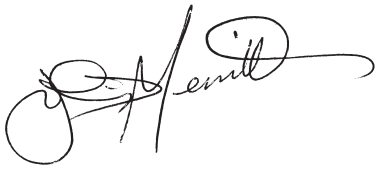
In addition to the pain and suffering experienced by workers suffering these injuries, these claims cost the industry, on average, more than $30 million every year.

To help reduce the risk of these types of injuries, we have produced this publication which details common manual handling tasks carried out within the MV&P industry.

It provides practical guidance for workers and management on how best to carry out these tasks in the safest manner and to best practice standards.

WorkSafe encourages everyone involved in MV&P manufacturing to read this publication and take action to incorporate the recommendations highlighted into their existing safety systems.

WorkSafe acknowledges the unions, workers, industry associations, employers, ergonomists, industry safety consultants and health and safety representatives involved in the development of this important publication.



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This guide should be used in conjunction with the Occupational Health and Safety (Manual Handling) Regulations 1999 and Manual Handling Code of Practice 2000

ABOUT THIS GUIDE

This guide includes results from a workshop held in February 2004. It demonstrates both WorkSafe's and the industry's expectations on how to best reduce the risk of musculoskeletal disorders (MSD) arising from manual handling.

MSD's are often referred to as 'sprain and strains'. It is a term used to describe a wide variety of injuries to the musculoskeletal system. This includes injuries to joints, ligaments, intervertebral discs and other structures in the back and injuries to joints, ligaments, tendons and nerves in the wrist, arms, shoulders, neck, abdomen and legs.

This guide is designed for all workplaces involved in the MV&P industry. It details the most common high risk activities contributing to MSD risk and to ensure they are either eliminated or reduced.

It illustrates various ways to control a variety of MSD risks ranging from interim controls to best practice. You should use the information to implement the risk control which best controls the risk in your workplace.

HOW TO USE THIS GUIDE

This guide uses comparative charts that provide a summary of identified hazards and assessment of risk for common MV&P tasks. The Green, Amber and Red format will help you identify high risk activities and assess your workplace to implement safer work practices.

The rationale is simple. To reduce injury rates and compensation claims, high risk situations must be addressed. Companies with work practices falling into the red, high risk area, who fail to implement risk control measures for these practices, are liable for prosecution.

If high risk practices are used in your workplace, you should immediately determine if you can implement the practices in the green column. If this isn't practicable, you should put in place the comparable practice in the amber column as an interim solution.

Note: in some circumstances, the amber solution may be suitable to control the risk. However, the amber solutions should be reviewed as higher order solutions (green) become more practicable.

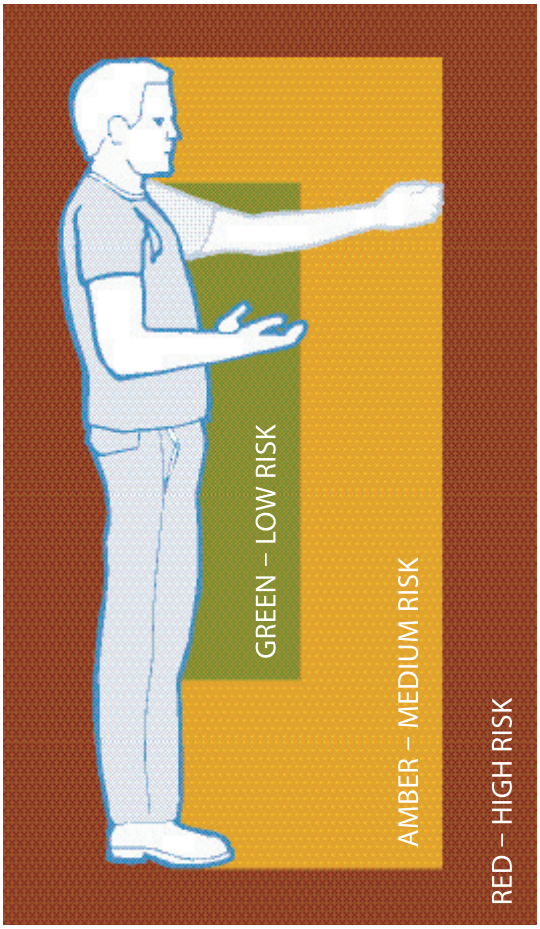
HIGH RISK	MEDIUM RISK	LOW RISK
The hazards in the red column give rise to the risk of an MSD occuring. An employer who allows those practices to be used is likely to be in breach of OHS legislation.	In some circumstances the practices in the amber column may be suitable to control the risk. Otherwise the amber solutions should be treated as interim solutions only.	The practices in the green column should be regarded as best practice.

As tasks and hazards will vary depending on the circumstances in your workplace, this guide cannot and does not replace the requirement for risk assessment and risk control under the OHS (Manual Handling) Regulations 1999.

The manual handling risk controls in the amber and green sections in this guide provide a number of different options. This is because the tasks, and hence the risk, will vary according to the specifics at your workplace. **It's important to ensure that any controls that you implement address the risk factors in the task.**

You should always check the legislation referred to in this material and make your own judgement about what action you may need to take to ensure you have complied with the law. Accordingly, the Victorian WorkCover Authority extends no warranties as to the suitability of the information for your specific circumstances.

This guide should be used in conjunction with the Occupational Health and Safety (Manual Handling) Regulations 1999 and Manual Handling Code of Practice 2000



GENERAL PRINCIPLES

- Postures, movements and forces that are known to be associated with MSD should be eliminated from the workplace where possible.
- No employee should be required to routinely work above their shoulder height, below their knees or at full reach distance.
- Physical changes to workplace design, layout and plant are more effective than administrative risk controls.
- To accommodate for different people and tasks, workstations should be quick and easy to adjust.

PRACTICABLE CONTROL MEASURES

Choose the most practicable risk control for your workplace. A review of your risk assessment will help you determine whether you have reduced the risk, so far as is reasonably practicable.

These questions may help to guide your decision making when choosing between options.

- Which risk factors (and how many) does it eliminate?
- Is it in place elsewhere or is it common industry practice?
- How much does it improve the situation?
- How permanent is the risk control?
- Does it rely on human behaviour or does the solution prevent the risk factor occurring?
- Does funding or capital expenditure need to be allocated?
- How long will it take to implement?
- What can be put in place now to reduce risk, whilst funding is allocated?

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ABOUT THIS GUIDE

TIPS FOR SUCCESSFUL CONTROL OF MSD RISK

- Consult with the people who do the job, who design the workplace or who make changes to the work process in the manual handling risk assessment and control process and communicate the results. This includes your employees and health and safety representatives, but may also include engineers, designers, consultants, suppliers or purchasers.
- Encourage the workforce to take ownership of the agreed solutions.
- Induct new employees into safe systems of work.
- Ensure all managers, supervisors and employees are trained in the use of agreed risk controls and that supervision ensures that they are used.
- Adopt interim solutions until longer term solutions can be implemented.
- Forward plan with effective cost benefit analysis to introduce higher order controls.
- Have a plan for ongoing re-assessment of all manual handling tasks for continuous improvement.

PLANT AND OTHER HAZARDS

When introducing manual handling risk controls it is important to ensure that you haven't created other hazards. For example, if a machine is guarded by distance and the plan to reduce the MSD risk from manual handling is to reduce reach distances, you may introduce a risk of crushing from the plant. This is unacceptable under the *Occupational Health and Safety (Plant) Regulations 1995* and either the manual handling risk control must be rethought, or the risk of injury from the plant must be controlled in an alternative way to continue to protect the employee from injury.

All hazards that may be affected by the implementation of manual handling risk controls must be assessed and controlled if there is a risk. Some other common hazards are noise, hazardous substances and falls. These are covered by the *Occupational Health and Safety (Noise) Regulations 2004, Occupational Health and Safety (Hazardous Substances) Regulations 1999* and *Occupational Health* and *Safety (Prevention of Falls) Regulations 2004*, respectively.

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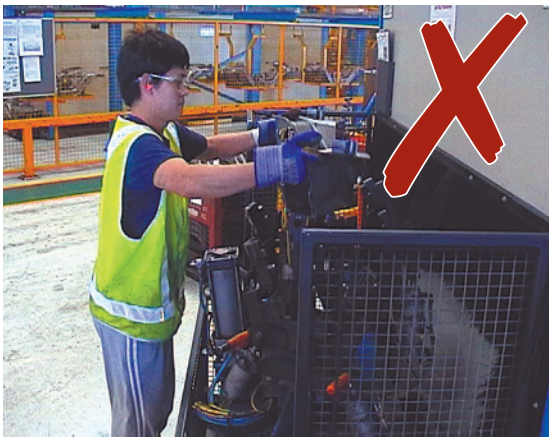
LOADING/UNLOADING PRODUCTION PLANT (PRESS, LATHE ETC)



Working at full arms length from the body is hazardous.

Loading and unloading production plant, including lathes and presses, can be hazardous particularly if your arms are outstretched to place or retrieve parts. Heavy parts and repetitive work increase the risk.

HIGH RISK		MEDIUM RISK	LOW RISK
ACTION	**SOURCE OF RISK**		
Back bending • >twice per minute or • >30 seconds at a time • with long duration (> 30 minutes continuously or > 2 hours over the whole shift) These actions may occur in the situations listed under 'source of risk' or in combination with other work activities.	Height of machine.	Introduce tool to reduce the need for back bending.	Implement engineering controls such as: • automated job ejection; • feed-in or ejection chutes; • auto feed coils; • conveyors. Redesign the workstation to: • raise the work height; • lower the employee.
	Machine design - loading/ unloading area is a long way from the operator.	Introduce tool to reduce the need for back bending.	Reduce reach distance by engineering means: • ensure that there is enough clearance under the machine for the feet; • automated job ejection; • feed-in or ejection chutes; • auto feed coils; • use of conveyor.
Neck bending and twisting • >twice per minute or • >30 seconds at a time • with long duration (> 30 minutes continuously or > 2 hours over the whole shift) These actions may occur in the situations listed under 'source of risk' or in combination with other work activities.	Guarding does not allow operator to see placement and removal of part without bending and twisting the neck.	Use of guarding materials that are see-through such as polycarbonate, other transparent material or mesh guarding if appropriate. Introduce mirrors or Closed Circuit TV.	Place guards so as not to get in the way of the operators line of sight for the task.

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LOADING/UNLOADING PRODUCTION PLANT (PRESS, LATHE ETC)

HIGH RISK		MEDIUM RISK	LOW RISK
ACTION	**SOURCE OF RISK**		
Above shoulder height • >twice per minute or • >30 seconds at a time • with long duration (> 30 minutes continuously or > 2 hours over the whole shift) These actions may occur in the situations listed under 'source of risk' or in combination with other work activities.	Machine guard needs to be repeatedly pulled down from above shoulder height.	Modify machine guard handle placement to eliminate above shoulder work. Use mechanical assistance eg: counterlevers, gas struts, springs.	Automate interlocked guard.
	Machine design - placing and retrieving part from above shoulder height.	Introduce tool to place and retrieve part. If tools are to be introduced then consideration must be given to: • the weight of the tool including weight of the part; • ways to support the tool eg: - a resting bar to create a pivot point - suspend the tool • the type of tool, handle, and grip required; • whether plant hazard controls are affected by any changes eg: guarding by distance may be compromised by introduction of a shorter tool.	Fully automate (Robotics). Implement engineering controls such as: • automated job ejection; • feed-in or ejection chutes; • auto feed coils; • use of conveyors. Redesign the work height by: • raising the height of the employee; • reducing the height of the workstation. Use mechanical aids or manipulators to handle the part.  *This platform raises the worker up to a better height.*
	Controls located above shoulder height.		Relocate controls to below shoulder height. Provide height adjustable controls or suspended pendant controls.

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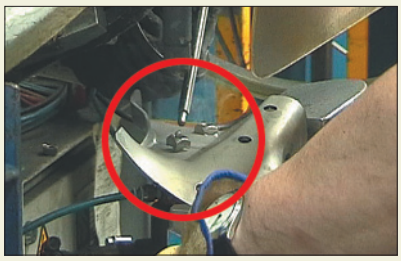
LOADING/UNLOADING PRODUCTION PLANT (PRESS, LATHE ETC)

HIGH RISK		MEDIUM RISK	LOW RISK
ACTION	**SOURCE OF RISK**		
Reaching >30cm from the body • >twice per minute or • >30 seconds at a time • with long duration (> 30 minutes continuously or > 2 hours over the whole shift) These actions may occur in the situations listed under 'source of risk' or in combination with other work activities.	Machine design - loading/ unloading area is a long way from the operator.	Use tools to reduce reach distances eg: • tongs to place the part; • magnet on the end of extension to place or remove parts. If tools are to be introduced then consideration must be given to: • the weight of the tool including weight of the part; • ways to support the tool eg: - a resting bar to create a pivot point - suspend the tool • the type of tool, handle, and grip required; • whether plant hazard controls are affected by any changes eg: guarding by distance may be compromised by introduction of a shorter tool.	Fully automated (Robotics). Use mechanical aids or manipulators to handle the part.  *This mechanical aid assists in loading the part into the cell.*  *Floor mounted mechanical aids are also an option.* Implement engineering controls to reduce reach distances eg: • automated job ejection; • feed-in chutes;  *(Pictured above and below)* *An automated feed-in chute eliminates the need to repetitively handle nuts.*  • auto feed coils; • ensure there is enough clearance under the machine for the feet to reduce reach distances.

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LOADING/UNLOADING PRODUCTION PLANT (PRESS, LATHE ETC)

HIGH RISK ACTION	SOURCE OF RISK	MEDIUM RISK	LOW RISK
Reaching >30cm from the body • >twice per minute or • >30 seconds at a time • with long duration (> 30 minutes continuously or > 2 hours over the whole shift) These actions may occur in the situations listed under 'source of risk' or in combination with other work activities.	Control position.		Place controls within easy reach and ensure they are easy to use eg: on a pendant.
	Requirement to swab or lubricate section.	Modify tool to reduce the reach distance.	Change lubricant to reduce swabbing requirements. Automate lubricant application.
Standing with most of the body's weight on one leg • >twice per minute or • >30 seconds at a time • with long duration (> 30 minutes continuously or > 2 hours over the whole shift) These actions may occur in the situations listed under 'source of risk' or in combination with other work activities.	Foot pedal is used to operate plant.	Ensure the pedal is relocatable to allow use by either the left or right foot. Ensure the foot pedal can be comfortably activated from a seated, sit/stand or standing position. Job rotation to a task which does not use a foot pedal (see general section for guidance on appropriately designed job rotation).	Fully automate operation. Re-engineer to use hand controls.
High force	Manual guards not maintained and high force required to lift, lower, push or pull.	Maintenance program implemented and performed to reduce forces required to operate guards.	Automate operation of the guard. Use mechanical assistance eg: counterlevers, gas struts, springs.
	Part gets stuck in press/jig or fixture and requires effort to retrieve.	Use a lever or tool to apply the force. Introduce lubricants to reduce force required.	Engineer/design problem out eg: • modify the die/tool; • introduce auto eject. Implement a maintenance program to ensure part doesn't get stuck.

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UNLOAD/LOADING STILLAGES OR PALLETS

Bending into stillages on the ground is hazardous for your back.

Stillages are often used for transporting product. Some workplaces also refer to them as pallets, containers or dunnage. Although they are useful to transport product, they are often not as easy to load or unload. Many have high solid sides that result in the employee needing to fully bend to load or unload.

Removable or drop down sides, in combination with pallet lifters, are useful to reduce the risk but require ongoing maintenance to ensure they don't jam and are easy to use.

HIGH RISK		MEDIUM RISK	LOW RISK
ACTION	**SOURCE OF RISK**		
Bending and twisting of the back and/or reaching >30cm • >twice per minute or • >30 seconds at a time • with long duration (> 30 minutes continuously or > 2 hours over the whole shift) These actions may occur in the situations listed under 'source of risk' or in combination with other work activities.	Part for retrieval from pallet/stillage is at floor level. Pallet/stillage has high sides so employee has to bend in to retrieve part. Unable to access all sides of the pallet/stillage on the floor to retrieve parts. Stillage not appropriate for the part eg: wire mesh with parts that can entangle in the mesh. No lifting aid for heavy or high frequency components. Placement of pallet/stillage results in employee bending and twisting in load/unload parts.	Use manually height-adjustable pallet/stillage lifters. Introduce stands to raise the height of the product between knee and shoulder height with: • drop down/fold down or removable stillage sides.  *This stillage is on a tilted stand to improve access and eliminate back bending.*  *A drop down side improves access for the worker.* • access to all sides of the stillage or pallet; • a turntable for access to all sides; • a 'bin insert', scissor insert or false bottom to keep the product around waist level.	Fully automate (robotics). Use purpose specific stillages/pallets to suit components.  *The stillage and purpose built blue slotted dividers suit this product and make it easier to handle.* Use mechanical aids to handle heavier components.  *Mechanical aids can be designed to handle specific parts.* Unload and load product from pallets or stillages around waist level by: • using a 'bin insert', scissor insert or false bottom in the pallet/ stillage to keep the product around waist level.

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UNLOAD/LOADING STILLAGES OR PALLETS

HIGH RISK		MEDIUM RISK	LOW RISK
ACTION	**SOURCE OF RISK**		
Bending and twisting of the back and/or reaching 30cm • >twice per minute or • >30 seconds at a time • with long duration (> 30 minutes continuously or > 2 hours over the whole shift) These actions may occur in the situations listed under 'source of risk' or in combination with other work activities.		• a tilt to allow better access or sliding of products.  *This stillage is tilted for easier access and has a drop down side.* Alter layout of workplace to reduce need to twist eg: provide sufficient work space for the employee's whole body to move and turn.	• using auto height adjustable pallet/stillage lifter with drop down/fold down or removable sides of pallet/stillage.  *This stillage with drop down sides is on a scissor lift to take the product to the worker on the platform.*  *A combination of scissor lift and mechanical aids is sometimes required.* Use packaging materials to divide or separate components to combine with above stillage risk controls to reduce bending, twisting and reaching. Use conveyors to eliminate manual unloading/loading pallets/stillages.
	Small parts in large stillage	Use a tool to bring components closer. If tools are to be introduced then consideration must be given to: • the weight of the tool including weight of the part; • ways to support the tool: - a resting bar to create a pivot point - suspend the tool • the type of tool, handle and grip required.	Obtain product in smaller containers, suitable for the product.

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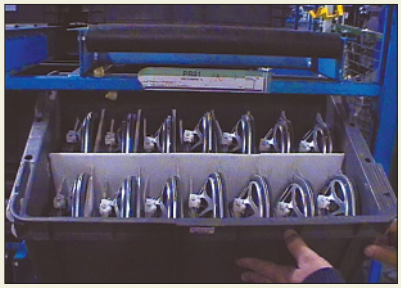
UNLOAD/LOADING STILLAGES OR PALLETS

HIGH RISK		MEDIUM RISK	LOW RISK
ACTION	**SOURCE OF RISK**		
Repetitive twisting, turning, grabbing picking or wringing actions with the fingers, hands or arms • >twice per minute or • >30 seconds at a time • with long duration (> 30 minutes continuously or > 2 hours over the whole shift) These actions may occur in the situations listed under 'source of risk' or in combination with other work activities.	Components in stillage nest, clamp or entangle together.		Use purpose-designed dividers to layer components (foam, hardboard, other types): • to prevent components interlocking.  *Preventing parts nesting and entangling can reduce the number of wrist movements and the force required to retrieve them and protect the parts from damage.* • to enable sliding of the component closer before lifting.  *Cardboard between layers of components can allow workers to slide products closer prior to lifting.* Alter component design to reduce nesting/ entanglement/clamping. • tabbing of components; • holes to reduce suction.
	Components oriented poorly which results in increased handling of part.		Review production flow/process design so that the part is correctly orientated for next process to reduce handling.
	Components entangle in mesh stillage sides.		Alter stillage design so that components cannot entangle in sides eg: change from mesh to full sides.
	Parts difficult to handle or grasp due to lubricant residue.	Use well fitting gloves to improve grip. Consider use of barrier cream.	Auto wash parts to reduce lubricant residue.

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UNLOAD/LOADING STILLAGES OR PALLETS

HIGH RISK ACTION	SOURCE OF RISK	MEDIUM RISK	LOW RISK
High force	Components are heavy and/or of awkward shape.	Re-orient awkward shaped part in purpose designed stillage.	Use mechanical aids.  *Purpose built stillages in combination with mechanical aids are sometimes required.*
	Components in stillage clamp or entangle together.		Use purpose-designed stillages or dividers to layer components (foam, hardboard, other types): • to prevent components interlocking.  *This purpose built trolley allows the worker good access to the parts whilst preventing entanglement.* • to enable sliding of the component closer before lifting.
	Drop down sides of stillages are damaged and difficult to remove and replace.	Ensure a breakdown maintenance program is in place to tag, remove and fix damaged stillages.	Implement a breakdown and preventative maintenance program to ensure drop/fold or removable sides are easy to handle.

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MOVING TROLLEYS, STILLAGES OR PALLETS

Pushing trolleys in awkward postures can increase the risk of an injury.

Mechanical aids or trolleys inappropriate for the load increase the force required to do the task. This increases the risk of MSD.

The force the person has to exert can also increase if the equipment is not maintained in good working condition, if floors are uneven or if housekeeping is poor.

HIGH RISK		MEDIUM RISK	LOW RISK
ACTION	**SOURCE OF RISK**		
High force	Trolleys handled manually and difficult to move by one person.	Use large diameter, clean wheels on trolleys and ensure they are regularly maintained. Position handles on trolleys to reduce awkward wrist postures and ensure they are designed for the job. Vertically oriented handles will fit a larger range of users. Keep floors clean, smooth and well maintained. Use team handling as an interim solution.	Use pallet jacks or other mechanical aids to move trolleys.  *Tyne slots have been added to this trolley which is now too heavy to handle manually.*
	Pallet jack or mechanical aid difficult to move due to weight of pallet or stillage load.	Use team handling as an interim solution.	Use tugs, walkie stackers or forklifts to move stillages or pallets.  *This tug eliminates the need to push the trolley manually.*
	Mechanical aid difficult to move due to excessive debris or large cracks in floor.		Keep floors clean, smooth and well maintained.

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DIE/TOOL HANDLING

Exerting high force above shoulder height increases the risk of an injury.

Die and tool handling includes the tasks of setting, moving and maintenance. Frequently, these tasks are performed in awkward postures for long periods and high forces are often required whilst in the awkward posture. This increases the risk of MSD.

HIGH RISK		MEDIUM RISK	LOW RISK
ACTION	**SOURCE OF RISK**		
Sustained awkward postures of the back, neck, wrists or postures such as lying or kneeling • >twice per minute or • >30 seconds at a time • with long duration (> 30 minutes continuously or > 2 hours over the whole shift) These actions may occur in the situations listed under 'source of risk' or in combination with other work activities.	Long duration spent in awkward postures setting dies/tools.	Workspace allows for neutral posture and easy movement.	Engineer out the awkward posture eg: easy access of auxillary services (pneumatics etc). Introduce rotating self loading jigs. Implement mechanical aids to allow better access eg: work platforms. Modify or introduce tools that eliminate awkward postures of the wrist eg: • if a pistol grip power tool creates awkward posture of the wrist, consider a straight or right-angled tool. Use extension sockets for tools. Use detached tool holder set up.
Excessive wrist postures • >twice per minute or • >30 seconds at a time • with long duration (> 30 minutes continuously or > 2 hours over the whole shift) These actions may occur in the situations listed under 'source of risk' or in combination with other work activities.	Die/tool maintenance involves using tools that do not allow for a neutral wrist posture while refacing and finishing.	Use appropriate hand-held powered tools that allow for neutral wrist postures. Re-orient the part eg: use jigs that can hold and/or turn.	Use a die finishing machine. Reprogram die finishing machines to provide a better surface.

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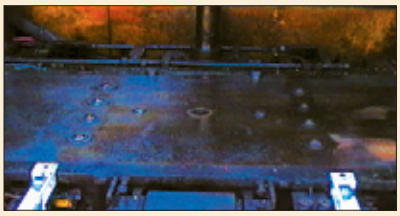
DIE/TOOL HANDLING

HIGH RISK ACTION	SOURCE OF RISK	MEDIUM RISK	LOW RISK
High force	Heavy dies/tools are handled manually.	Use manually operated lifting aid. Use trolleys or roller racks and roller trolleys to move dies/tools.  *A trolley fitted with a roller bed reduces the force required to move the die.*  *(Pictured above and below) Rollers have been added to the bed of the press. These are used in combination with a roller trolley to help move the die in and out of the face of the press.*  Ensure trolleys have large, clean wheels and ensure they are regularly maintained. Keep floors clean, smooth and well maintained.	Use powered mechanical lifting aids eg: mobile plant, overhead crane, hoist.  *This yellow forklift jib attachment has been purpose built for the die.* Use or add winching/lifting points on dies/tools to be able to use mechanical aids. Change the orientation of the face worked on mechanically eg. swivel eye bolt with overhead crane attachment.
	Load/unload die/tools into machines manually, including manual leveraging.	Use die/tool positioning guides.	Introduce automatic load/unload. Use self locating dies/tools in conjunction with mechanical aids.
	Manual tensioning with application of high force in awkward postures.	Use of tools that provide a large lever. Workspace allows for neutral posture and easy movement.	Powered tools for bulk of work.
	Dies/tools on trolleys are hard to push.	Trolleys are well maintained and have large wheels. Floors are kept clean and maintained to reduce uneven surfaces. Use team handling as an interim solution.	Use tugs, walkie stackers or forklifts to transfer dies/tools.

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ASSEMBLY WORK

Using handtools in awkward postures can increase the risk of injury.

Postures, movements and forces required in assembly work vary markedly depending on the nature of the work.

The risks are commonly associated with the layout of the workstation, the way the work is oriented, the position in which the tools are used, or the system of the work that is used.

HIGH RISK		MEDIUM RISK	LOW RISK
ACTION	**SOURCE OF RISK**		
Back bending or twisting • >twice per minute or • >30 seconds at a time • with long duration (> 30 minutes continuously or > 2 hours over the whole shift) These actions may occur in the situations listed under 'source of risk' or in combination with other work activities.	Workheight is too low for the operator. Workstation adjustable but very difficult to adjust.	Raise work with fixed height platform or stand. Provide a range of fixed height workstations.	Introduce workstations easily adjustable for height.
	Insufficient workspace means employee needs to twist to access work materials.	Ensure that there is sufficient work space for the employee's whole body to move, turn and step.	Ensure all objects and materials used in the task are presented to the employee 'front-on' so that the requirement to twist is eliminated.
	Parts need to be lifted in/out of containers / bins/ stillages.	Introduce stands to raise the height of the product to a level between knee and shoulder height with: • drop down/fold down or removable stillage sides.  *Smaller stillages with drop down sides on stands mean workers don't have to bend.* • access to all sides of the container / bins or stillage; • a turntable for access to all sides; • a 'bin insert', scissor insert or false bottom to keep the product around waist level; • a tilt to allow better access or sliding of products.	Use smaller containers suitable for components to reduce the need to reach.  *Roller racks deliver smaller containers of product at a good height.* Keep components between knee and shoulder height by introducing stillage/ bin lifters: • with drop down/fold down or removable stillage or bin sides; • access to all sides of the container / bins or stillage; • a turntable for access to all sides; • a 'bin insert', scissor insert or false bottom to keep the product around waist level.

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HIGH RISK ACTION	SOURCE OF RISK	MEDIUM RISK	LOW RISK
Back bending or twisting continued		 *Smaller tubs on stands, tilted and staggered allows good access to components.*	• roller racks and smaller containers. Also see solutions in the amber and green sections on page 9 and 10.
	Materials frequently used in the task are located all around the employee.		Locate all frequently used controls, equipment, materials and tools in front of the employee.
	Cramped postures due to restricted space because many people work inside the vehicle at the same time.	Change process to allow fewer people in the vehicle at any one time.	Alter process to eliminate time spent on work inside the vehicle eg: sub- assemble outside the vehicle.
	Non-adjustable chair means employee needs to twist to access work materials.		Introduce adjustable swivel chairs for seated tasks.
	Objects to be weighed are repeatedly lifted on/off scales.		Recess scales into the workstation, packing station or conveyor.
	Parts need to be lifted up from dividers used to separate components.		Alter surfaces so that parts can slide or be moved more easily.  *These cardboard layers let workers slide components closer to their bodies before lifting.*

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ASSEMBLY WORK

HIGH RISK		MEDIUM RISK	LOW RISK
ACTION	**SOURCE OF RISK**		
Neck bending • >twice per minute or • >30 seconds at a time • with long duration (> 30 minutes continuously or > 2 hours over the whole shift) These actions may occur in the situations listed under 'source of risk' or in combination with other work activities.	Precision work is too low for operator.		Ensure work is able to be brought closer to the employee by changing the work surface eg: • raising and/or tilting the work surface; • using a jig or fixture.  *This jig allows the welder to keep the component at the best height and position to weld.*
Reaching above shoulder height • >twice per minute or • >30 seconds at a time • with long duration (> 30 minutes continuously or > 2 hours over the whole shift) These actions may occur in the situations listed under 'source of risk' or in combination with other work activities.	Components are kept above shoulder height. Work height too high. Suspended tools need to be pulled down from above shoulder height. Drilling overhead.	Raise the employee.  *This employee uses a fixed height platform to improve the work height.*	Redesign the workstation to: • bring frequently required objects closer to employee and below shoulder height.  *This workstation has suspended hand tools and a mechanical device to assist in turning over the component.* • use jigs or fixtures to allow employee to orient part for best working posture.  *This jig makes the task easier by holding the parts still.* • use height adjustable workstation platforms. Ensure suspended tools are at lowest levels practicable. Change process so work is performed at a better height eg: predrill panels to eliminate drilling overhead.

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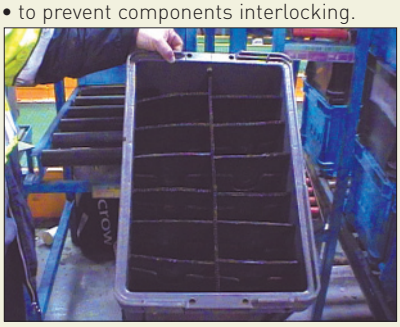
HIGH RISK		MEDIUM RISK	LOW RISK
ACTION	**SOURCE OF RISK**		
Reaching 30cm from the body • >twice per minute or • >30 seconds at a time • with long duration (> 30 minutes continuously or > 2 hours over the whole shift) These actions may occur in the situations listed under 'source of risk' or in combination with other work activities.	Foot access is restricted so worker cannot reach task. Parts to be assembled are too far away from the worker. Components being assembled are in very large containers / bins / stillages and all sides cannot be accessed. Jigs or fixtures to hold part are too far away from the worker.		Remove all barriers which prevent work being done close to the body eg: • ensure that there is enough clearance under the machine or workstation for the feet; • introduce 'cut out' areas into the workstation to bring the employee closer to the work.  *This stillage was designed with a cut-out to allow the worker to get in closer to the part as he removes it.* • use mechanical devices or diverters to direct material on a conveyor closer to where work is done; • ensure objects used in the work are brought closer to the employee.  *Delivering components between hip and shoulder height and close to the worker decreases risk.* Alter surfaces so that parts can be slid closer to the worker.

This guide should be used in conjunction with the Occupational Health and Safety (Manual Handling) Regulations 1999 and Manual Handling Code of Practice 2000

ASSEMBLY WORK

HIGH RISK		MEDIUM RISK	LOW RISK
ACTION	**SOURCE OF RISK**		
Repetitive twisting, turning, grabbing, picking or wringing actions with the fingers, hands or arms • >twice per minute or • >30 seconds at a time • with long duration (> 30 minutes continuously or > 2 hours over the whole shift) These actions may occur in the situations listed under 'source of risk' or in combination with other work activities.	Assembly requires repetitive extreme wrist postures.	Change the process flow if possible eg: change the order of the tasks. Implement appropriately designed job rotation (see pg 27).	Engineer the problem out eg: • use different fastening devices; • split one component into two pieces for easier assembly, then put the two completed pieces back together; • use jigs or fixtures to orient the part.  *Using jigs to assist in assembly work can better orientate the parts.*
	Components nest, clamp or entangle together.		Use purpose-designed dividers to layer components (foam, hardboard, other types): • to prevent components interlocking.  *Preventing parts nesting and entangling can reduce the number of wrist movements and the force required to retrieve them.* • to enable sliding of the component closer before lifting.  *Cardboard between layers of components can allow workers to slide them closer prior to lifting.* Alter component design to reduce nesting/ entanglement /clamping: • tabbing of components; • holes to reduce suction.

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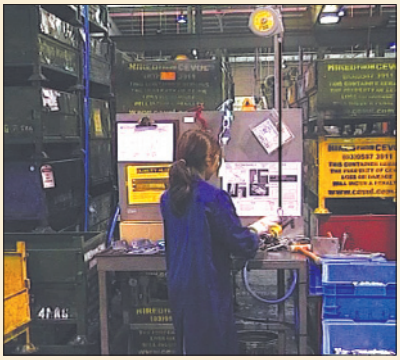
USING HAND TOOLS

Awkward hand and arm postures can lead to injury.

The use of hand tools in the motor vehicle and parts industry is common. Often tools are used repetitively and for long periods. MSD risk can increase if wrist postures are extreme, if tool kickback results in jerky actions, if triggers are operated by one finger or if there is no vibration control with vibrating tools.

HIGH RISK		MEDIUM RISK	LOW RISK
ACTION	**SOURCE OF RISK**		
Above shoulder height • >twice per minute or • >30 seconds at a time • with long duration (> 30 minutes continuously or > 2 hours over the whole shift) These actions may occur in the situations listed under 'source of risk' or in combination with other work activities.	Employee supports weight of tool. Work takes place above shoulder height for prolonged periods. Drilling overhead.	Weight of tool supported eg: by counterbalance.  *Suspending the hand tool reduces the need to lift and lower the tool.* Use moveable platforms. Implement appropriately designed job rotation (see pg 27). Pre-mount the drill with a lever to operate.	Automate the process eg: robotics, blasting or tumblers, grinding or polishing machines. Re-orient the work so it is not above shoulder height eg: by using jigs or fixtures.
Excessive bending of the wrist • >twice per minute or • >30 seconds at a time • with long duration (> 30 minutes continuously or > 2 hours over the whole shift) These actions may occur in the situations listed under 'source of risk' or in combination with other work activities.	Tool grip does not suit the direction of force eg a pistol grip on horizontal surface creating excessive bending of the wrist.	Implement appropriately designed job rotation (see pg 27).	Automate the process eg: robotics, blasting, tumblers, grinders or polishing machine. Re-orient the work so that the tool is able to be used with a neutral grip.  *A jig has been designed for this component to allow the worker to weld in a more neutral posture.*

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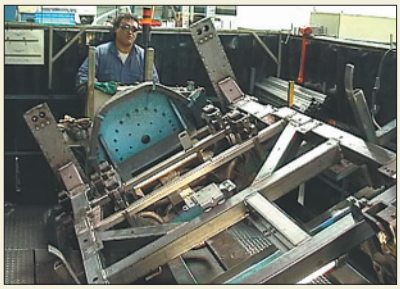
USING HAND TOOLS

HIGH RISK		MEDIUM RISK	LOW RISK
ACTION	**SOURCE OF RISK**		
Excessive bending of the wrist continued			Maintain a neutral grip by using a tool with an adjustable handle dependent on the work required. Modify or introduce tools that eliminate awkward postures of the wrist eg: if a pistol grip power tool creates awkward posture of the wrist, consider a straight or right-angled tool. This will also be dependent on the type of force required eg: a person can generate more force with a pistol grip than with a straight handle. Suspend tool to allow the operator to work with the tool tilted.
Exerting force whilst in an awkward posture (such as bending the back or neck forwards or sideways or bending the back backwards) • >twice per minute or • >30 seconds at a time • with long duration (> 30 minutes continuously or > 2 hours over the whole shift) These actions may occur in the situations listed under 'source of risk' or in combination with other work activities.	Work task too low for employee creating back or neck bending for long periods whilst using hand tools. Employee needs to bend to view task or to ensure hand tool is at right orientation to the object.	Re-orient the work to reduce awkward postures eg: • raise the work task; • use a jig or fixture to orient part. Implement appropriately designed job rotation (see pg 27).	Automate the process eg: robotics, blasting or tumblers, grinding or polishing machines. Use mechanical aids such as cranes or trolleys. Re-orient the work to reduce awkward postures eg: • raise the work task by using an adjustable workstation for height; • use an adjustable jig or fixture to move and orient part.  *Jigs to orient work can eliminate awkward postures.*
	Overhead work can sometimes result in bending the back backwards.	Implement appropriately designed job rotation (see pg 27).	Re-orient the work so it is not overhead by using jigs or fixtures.

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HIGH RISK ACTION	SOURCE OF RISK	MEDIUM RISK	LOW RISK
Holding, supporting or operating a tool • >twice per minute or • >30 seconds at a time • with long duration (> 30 minutes continuously or > 2 hours over the whole shift) These actions may occur in the situations listed under 'source of risk' or in combination with other work activities.	Tool is held repetitively or for long periods by the employee.	Reduce weight of tools. Implement appropriately designed job rotation (see pg 27).	Redesign the work process eg: use other fastening devices.  *This tool is suspended so the worker doesn't need to hold the tool weight.* Suspend the tool eg: • counter balance; • articulated arm; • jig. Ensure that excessive force is not required to pull the tool down.
	Trigger for tool operated repetitively with one finger.	Ensure trigger is able to be locked into on or off position as required.	Use lever triggers that are able to be operated with fingers or with palm of the hand that are able to be locked. Ensure trigger forces are low.
Vibration	No vibration control. Use of hand tools that expose the operator to vibration for a long duration.	Use job rotation to reduce time spent on the task eg not more than 2 hours (see pg 27).	Automate the process eg: robotics, blasting, tumblers, grinders or polishing machine. Replace or modify hand tools to include vibration dampening.
	Increased vibration due to no maintenance on tool.	Implement a maintenance schedule to ensure power tools are well maintained eg: ensure grinding wheels are balanced and precisely fitted.	Use bow grip handles to minimise torque with chipping hammers with high feed force.
	Mismatch of tools and attachments eg: grinder with buffer attachment.		Correctly match tools and attachment that are designed for the task.

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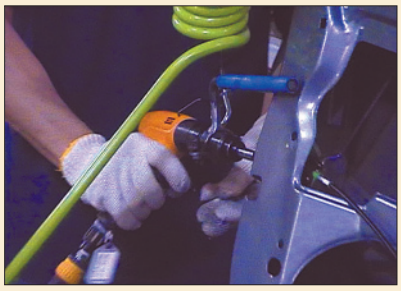
USING HAND TOOLS

HIGH RISK ACTION	SOURCE OF RISK	MEDIUM RISK	LOW RISK
High force and jerky forces	Larger holes require high force to drill.		Pre-drill to reduce the force required and to reduce the length of time spent drilling in awkward postures.
	Applying counterforce to stop drill going through an outerskin.		Use drill stops to control hole depth.
	Drilling overhead.	Pre-drill. Pre-mount the drill.	Change the process so work is not done overhead.
	Sudden or unexpected movement of tool eg: when tool attachment jams on part or kickback of tool.	Introduce an anti-kickback device.  *This anti-kickback device prevents forces being taken by the wrist and arm.* Introduce support handles.  *The support handle on this tool allows the worker to have more control of the position of the tool.*	Modify or introduce tools that reduce jerky forces eg: a nutrunner with a torque clutch may minimise the jerk.

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HANDLING AND CARRYING BOXES/CRATES AND OTHER OBJECTS

Bending and lifting is hazardous for your back.

Double handling of product or components is a waste of time and effort. It increases exposure to hazardous manual handling.

Investigate the flow of work through your workplace. See if you can eliminate unwarranted and possibly unproductive handling. Large and awkward components make handling and carrying difficult.

For specific order picking guidance refer to WorkSafe's *A Guide to Manual Order Picking*.

HIGH RISK		MEDIUM RISK	LOW RISK
ACTION	**SOURCE OF RISK**		
Back bending • >twice per minute or • >30 seconds at a time • with long duration (> 30 minutes continuously or > 2 hours over the whole shift) These actions may occur in the situations listed under 'source of risk' or in combination with other work activities.	Flow of material in the workplace means that products or components are unnecessarily double or triple handled. Palletising below knee height with the pallet on the ground or into stillages on the ground.	Streamline the production flow to eliminate double/triple handling. Raise the height of the load by introducing: • manually adjusted pallet lifters; • manually adjusted pallet lifters with turntables; • pallet stands. Implement appropriately designed job rotation (see pg 27).	Automate the process. Introduce vacuum lifters or other mechanical lifters. Increase the load size so that it can only be handled mechanically. Raise the height of the load by introducing: • auto adjustable pallet lifters; • auto adjustable pallet lifters with turntables.
Above shoulder height • >twice per minute or • >30 seconds at a time • with long duration (> 30 minutes continuously or > 2 hours over the whole shift) These actions may occur in the situations listed under 'source of risk' or in combination with other work activities.	Palletising above shoulder height.	Use platforms for high loads.	Fully automate. Use slip-sheets. Reduce the height of the pallet stack.

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HANDLING AND CARRYING BOXES/CRATES AND OTHER OBJECTS

HIGH RISK		MEDIUM RISK	LOW RISK
ACTION	**SOURCE OF RISK**		
High force • >twice per minute or • >30 seconds at a time • with long duration (> 30 minutes continuously or > 2 hours over the whole shift) These actions may occur in the situations listed under 'source of risk' or in combination with other work activities.	Lifting heavy boxes or boxes of awkward size.	Utilise rollers to move boxes/cartons.	Introduce mechanical aids such as vacuum lifters. Reduce the weight per item. Reduce the size of the item. Automate the process to eliminate carrying.
	Heavy and/or awkward sized parts need to be carried.		Introduce suitable carrying devices eg: trolley or mechanical aid.  *Trolleys like this one can be used to transfer parts.*

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PACE AND FLOW OF THE WORK
How they can affect MSD risk

Poor systems of work and workplace practices have the potential to increase the risk of developing an MSD by:

- increasing the frequency of poor postures, movements or forces;
- increasing the length of time spent in static awkward postures;
- increasing the duration of the task.

If risk factors, such as repetitive bending, or working above shoulder height already exist in the task, then increasing the frequency of the actions or the length of the shift can increase the risk of developing an MSD. Incentive and bonus schemes have the potential to do this. If the pace or flow of the work is affected, for example, by last minute rushes, then the frequency of actions may increase dramatically for that period of time. Poor planning or systems may also lead to the shift being lengthened to ensure production targets are met. This increases exposure time to the risk factors.

If risk factors in your workplace exist that increase the risk of developing an MSD, altering the way you work or your systems of work can contribute to risk reduction. You can reduce risk by ensuring that:

- staffing levels are adequate to complete the work;
- adequate breaks are taken during shifts and there is adequate time between shifts to rest and recuperate;
- if shifts are longer than 8 hours, the pace and duration of repetitive work or sustained effort is reviewed and reduced where necessary;
- work rates are realistic: employees should not have to work at a rate that is at the limit of their capacity;
- buffer systems are used if work is machine paced. For example, divert items from a production line that is moving faster than the employee's comfortable rate, for the employee to process later;
- workplace management practices do not promote excessive work rates or discourage the taking of appropriate breaks;
- lean manufacturing practices such as just-in-time work smoothly;
- consultation occurs on setting or adjusting line speed;
- production co-ordination caters for peaks and troughs in workload by:
  - having inventory holdings
  - scheduling work so as to prevent last minute rushes
  - having a system to forecast and prepare for anticipated demand.

JOB ROTATION

Job rotation may be used as one element in a range of risk control measures. However, employers must reduce MSD risk, not just rotate workers through risky tasks. Job rotation does not eliminate MSD risk. It only reduces exposure time to the risk. If it is used, ensure that the jobs through which employees rotate involve different muscle groups.

HIGH RISK	MEDIUM RISK	LOW RISK
Job rotation in place but to similar tasks with same postures movements or forces.	Job rotation to different tasks, but some tasks with similar postures, movements or forces. Some risk factors are still being performed for >30 minutes at a time or for >2 hours over the whole shift.	Job rotation to tasks with different postures, movements and forces to ensure exposure time to risk factors is <30 minutes at a time and <2 hours over a whole shift. Job rotation is monitored and revised to ensure that exposure to risk is reduced.

For further information on appropriate designed job rotation please refer to WorkSafe's Alert *Job rotation doesn't eliminate manual handling risk.*

DOUBLE HANDLING AND OTHER PRODUCTION FLOW ISSUES

Double handling of product is more common than you think. Reviewing and controlling MSD risk from manual handling often solves this inefficiency and can improve quality.

The 'Lean Manufacturing Practices' cover a vast spectrum of manufacturing tools which can significantly aid businesses in developing more efficient and effective work practices including safety. Such practices as '5S's', 'Just in Time, Kaizen', 'Six Sigma' and 'Total Productive Maintenance' are all examples of practices which, if implemented correctly, may aid in the development and/or support of effective manual handling risk reduction.

MV&P organisations could consider "Lean Manufacturing Practices" in the development of strategic safety systems. However, caution should be taken not to focus heavily on "Lean Manufacturing Practices" as the primary driver to effective safety management.

When determining the best solution for the MSD risk from manual handling, consider processes both before, and after the one you are working on. Different workstations handle components or parts in different ways. The way you present components or materials within, or to go out of your workplace, will have implications for the next person who uses them. Re-presenting or re-orienting components or materials may be beneficial.

Don't narrow your focus too early when determining solutions. For example, for problems with tool use, consider whether the whole task, action or tool can be eliminated by a different fastening device, or by doing the task earlier in the process, or by automating part of the process or introducing other tasks such as pre-drilling.

OTHER ISSUES (such as housekeeping) How they may impact on MSD risk

	HIGH RISK	LOW RISK
Lighting	Poor lighting or lack of task lighting results in poor postures eg: • sustained or repetitive back or neck bending occurs in order for the employee to see the task.	Lighting levels are appropriate for the task. For more information see AS 1680. Task lighting is built-in and correctly located.
Housekeeping	Lack of housekeeping results in increased MSD risk eg: • waste products in front of a press mean the employee may have to reach further to place the part; • swarf on floor results in trolleys being harder to move around; • oil on parts make them difficult to grip.	Regular housekeeping results in areas kept clean and free of waste. Response clean up occurs promptly eg: • oil leaks repaired; • parts cleaned.
Floors	Uneven or non smooth floors can create an increased MSD risk eg: • floors are uneven creating high force to move trolleys; • floors not level in the work area resulting in the operator spending most of the day with their body weight on one leg.	Floors are kept clean, smooth and well maintained. Regular inspections take place and maintenance occurs promptly.
Maintenance	No preventative maintenance and/or no tag out and/or break-down maintenance system means that MSD risk may increase eg: • drop down sides of stillage require excessive force to pull down or pull up due to damage.	Preventative maintenance schedules are in place and are performed. Breakdown and response maintenance is prompt.
Traffic Management	Poor traffic management can affect manual handling and risk of MSD eg: • pallets are delivered in a haphazard way, forcing employees to bend and reach long distances across other pallets to lift and retrieve stock.	Effective traffic management plans are in place, including well marked, designated loading and unloading zones or drop zones.
Personal Protective Equipment PPE	Heavy, poorly fitted PPE, or lack of PPE can create an increased MSD risk eg: • lack of aprons may mean employees hold objects further away from their body to avoid getting dirty, increasing the force required to hold the load; • poorly fitting gloves can increase the muscular effort required to grip things.	Required PPE is appropriate for the task and is used, available, well fitted, light weight, maintained and replaced as required.
Standard Operating Procedures (SOPs)	No SOP for the job, operators are not trained in or are not familiar with the SOP, no compliance with the SOP. No induction training in place. No time allowed for new employees or employees returning from a period of absence to build up to the required work rate.	Standard operating procedures: • are in place for the job; • are reviewed as required; • operators are trained in SOP; • systems in place to ensure compliance with SOP; • induction training in place. Enough time allowed for new employees or employees returning to work after a period of absence to build up to the required work rate. This is particularly important where the pace of work is beyond the employee's control.

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PEOPLE'S DECISIONS
How they can affect MSD risk

	HIGH RISK	LOW RISK
Including designers / purchasers / engineers / suppliers / manufacturers	No consultation with people who will be affected by their decisions.	Employer ensures consultation occurs with the purchasers/ designers / engineers/ suppliers, employees and HSRs and any other people involved who may be exposed to potential MSD risks in any object/ workstation/ system/ task or job change.
	No knowledge of hazardous manual handling, the factors that give rise to the risk of injury, or risk controls. No consideration given as to what postures, movements of forces will be required by a person in the manufacture, handling, assembly or maintenance of plant, systems of work, products or components being changed, introduced or made. No system in place to implement risk controls after conducting a manual handling assessment: • prior to any task involving manual handling being done for the first time in the workplace; • or before any alteration is made to objects used in the workplace or to systems of work including: - the designers of dies/tools; - the designers of production plant; - those involved in planning of workstation set up, location and placement; - those involved in retrofitting guards or other workplace changes.	Employer ensures that designer/ purchaser/ engineer/ supplier eliminates or reduces MSD risk involved with any manual handling task. This includes the way it will be manufactured, handled, assembled, transported and maintained. All manual handling risk assessments are completed and risk controls put in place before introduction into the workplace. Line or job speed is set in consultation with all employees involved in the task.
	Suppliers do not provide risk assessments or information on risk controls or on any manual handling risks not controlled.	Suppliers provide risk assessments and risk controls and information on any manual handling risks not controlled.

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LABOUR HIRE AND ON-HIRE WORKERS

INFORMATION FOR EMPLOYERS

The use of contractors and labour hire employees is not uncommon in the motor vehicle and parts industry.

Host organizations are deemed to be employers of contractors and employees of contractors in relation to matters over which they have control. Therefore both on-hire companies and host organizations have the duty to ensure that on-hire workers are provided with safe workplaces.

Before entering into an on-hire worker contract both the on-hire company and host organization should consider that:

- training, skills and experience of workers are verified and match the needs of the task;
- identification assessment of control of all the risks associated with the task must be completed before work commences;
- the worker is inducted into systems of work, is adequately supervised and has the opportunity to consult and be consulted by the direct and host organization;
- the worker knows what to do when health and safety issues arise in the host's workplace.

For further information visit **www.workcover.vic.gov.au**

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WorkSafe Victoria is a division of the Victorian WorkCover Authority.

VWA 687/01/12.04