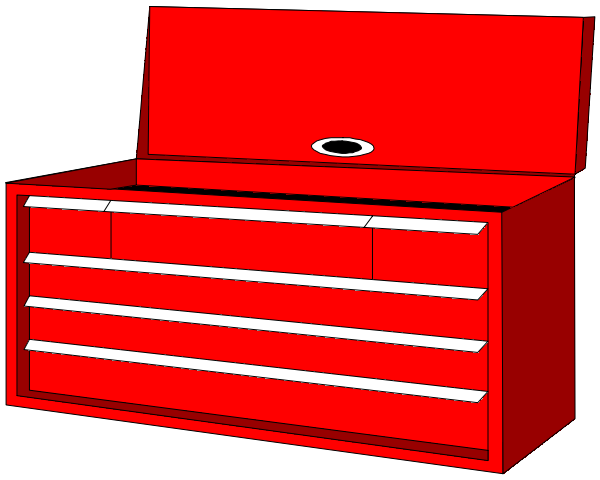
Industrial Musculoskeletal Injury Reduction Program

Common Industry Jobs (CIJs)

Tallyman Tool Kit



IMIRP program coordinated by:

Council of Forest Industries

Industrial Wood & Allied Workers of Canada

Advanced Ergonomics Inc.

In cooperation with the Workers' Compensation Board of British Columbia

TALLYMAN TOOL KIT
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Overview
Tallyman

Job Summary

A Tallyman is responsible for accurately tallying and tagging loads for shipment. A Tallyman may operate rollcases to advance loads, lift or carry lumber to finish loads, inspect loads for grade, length, species, and number of boards, prepare and print labels for loads, wrap and staple loads, apply labels to loads, place dunnage on loads, band or strap loads, and change banding/paper rolls. Refer to the Physical Demands Analysis for more detail.

Physical Demands

The physical demands of the Tallyman job may include:

a) Forceful movements of the neck/shoulder, elbow/wrist, wrist/hand, and low back
b) Repetitive movements of the neck, neck/shoulder, elbow/wrist, wrist/hand, low back, and knee
c) Awkward postures of the neck, neck/shoulder, elbow/wrist, wrist/hand, low back, and knee
d) Static postures of the neck, neck/shoulder, wrist/elbow, wrist/hand, low back, and knee
e) Contact stress at the knee
f) Walking during all tasks
g) Sitting while preparing labels
h) Standing during all tasks
i) Climbing while packaging a load, inspecting a load, applying labels to a load, and changing a banding/paper roll
j) Kneeling/crouching while changing a banding/paper roll

Mental Demands

A Tallyman must be able to recognise grade marks and work quickly and efficiently. A Tallyman may be held accountable for mis-tallied loads, as the operator's name is placed on outgoing loads.

Major Variations

With different mills, the following major variations may be found:

1) Due to job enlargement in some mills, a Tallyman may also be responsible for some or all of the tasks of the following jobs:
   a) Load Strapper/Bander
   b) Stenciller/End Sealer
   c) Packaging Press Operator

2) A Tallyman may work:
   a) Primarily in an enclosed environment
   b) Primarily in an exposed environment
   c) In a combination of both environments

3) The stapler a Tallyman uses to wrap and staple a load may be:
   a) Pneumatic
   b) Manual

4) Work pace can vary greatly depending on the size of lumber being produced.

Minor Variations

With different mills, the following minor variations may be found:

1) A Tallyman may prepare labels:
   a) Manually
   b) With the aid of a computer

Physical Demands Analysis
Tallyman

PDA General Instructions: Tallyman

This Physical Demands Analysis (PDA) identifies the physical demands of the Tallyman job as assessed by IMIRP ergonomists. The information reported was collected from a sample of Tallymen in the BC Sawmill Industry. Where possible, state-of-the-art equipment and techniques were used in data collection and analysis to increase accuracy. However, some information is based on third party comments that are often subjective and not subject to verification.

Subsequent changes to the work process may reduce the validity of any pre-existing physical demands analysis. The IMIRP Society accepts no responsibility for the use or misuse of the Physical Demands Analysis, or for the accuracy of the PDA as it applies to any specific workplace.

To make the PDA specific to your workplace, determine which of the tasks identified are present in your mill. For each section, check off the items (e.g., tasks, tools, etc.) listed that reflect the Tallyman job at your mill.

Rehabilitation professionals are encouraged to verify and update critical information through the client and through workplace sources to ensure that the content (e.g., tasks, weights of objects handled, etc.) accurately reflects the job.

Disclaimer

The BC sawmill IMIRP documents were developed by Advanced Ergonomics Inc. (AEI) based on analyses conducted in a number of voluntary, participating sawmills in British Columbia and should be considered applicable only to the BC sawmill industry. Modification to these documents may reduce their usefulness and/or lead to hazardous situations. Individuals or committees wishing to make Physical Demands Analyses (PDAs) site-specific, or wishing to implement options from the Work Manuals, are advised to first complete the two-day OHSC and Supervisor Ergonomics Training Session. Modifications to a PDA must be within the scope of competence of those individuals making the changes and must be reported to any rehabilitation professional using the PDA. Neither AEI nor the IMIRP Society accepts any responsibility for the use or misuse of these documents.

PDA Table of Contents

Physical Demands Analysis
Tallyman

Task List

For each of the tasks listed below, please indicate whether it occurs at your mill.

Advance loads

A Tallyman advances loads into the work area by operating a roll case.

Does this task occur at your mill?

☐ Yes ☐ No

Finish loads

A Tallyman finishes a load by adding or removing boards to prepare it for wrapping.

Does this task occur at your mill?

☐ Yes ☐ No

Inspect loads

A Tallyman inspects loads for grade marks, species, and the length of the boards. A Tallyman may also need to count the number of pieces in a load.

Does this task occur at your mill?

☐ Yes ☐ No

Prepare and print labels

A Tallyman prepares and prints labels that include the grade and length of the load. This may be done manually, or generated using a computer.

Does this task occur at your mill?

☐ Yes ☐ No

Wrap and staple loads

A Tallyman wraps and staples loads. This task may be done with a pneumatic or a manual stapler. If shim sticks or pieces of lath are protruding from the sides of the load, they must be broken with a hammer (or similar tool) before the load is wrapped.

Does this task occur at your mill?

☐ Yes ☐ No

Apply labels

A Tallyman applies labels to the wrapped loads. The labels may either be a sticker style or one that may be stapled to the load.

Does this task occur at your mill?

☐ Yes ☐ No

Place dunnage on loads

A Tallyman places dunnage on top of some finished loads.

Does this task occur at your mill?

☐ Yes ☐ No

Band loads or strips

A Tallyman periodically bands loads or bundles of strips.

Does this task occur at your mill?

☐ Yes ☐ No

Change banding and/or paper rolls

A Tallyman replaces the banding roll in an automatic banding machine (may require lifting and carrying). A Tallyman also replaces paper rolls (usually done with a lifting device).

Does this task occur at your mill?

☐ Yes ☐ No

Company Profile

Company Name:_____ Division:_____

Number of Employees: _____ Turnover in last 12 months: +/- _____ or ____ %

Is a Return-to-Work (RTW) strategy in place? ☐ Yes ☐ No

If yes, check all that apply: ☐ Modified Job ☐ Modified Worksite ☐ Graduated RTW

Work Organisation

Task Description

The table below contains a list of tasks performed on an everyday basis by a Tallyman.

Indicate each of the tasks performed by placing a check mark (✔) in the far left column.

Check marks (✔) in the Percent of Shift columns correspond to percentages found during the ergonomic investigation. The Comments section may be used to elaborate on the task description (e.g., variations between mills, frequencies, cycle times, etc.).

	Task	Percent of Shift				Comments
		Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	Advance loads	✔				• *Duration = 10 to 15 seconds*
	Finish loads	✔				• *Varies depending on number of boards to be added or removed*
	Inspect loads		✔			• *Duration = 1 to 10 seconds* • *Frequency = once per load**
	Prepare and print labels		✔			• *Duration = 5 to 10 seconds per load* • *Frequency = once per load**
	Wrap and staple loads		✔	✔		• *Duration = 20 to 60 seconds per load* • *Frequency = once per load**
	Apply labels	✔				• *Duration = 1 to 3 seconds* • *Frequency = once per load**
	Place dunnage on loads	✔				• *Duration = 2 to 5 seconds, every fourth load if applicable*
	Band loads or strips	✔	✔			• *Duration = 2 to 3 minutes* • *Frequency varies depending on worksite*
	Change banding and/or paper rolls	✔				• *Duration = 5 to 10 minutes* • *Frequency varies depending on work pace and lumber sizes*
	Other:					

* *Number of loads varies depending on the size of wood being packaged*

PLEASE NOTE: The above Percent of Shift values are based on a continuous work pace with little downtime. The frequency of some tasks may decrease as downtime increases.

Organisational Factors

The table below contains a list of organisational factors for a Tallyman. For each of the items input the necessary information to reflect the situation at your mill.

For the last item, if the job has scheduled job rotation (i.e., rotate from one job to another during a shift) check 'Yes' and then write in the jobs the worker rotates to and how often these rotations occur. If you do not have job rotation for this job, check 'No'.

Length of shift	☐ *8 hours* ☐
Formal breaks	☐ *Two 10 minute coffee breaks* ☐ *One 30 minute lunch break* ☐
Informal breaks	☐ *Yes - amount of time varies, depending on size of lumber being packaged, work pace, and performance of processes up stream.* ☐
Work pace	☐ *Average = 30 to 40 loads per shift* ☐ *Average = 60 to 80 loads per shift* ☐ *Average = 100 to 150 loads per shift* ☐ *Maximum = 120 to 200 loads per shift* ☐ ** NOTE: larger boards (e.g., 2" by 10") tend to increase the work pace, smaller boards (e.g., 1" by 4") significantly decrease work pace*
Work pace control	☐ *Pace depends on the pace of the process before* ☐ *Self-paced* ☐ *Dwell area (employee can pause without stopping others)* ☐
Job rotation ☐ Yes *(Check one)* ☐ No	If **Yes:** Rotation with what job(s):_____ _____ How often: (e.g., every 2 hours)_____

Workstation Characteristics

Dimensions & Layout

Indicate the specified dimensions of the workstation to the nearest centimetre. Please refer to Figure 1 for the measurement locations.

Workstation Dimensions	
(A) Height from floor to mid-monitor work bench surface	cm
(B) Height of rollcase	cm
(C) Height of load on top of rollcase	cm

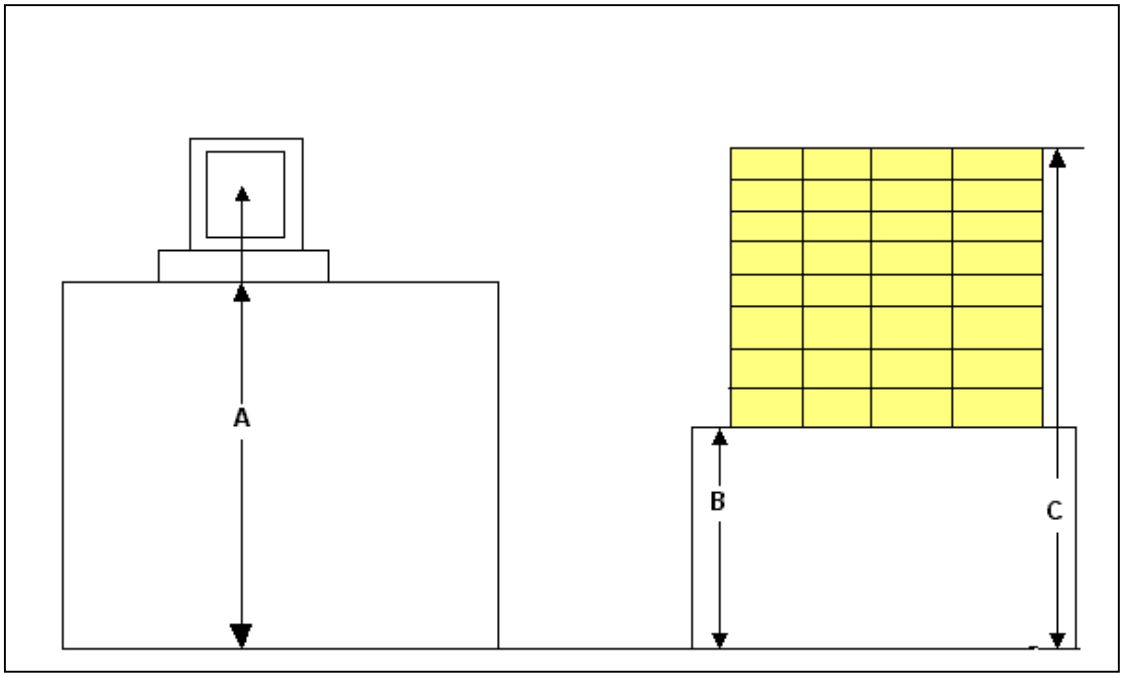


Figure 1: Tallyman Workstation

Flooring, Displays, and Seating

The table below lists several components of a workstation. For Flooring and Displays there are several options provided. Please indicate all of the options that apply to the workstation at your mill.

For the Seating section, first indicate whether seating is present at the workstation and then continue by elaborating on the features of the seating.

<table>
<tr><th colspan="2">Workstation Characteristics</th></tr>
<tr><td>Flooring</td><td>Check all that apply

☐ Cement ☐ Wood ☐ Rubber Matting ☐ Metal

☐ Other (e.g., tile, carpet) _____</td></tr>
<tr><td>Displays</td><td>Check all that apply

☐ Lights on Console ☐ Mirrors ☐ Video Monitors ☐ Computer Monitors

☐ None ☐ Scrolling Display ☐ Signal Lights ☐ Other _____</td></tr>
<tr><td rowspan="2">Seating:

☐ Yes
(Check one)
☐ No</td><td>☐ Sit/stand ☐ Office Height of seat: _____ cm
☐ Industrial ☐ In-house Design Depth of seat: _____ cm
Width of seat: _____ cm</td></tr>
<tr><td>Check all that apply

☐ Armrests ☐ Backrest ☐ Swivel Seat ☐ Slide track

☐ Foot rest ☐ Lumbar support ☐ Castors # _____
Covering type: _____

Seat adjustable? ☐ Yes ☐ No

If yes, adjustable: ☐ Height ☐ Armrests
☐ Backrest ☐ Forward tilt</td></tr>
</table>

Equipment & Machinery Controls

The table below contains a list of the types of controls used by a Tallyman.

Indicate the controls which are present at your mill by placing a check mark (✔) in the far left column.

The Comments section may contain information that describes variations between mills.

	Type of Control	Function	Frequency	Comments
	Push/pull button	• *Control infeed roll case*	*1 to 2 times per load*	• *Advancing load to work area*
		• *Emergency stop*	*Few times per shift*	• *When working in conjunction with a Load Strapper/ Bander, emergency stop may be used when visual contact is obstructed*
	Push button	• *Control paper drop*	*2 to 3 times per load*	• *Some mills have an automated paper drop system that is operated by push buttons*
	Keyboard	• *Sign in and out*	*2 times per shift*	• *Beginning and end of shift*
		• *Input for labels*	*Once per load*	• *Duration = 5 to 15 seconds per load*
	Rotary selector switch	• *Control outfeed transfer*	*Rarely*	• *Usually done by others in the packaging area*
	Other:			

Physical Demands

Whole Body Physical Demands

Identify each of the physical demands required by a Tallyman by placing a check mark (✔) in the far left column.

Check marks (✔) in the Percent of SHIFT columns correspond to percentages found during the ergonomic investigation. The Comments section may contain information relating to duration, frequencies and other variations in the physical demands.

Physical Demands		Tasks or Activity	Percent of Shift				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	Walking	• *Finish loads* • *Inspect loads* • *Prepare and print labels* • *Wrap and staple loads* • *Band loads or strips* • *Change banding and/or paper rolls*		✔	✔		• *Percentage of shift will vary depending on workstation layout, tasks performed, work pace, and work technique*
	Sitting	• *Prepare and print labels*		✔	✔		• *Frequency varies depending on the run of lumber*
	Standing	• *Advance loads* • *Finish loads* • *Inspect loads* • *Prepare and print labels* • *Wrap and staple loads* • *Apply labels* • *Place dunnage on loads* • *Band loads or strips* • *Change banding and/or paper rolls*		✔	✔	✔	• *Percentage of shift will vary depending on workstation layout, tasks performed, work pace, and work technique.*

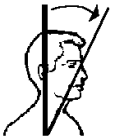
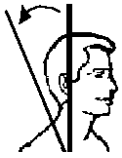
Physical Demands		Tasks or Activity	Percent of Shift				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	Climbing	• *Finish loads* • *Inspect loads* • *Apply labels* • *Change banding and/or paper rolls*	✔				• *Percentage of shift will depend on the tasks performed by the Tallyman, work pace, and work technique*
	Balancing						*Not Applicable*
	Kneeling/ Crouching	• *Change banding and/or paper rolls*	✔				• *Percentage of shift will depend on work pace and the size of lumber run*
	Other:						

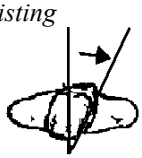
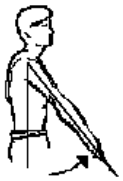
Body Postures

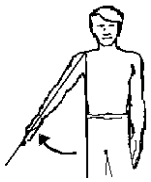
The table below outlines the body postures held or repeated throughout the shift by a Tallyman.

For each of the postures identified, indicate whether it occurs by placing a check mark (✔) in the far left column.

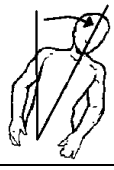
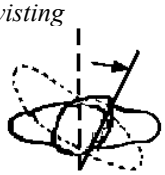
Check marks (✔) in the Percent of TASK columns correspond to percentages found during the ergonomic investigation. The Comments section may contain information relating to duration, frequencies, and other variations in posture.

Body Posture		Task(s)	Percent of Task				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
Neck							
	Flexion 	• *Finish loads*		✔			• *Looking down to lift and lower boards* • *Varies depending on work heights and worker height*
		• *Inspect loads*	✔		✔		• *Reading grade stamp or label* • *Varies depending on workstation layout*
		• *Prepare and print labels*		✔	✔		• *Viewing and scanning bar codes and paper work* • *Varies depending on work heights and worker height*
		• *Wrap and staple loads*		✔	✔	✔	• *Looking at bottom of load* • *Varies depending on work heights and worker height*
		• *Apply labels*		✔	✔		• *Varies depending on work heights and worker height*
		• *Band loads or strips*				✔	• *Looking down at the load*
		• *Change banding and/or paper rolls*		✔			• *Varies depending on work heights and worker height*
	Extension 	• *Finish loads*	✔				• *Varies depending on worker height and work technique*
		• *Wrap and staple loads*	✔	✔			• *Pulling down wrapping and stapling bottom of load* • *Varies depending on work height and work technique*
		• *Change banding and/or paper rolls*		✔			• *Viewing roll being lifted by hoist* • *Varies depending on work heights and worker height*

Body Posture		Task(s)	Percent of Task				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
Neck							
	Twisting 	• *Advance loads*				✔	• *Viewing load*
		• *Finish loads*	✔				• *Adjusting boards on load* • *Varies depending on work technique*
		• *Prepare and print labels*		✔			• *Looking from VDT to bar codes to paperwork*
		• *Wrap and staple loads*	✔	✔			• *Looking from one side of load to the other* • *Varies depending on work technique*
Shoulder							
	Flexion 	• *Finish loads*		✔	✔		• *Handling boards* • *Amount of force required varies depending on the number of boards carried and the size of the boards*
		• *Inspect loads*			✔		• *Posture is dependent on work technique*
		• *Prepare and print labels*			✔		• *Using scan gun and reaching for labels*
		• *Wrap and staple loads*		✔	✔	✔	• *Degree and frequency of flexion depends on the working heights and the worker height*
		• *Apply labels*		✔	✔		• *Varies depending on work heights and worker height*
		• *Place dunnage on loads*			✔		• *Reaching up to top of load*
		• *Band loads or strips*			✔		• *Using bander and feeding banding around the bundle*
		• *Change banding and/or paper rolls*		✔	✔		• *Lifting banding roll* • *Operating hoist (hoist is usually available for paper rolls)* • *Banding rolls weigh 35 to 44 kg*

Body Posture	Task(s)	Percent of Task				Comments
		Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
Shoulder						
Abduction 	• *Advance loads*				✔	• *Operating controls*
	• *Finish loads*	✔	✔			• *Handling boards* • *Amount of force required will vary depending on the number of boards carried and the size of the boards*
	• *Inspect loads*		✔			• *Posture is dependent on work technique*
	• *Prepare and print labels*		✔	✔		• *Using scan gun and operating mouse and keyboard*
	• *Wrap and staple loads*		✔	✔		• *Pulling the wrapping while stapling and reaching for staple gun* • *Amount of abduction will vary with work technique*
	• *Change banding and/or paper rolls*		✔			• *Attaching roll to hoist*
Extension 	• *Finish loads*	✔	✔			• *Handling boards* • *Amount of force required will vary depending on the number of boards carried and the size of the boards*
Forearm						
Rotation 	• *Finish loads*		✔			• *Adjust boards on top of load*
	• *Prepare and print labels*		✔			• *Using mouse and keyboard*
	• *Wrap and staple loads*	✔		✔		• *Amount of forearm rotation will vary depending on work technique*

Body Posture	Task(s)	Percent of Task				Comments
		Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
Wrist						
Flexion 	• *Advance loads*				✔	• *Activating controls*
	• *Finish loads*		✔			• *Handling boards*
	• *Wrap and staple loads*	✔	✔			• *Use of staple gun* • *Wrist postures may vary depending on work technique*
Extension 	• *Finish loads*		✔			• *Handling boards*
	• *Prepare and print labels*		✔	✔		• *Using scan gun, mouse, and keyboard*
Ulnar Deviation 	• *Advance loads*				✔	• *Operate controls*
	• *Wrap and staple loads*		✔	✔	✔	• *Holding a staple gun, static posture for 10 to 20 seconds at once* • *Wrist postures may vary depending on work technique*
	• *Band loads or strips*		✔			• *Using bander*
Radial Deviation 	• *Wrap and staple loads*		✔			• *Posture may occur when using the staple gun*

Body Posture		Task(s)	Percent of Task				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
Back							
	Flexion 	• *Finish loads*		✔			• *Lifting or raising boards using leverage*
		• *Inspect loads*		✔			• *Posture occurs when reading stamp or label and when counting pieces*
		• *Prepare and print labels*	✔				• *Amount of flexion will vary depending on worker height*
		• *Wrap and staple loads*		✔	✔		• *Stapling bottom of load* • *Degree and amount of back flexion will vary depending on working heights and worker height*
		• *Place dunnage on loads*		✔			• *Picking up dunnage*
		• *Band loads or strips*		✔	✔		• *Feeding banding around a bundle*
		• *Change banding and/or paper rolls*		✔			• *Manoeuvring rolls*
	Lateral Flexion 	• *Inspect loads*		✔			• *Posture may occur when counting pieces of lumber*
		• *Wrap and staple loads*	✔	✔			• *Wrapping and stapling around corners of load*
	Twisting 	• *Finish loads*	✔				• *Handling boards*
		• *Wrap and staple loads*		✔			• *Rotation may occur with back flexion while stapling and wrapping the corners*
	Extension 						*Not Applicable*
Other:							

Hand Grips

The table below contains a list of the common types of hand grips (i.e., how objects are held) used by a Tallyman.

For each of the hand grips, indicate which types of grips are used at your mill by placing a check mark (✔) in the far left column.

Check marks (✔) in the Percent of TASK columns correspond to percentages found during the ergonomic investigation. The Comments section may contain information relating to duration, frequencies, hand used, etc.

	Type	Task(s)	Percent of Task				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	Power 	• *Finish loads*	✔				• *Use of a picaroon to help with handling boards*
		• *Wrap and staple loads*			✔		• *Occurs when holding staple gun, or when holding a hammer (to break shim sticks)*
		• *Band loads or strips*		✔			• *When tightening bands*
		• *Change banding and/or paper rolls*	✔				• *Operator may need to use pliers when changing a banding roll*
	Pinch 						*Not Applicable*
	Hook 						*Not Applicable*
	Precision 						*Not Applicable*
	Other:						

Manual Material Handling

The table below contains a list of manual material handling tasks (e.g., pushing, pulling, lifting, lowering, and carrying) performed by a Tallyman.

Indicate which tasks are performed by placing a check mark (✔) in the far left column. Fill in the weight (or force) required to move the objects (may have to estimate).

The Comments section may contain information relating to duration, frequencies, and details regarding characteristics of the object handled.

	Handling Description	Weight (kg)	Percent of TASK				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	Lift and carry boards	*Varies** *See Appendix A for equation*	✔				• *Packaging loads* • *Weight of the boards will vary depending on size, species and length*
	Lift and carry boxes of supplies	*12.0 to 22.9*	✔				• *Wrapping and stapling loads* • *Weight of the box being carried will vary depending on the supply it contains*
	Lift and carry banding rolls	*71.0*	✔				• *Changing banding and/or paper rolls* • *Some workplaces may have hoists to lift the banding rolls*
	Other:						

Hand Tools

Indicate the hand tools used by a Tallyman at your mill by placing a check mark (✔) in the far left column. Determine the weight of the hand tool and enter it in the appropriate column.

Check marks (✔) in the Percent of TASK columns correspond to percentages found during the ergonomic investigation. The Comments section may contain information relating to duration and frequencies of use.

	Type of Tool	Task(s)	Weight (kg)	Percent of Task				Comments
				Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	Picaroon	• *Finish loads*	*1.4*	✔				• *May be used to aid in handling boards*
	Chainsaw	• *Finish loads*	*4.0*	✔				• *May be used to trim the ends of boards when packaging loads*
	Scanning gun	• *Prepare and print labels*	*0.3*			✔		• *Used to scan bar codes*
	Staple gun (pneumatic)	• *Wrap and staple loads*	*1.0*			✔		• *Used to secure the wrapping onto the load*
	Staple gun (manual)	• *Wrap and staple loads*	*1.2*			✔		
	Hammer	• *Wrap and staple loads*	*1.8 to 2.8*	✔				• *May be used to break off shim sticks before wrapping*
	Strapper (hand-held)	• *Band loads or strips*	*1.2*	✔				• *May be used to band loads*
	Strap fastener	• *Band loads or strips*	*1.1*	✔				• *May be used when banding loads*
	Pliers	• *Change banding and/or paper rolls*	*0.7*	✔				• *May be used when changing the banding roll*
	Other:							

Environmental Conditions

Work Environment

The table below contains a list of environmental conditions that may be of concern at the Tallyman job.

Vibration occurs when the body is in contact with a vibrating object or surface such as a tool, a seat, or the floor. If vibration occurs at this job, check 'Yes' and then mark whether the vibration is whole body and/or hand transmitted and the path through the body by which the vibration is transmitted. If vibration does not occur at this job, check 'No'.

If possible, indicate the appropriate value for the noise and lighting levels at your mill for the Tallyman. For the lighting level, include the location of the measurements within the workstation.

Factor	
Vibration ☐ Yes *(Check one)* ☐ No	☐ Whole body ☐ Seat ☐ Floor
	☐ Hand transmitted ☐ Tool ☐ Other: _____

Noise level (dB)	*Range found: 84.1 to 89.7* *Mill specific:*
Lighting level (lux)	*Ranges found: 85 to 620 in booth* *434 to 1300 over loads* *145 to 932 in front of VDT* *Mill specific:*
Temperature (^{0}C)	*See Regional Temperatures on next page*

Location of Workstation

The table below contains a list of the type of work environments a workstation may be located in.

For the workstation, indicate which of the following types of work environments apply with a check mark (✔) in the left column.

For example, the workstation may be inside the main building but exposed to the outside via a doorway that is always open and has both a fan and a heater. In this situation all three, 'Inside exposed', 'Fan' and 'Heater', would be checked for this workstation.

	Work Environment
	Outside uncovered
	Outside covered
	Inside enclosed
	Inside exposed
	Heater present
	Fan present

Temperature

The table below contains a list of the geographical regions of British Columbia.

For your mill, indicate the appropriate region with a check mark (✔) in the left column.

Refer to the regional map in Appendix B of the PDA.

	Region	Avg. Max July/Aug	Avg. Min Dec/Jan	Extreme Max.	Extreme Min.
	Vancouver Island	22.5 °C	-0.6 °C	36.1 °C	-18.8 °C
	Southwestern BC	22.9 °C	0.4 °C	35.6 °C	-18.3 °C
	Cariboo Chilcotin Coast	22.2 °C	-11.6 °C	36.4 °C	-42.5 °C
	High Country	26.3 °C	-9.9 °C	39.6 °C	-39.7 °C
	Okanagan Similkameen	26.5 °C	-8.4 °C	36.0 °C	-36.3 °C
	Kootenay Country	26.2 °C	-6.7 °C	38.5 °C	-32.0 °C
	British Columbia Rockies	24.7 °C	-12.3 °C	37.5 °C	-42.2 °C
	North by Northwest	19.5 °C	-11.7 °C	32.9 °C	-38.1 °C
	Peace River Alaska Highway	20.0 °C	-20.2 °C	34.6 °C	-47.7 °C

Personal Protective Equipment

The table below contains a list of the personal protective equipment (PPE).

For the Tallyman job at your mill, indicate which of the PPE items are required with a check mark (✔).

	Gloves Type:		Hard Hat		Leather Apron
	Glove Liners		Steel-toed Boots		Dust Mask
	Eye Protection		Hearing Protection		Seat Belt
	Face Shield/Helmet		Life Jacket		Harness
	Knee Pads		Other:		Other:

Appendix A – Weight of Wood Equation

1. Type of Wood Handled

The table below contains a list of the types of wood processed in British Columbia. The weight per board foot wet and dry is given for each species. This information will be used in the table in *Section 4* to calculate the weight of the wood handled. Please indicate all of the types of wood processed at your mill.

Wood Handled		Wet lb./ Board Foot	Dry lb./ Board Foot	Wood Handled		Wet lb./ Board Foot	Dry lb./ Board Foot
	Douglas Fir	3.60	2.83		Larch	3.48	N/A
	Hemlock	3.42	2.49		Spruce/Pine/Fir*	2.95	2.18
	Red Cedar	2.42	2.00		Alpine Fir	2.67	2.00
	Yellow Cedar	3.01	2.49		Lodge Pole Pine	3.26	2.41
	Sitka Spruce	2.76	2.23		White Spruce	2.93	2.15

*The Spruce/Pine/Fir values are an average of White Spruce, Lodge Pole Pine, and Alpine Fir.

2. Size of Wood*

The table below contains a list of different sizes or dimensions of wood. The percentage next to the size of the wood is the multiple used to compare the size of the board to a board foot (1" by 12" by 12"). This multiple will be used in the table in *Section 4* to calculate the weight of wood handled. Please indicate all of the applicable sizes of wood handled at the workstation. Add any other sizes to the bottom of the table if your particular size of wood is not listed.

1" Sizes		Multiple	2" Sizes		Multiple	4" Sizes		Multiple	6" Sizes		Multiple	8" Sizes		Multiple
	1 by 4	0.33		2 by 4	0.67		4 by 4	1.33		6 by 6	3.00		8 by 8	5.33
	1 by 6	0.50		2 by 6	1.00		4 by 6	2.00		6 by 8	4.00		8 by 10	6.67
	1 by 8	0.67		2 by 8	1.33		4 by 8	2.67		6 by 10	5.00		8 by 12	8.00
	1 by 10	0.83		2 by 10	1.67		4 by 10	3.33		6 by 12	6.00			
	1 by 12	1.00		2 by 12	2.00		4 by 12	4.00						

* Conservative estimates of actual wood dimensions

If the size of the board is different from those in this table, use this equation to find out the multiple value.

[(Dimensions of wood) x 12] / 144 = Multiple
For example: For a 5 by 5 piece of wood [(5x5) x 12]/144 = 2.08

3. Length of Wood

The table below contains a list of the common lengths of wood. Please indicate which of these lengths are being handled at this particular workstation. Add additional lengths to the table if necessary. This information will be used in the table in *Section 4*.

Length of Wood							
	6 foot		12 foot		18 foot		22 foot
	8 foot		14 foot		20 foot		24 foot
	10 foot		16 foot		Other:		Other:

4. Weight of Wood Equation*

The table below is used to calculate the weight of the boards being handled. The weight is calculated by multiplying the species weight/board foot (*Section 1 value*) by the size of wood multiple (*Section 2 value*) and by the length of wood (*Section 3 value*).

Example: For a run of wet Spruce/Pine/Fir, 2" x 4", 16 feet long

2.95 *(wet lb./ board foot)* x **0.67** *(size of wood multiple for 2" x 4")* x **16** *(length of board in feet)* = **32 lbs**.

For the heaviest species handled, enter the lb./board foot value, the multiple for the largest size of this wood, and the largest length of this wood. Multiply these values together to determine the weight of the board in pounds.

For the most common species handled, enter the lb./board foot value, the multiple for the most common size of wood, and the most common length of this wood. Multiply these values together to determine the weight of the board in pounds.

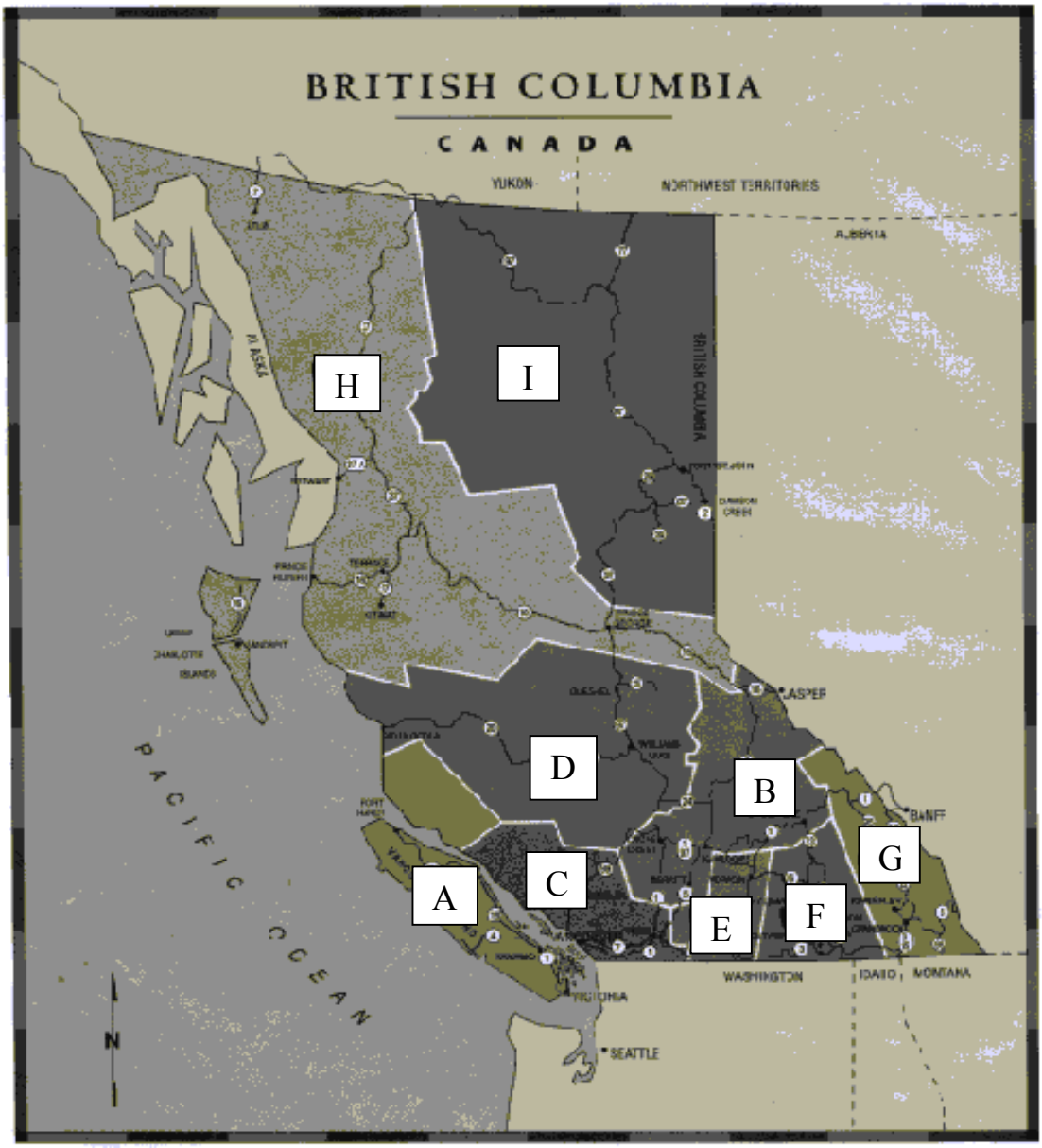
For the lightest species handled, enter the lb./board foot value, the multiple for the smallest size of wood, and the shortest length of this wood. Multiply these values together to determine the weight of the board in pounds.

If required, divide the pound value by 2.2 to obtain the weight of the board in kilograms.

Type of Wood Handled (lb./ board foot) *From Section 1*		**x**	**Multiple (size of wood)** *From Section 2*	**x**	**Length of Wood** *From Section 3*	**=**	**Weight of the Board in pounds**	**Divide by 2.2 to calculate value in kilograms**
Heaviest Species Handled		x		x		=		
Most Common Species Handled		x		x		=		
Lightest Species Handled		x		x		=		

* Weight may vary from the above calculation depending on the cell moisture content of the wood, actual wood dimensions, and wood density.

Appendix B - Regional Map



A - Vancouver Island	**F** - Kootenay Country
B - High Country	**G** - British Columbia Rockies
C - Southwestern BC	**H** - North by Northwest
D - Cariboo Chilcotin Coast	**I** - Peace River Alaska Highway
E - Okanagan Similkameen	

Risk Factor Identification Checklist
Packaging End

Purpose

The Risk Factor Identification Checklist for Packaging End is used to **identify** potential ergonomic risk factors. Keep in mind that the purpose of this checklist is only to **identify** potential ergonomic risk factors, **not** to assess them.

The checklist can be used as part of your ergonomic intervention process, when workers express concerns about their work environment, during regular workplace inspections and observations, or when conducting an accident or injury investigation. Ideally, management and worker representatives who have completed the IMIRP Occupational Health & Safety Committee and Supervisor Ergonomic Training Session should complete this checklist. Try to view different workers in the same occupation when completing the checklist. Some specific examples are given to help answer the questions.

Instructions

General

Except for the first two questions, all remaining questions will require an answer with an implied frequency. For appropriate questions indicate with a check mark (✓) whether the answer to the question is 'No' or **'**Yes'. This way you will have a record indicating that all risk factors have been considered in the identification process.

If you indicate 'No', please continue to the next question. If the question refers to a situation which does not exist (e.g., there is no seating available), please indicate 'No' in the appropriate box and continue to the next question.

If your answer is 'Yes', please check the appropriate box and then circle the frequency ('S' for 'Sometimes' or 'O' for 'Often'). If you answer 'Yes – Sometimes', then this risk factor **may be** a potential area of concern. If you answer 'Yes – Often' then there is an increased likelihood that this risk factor **is** an issue. Each mill will be responsible for defining what 'Sometimes' and 'Often' will mean to them. It is important that all people who complete the checklist are consistent in how they determine if a risk factor occurs 'Sometimes' or 'Often'. Use the 'Comments' section to indicate specific tasks, or to make other notes about the direct risk factors.

Since ergonomic risk factors frequently occur in combinations, you may find similar questions in different sections. Answering all questions will ensure that the situations that involve combinations of ergonomic risk factors are identified. It is very important to recognise all risk factors that occur in the work area.

Please note that for some of the questions it will be beneficial to ask the worker for their input. Please take the opportunity to include the operator in the risk factor identification process as much as possible. Videotaping the job of interest and reviewing the checklist in a quiet area with the worker may allow for more discussion.

Summary Tables

At the end of each body part section, summarise your findings in the table provided. If any of the direct risk factor sections contain a 'Yes', indicate 'Yes' in the appropriate section of the summary table. Answer the questions referring to injury statistics and discomfort survey findings. If there are only 'No' answers in a direct risk factor section, indicate 'No' in the summary table for that section. Use the summary information to determine how you will use the Work Manual.

Risk Factor Identification Checklist – Packaging End

Management Representative _____

Worker Representative _____

Date _____

Risk Identification completed:

☐ Before implementation of solutions

☐ After implementation of solutions

Job History		No	Yes	Comments
1	Are there records of musculoskeletal injuries or accidents to indicate a risk of musculoskeletal injury? (refer to Worksheet 1 in Implementation Guide)			
2	Are there worker comments to indicate a risk of musculoskeletal injuries? (refer to Worksheet 2 in Implementation Guide)			

Definitions

Force: Force is the amount of physical effort required by the person to do a task and/or maintain control of tools and equipment. The effort depends on the type of grip, object weight and dimensions, body posture, type of activity, surface of the object, temperature, vibration, duration of the task, and number of repetitions.

Repetition: Repetition is defined as similar or the same motions performed repeatedly. The severity of risk depends on the frequency of repetition, speed of the movement or action, the number of muscle groups involved, and the required force. Repetition is influenced by machine or line pacing, incentive programs, piecework, and deadlines.

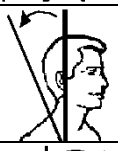
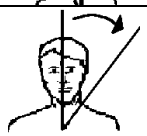
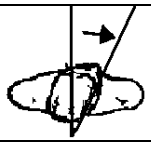
Static Postures: Static loading (sustained exertions) is physical effort (body postures) that is held, requiring muscle contraction for more than a short time.

Contact Stress: Contact stress is the contact of the body with a hard surface or edge. Contact stress can also result when using a part of the body as a hammer or striking instrument.

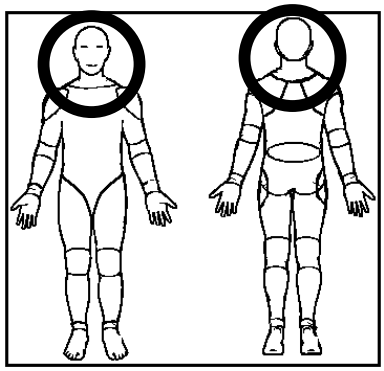
Awkward Postures: Awkward postures occur when there is a deviation from a power working posture. Some examples of awkward postures typically include reaching behind, twisting, working overhead, and forward or backward bending.

Vibration: Vibration is oscillation of a tool or surface. Vibration can be transmitted through the arm or through the whole body.

NECK

Repetition		N	Y		Comments:
Are identical or similar motions performed over and over again? (e.g., looking down and up frequently)				S O	
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., wrapping and stapling)				S O	
Static Posture					
Ask the worker: Do tasks require your neck or shoulders to be maintained in a fixed or static posture?				S O	
Awkward Posture					
Flexion				S O	
Extension				S O	
Lateral Bending				S O	
Rotation				S O	

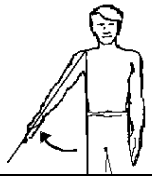
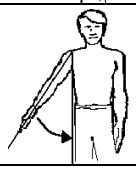
Please indicate whether the following direct risk factors were identified at the **NECK**.		
Direct Risk Factors	Repetition	☐Yes ☐No
	Static Posture	☐Yes ☐No
	Awkward Posture	☐Yes ☐No
In the **Injury Statistics** investigation, were there injury reports for the Neck or Head/Eye or Upper Back? (see Worksheet 1 in the Implementation Guide)		☐Yes ☐No
In the **Discomfort Survey** investigation, were there reports of discomfort for the Neck or Head/Eye or Upper Back? (see Worksheet 2 in the Implementation Guide)		☐Yes ☐No



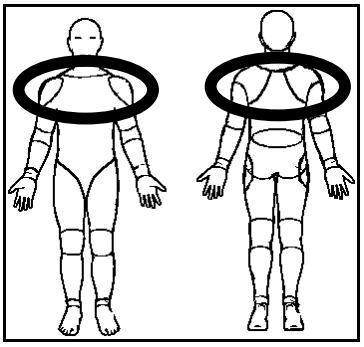
Body parts within the circled area will be classified as NECK issues.

SHOULDER

Force	N	Y		Comments:
Is forceful physical handling performed? Such as: Lifting			S O	
Lowering			S O	
Pushing			S O	
Pulling			S O	
Carrying			S O	
Repetition				
Are identical or similar motions performed over and over again? (e.g., wrapping and stapling)			S O	
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., wrapping and stapling)			S O	
Static Posture				
Ask the worker: Do tasks require your shoulders to be maintained in a fixed or static posture? (e.g., operating controls)			S O	
Ask the worker: Do you hold parts, tools, or objects for long periods? (e.g., stapler)			S O	

Awkward Posture		N	Y		Comments:
Flexion				S O	
Extension				S O	
Abduction				S O	
Adduction				S O	

Please indicate whether the following direct risk factors were identified at the **SHOULDER**.		
Direct Risk Factors	Force	☐Yes ☐No
	Repetition	☐Yes ☐No
	Static Posture	☐Yes ☐No
	Awkward Posture	☐Yes ☐No
In the **Injury Statistics** investigation, were there injury reports for the Shoulder or Neck or Upper Back? (see Worksheet 1 in the Implementation Guide)		☐Yes ☐No
In the **Discomfort Survey** investigation, were there reports of discomfort for the Shoulder or Neck or Upper Back? (see Worksheet 2 in the Implementation Guide)		☐Yes ☐No



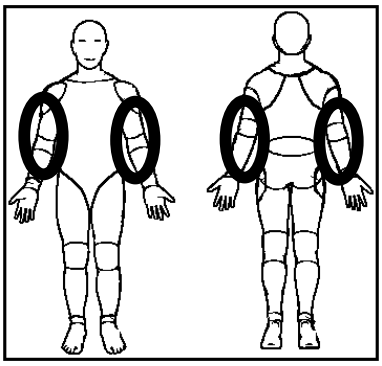
Body parts within the circled area will be classified as SHOULDER issues.

ELBOW

Force	N	Y		Comments:
Is forceful physical handling performed? Such as: Lifting			S O	
Lowering			S O	
Pushing			S O	
Pulling			S O	
Carrying			S O	
Turning materials			S O	
Are objects handled in a power grip? (e.g., staple gun) 			S O	
Are objects handled in a pinch grip? (e.g., paper) 			S O	
Are objects handled in a hook grip? (e.g., bucket) 			S O	
Ask the worker: Do you wear gloves while performing your job? If the answer is **No**, check the **No** box and go to next section.		*	S O	
*If the answer to the above question is **Yes**, ask the worker: Are the gloves too large/small?			S O	
Does the thickness of the gloves cause problems with gripping?			S O	
Repetition				
Are identical or similar motions performed over and over again? (e.g., wrapping and stapling)			S O	
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., wrapping and stapling)			S O	

Static Posture	N	Y		Comments:
Ask the worker: Do tasks require your hand and arm to be maintained in a fixed or static posture?			S O	
Ask the worker: Do you apply constant pressure on controls/objects with your hand?			S O	
Ask the worker: Do you hold parts, tools, or objects for long periods? (e.g., stapler)			S O	
Contact Stress				
Ask the worker: Do **any** objects, tools or parts of the workstation put pressure on **any** parts of your hand or arm, such as the backs or sides of fingers, palm or base of the hand, forearm, elbow? (e.g., hand tools that dig into the palm of the hand)			S O	
Vibration				
Ask the worker: Is vibration transmitted to your hand through a tool or piece of equipment? (e.g., pneumatic tools)			S O	

Please indicate whether the following direct risk factors were identified at the **ELBOW**.		
Direct Risk Factors	Force	☐Yes ☐No
	Repetition	☐Yes ☐No
	Static Posture	☐Yes ☐No
	Contact Stress	☐Yes ☐No
	Vibration	☐Yes ☐No
In the **Injury Statistics** investigation, were there injury reports for the Elbow or Forearm? (see Worksheet 1 in the Implementation Guide)		☐Yes ☐No
In the **Discomfort Survey** investigation, were there reports of discomfort for the Elbow or Forearm? (see Worksheet 2 in the Implementation Guide)		☐Yes ☐No



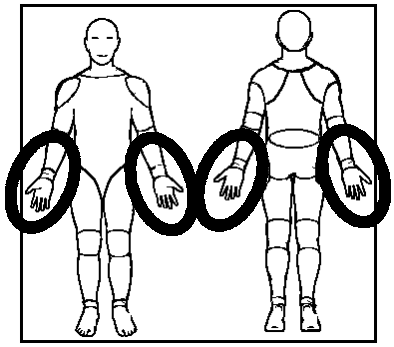
Body parts within the circled area will be classified as ELBOW issues.

WRIST/HAND

Force	N	Y		Comments:
Is forceful physical handling performed? Such as: Lifting			S O	
Lowering			S O	
Pushing			S O	
Pulling			S O	
Carrying			S O	
Turning materials			S O	
Are objects handled in a power grip? (e.g., staple gun) 			S O	
Are objects handled in a pinch grip? (e.g., paper) 			S O	
Are objects handled in a hook grip? (i.e., bucket) 			S O	
Ask the worker: Do you wear gloves while performing your job? If the answer is **No**, check the **No** box and go to next section.		*	S O	
*If the answer to the above question is **Yes**, ask the worker: Are the gloves too large/small?			S O	
Does the thickness of the gloves cause problems with gripping?			S O	
Repetition				
Are identical or similar motions performed over and over again? (e.g., wrapping and stapling)			S O	
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., wrapping and stapling)			S O	

Static Posture	N	Y		Comments:
Ask the worker: Do tasks require any part of your arm or hand to be maintained in a fixed or static posture?			S O	
Ask the worker: Do you apply constant pressure on controls/objects with your hand?			S O	
Ask the worker: Do you hold parts, tools, or objects for long periods?			S O	
Contact Stress				
Ask the worker: Do **any** objects, tools or parts of the workstation put pressure on **any** parts of your hand or arm, such as the backs or sides of fingers, palm or base of the hand, forearm? (e.g., hand tools that dig into the palm of the hand)			S O	
Ask the worker: Do you use your hand like a hammer for striking? (e.g, breaking off shim sticks)			S O	
Awkward Posture				
Flexion 			S O	
Extension 			S O	
Ulnar Deviation 			S O	
Radial Deviation 			S O	
Vibration				
Ask the worker: Is vibration transmitted to your hand through a tool or piece of equipment? (e.g., pneumatic tools)			S O	

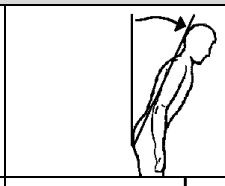
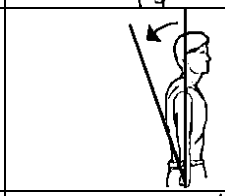
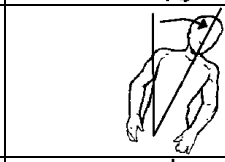
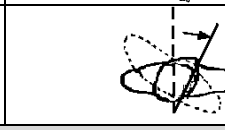
Please indicate whether the following direct risk factors were identified at the **WRIST/HAND**.		
Direct Risk Factors	Force	☐Yes ☐No
	Repetition	☐Yes ☐No
	Static Posture	☐Yes ☐No
	Contact Stress	☐Yes ☐No
	Awkward Posture	☐Yes ☐No
	Vibration	☐Yes ☐No
In the **Injury Statistics** investigation, were there injury reports for the Wrist or Hand/Finger or Forearm? (see Worksheet 1 in the Implementation Guide)		☐Yes ☐No
In the **Discomfort Survey** investigation, were there reports of discomfort for the Wrist or Hand/Finger or Forearm? (see Worksheet 2 in the Implementation Guide)		☐Yes ☐No



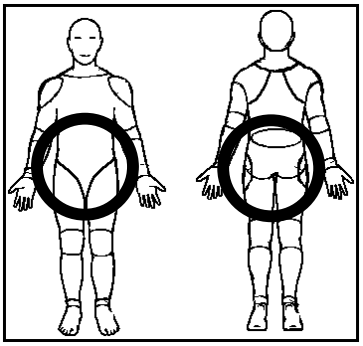
Body parts within the circled area will be classified as WRIST issues.

LOW BACK OR HIP/THIGH

Force	N	Y		Comments:
Is forceful physical handling performed? Such as: Lifting			S O	
Lowering			S O	
Pushing			S O	
Pulling			S O	
Carrying			S O	
Repetition				
Are identical or similar motions performed over and over again? (e.g., wrapping and stapling)			S O	
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., wrapping and stapling)			S O	
Static Posture				
Ask the worker: Do tasks require your trunk and upper body to be maintained in a fixed or static posture? (e.g., bending forward to wrap a load)			S O	
Are workers required to sit or stand in a stationary position for long periods of time during the shift?			S O	
Contact Stress				
Ask the worker: Do **any** objects, tools or parts of the workstation put pressure on **any** parts of your hip/thigh? (e.g., workstation that digs into the hip or thigh)			S O	

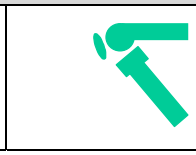
Awkward Posture		N	Y		Comments:
Flexion				S O	
Extension				S O	
Lateral Bending				S O	
Twisting				S O	
Vibration					
Ask the worker: Is your whole body exposed to vibration for significant portions of the work shift? (e.g., standing on vibrating surface)				S O	

Please indicate whether the following direct risk factors were identified at the **LOW BACK or HIP/THIGH**.		
Direct Risk Factors	Force	☐Yes ☐No
	Repetition	☐Yes ☐No
	Static Posture	☐Yes ☐No
	Contact Stress	☐Yes ☐No
	Awkward Posture	☐Yes ☐No
	Vibration	☐Yes ☐No
In the **Injury Statistics** investigation, were there injury reports for the Low Back or Hip/Thigh? (see Worksheet 1 in the Implementation Guide)		☐Yes ☐No
In the **Discomfort Survey** investigation, were there reports of discomfort for the Low Back or Hip/Thigh? (see Worksheet 2 in the Implementation Guide)		☐Yes ☐No

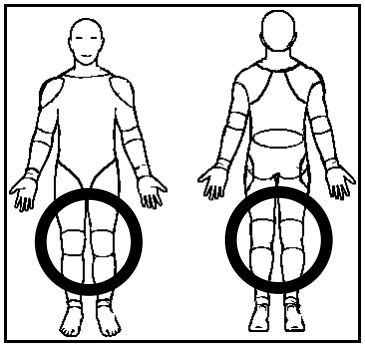


Body parts within the circled area will be classified as LOW BACK issues.

KNEE

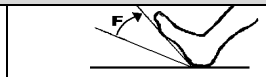
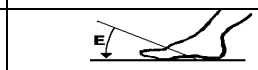
Repetition	N	Y		Comments:
Are identical or similar motions performed over and over again?			S O	
Static Posture				
Ask the worker: Do tasks require you to maintain your knee(s) in a fixed or static posture?			S O	
Are workers required to sit or stand in a stationary position for long periods of time during the shift?			S O	
Do workers kneel (with one or both knees)?			S O	
Contact Stress				
Ask the worker: Do **any** objects or parts of the workstation put pressure on your knee(s)?			S O	
Awkward Posture				
Extreme Flexion 			S O	

Please indicate whether the following direct risk factors were identified at the **KNEE**.		
Direct Risk Factors	Repetition	☐Yes ☐No
	Static Posture	☐Yes ☐No
	Contact Stress	☐Yes ☐No
	Awkward Posture	☐Yes ☐No
In the **Injury Statistics** investigation, were there injury reports for the Knee or Hip/Thigh? (see Worksheet 1 in the Implementation Guide)		☐Yes ☐No
In the **Discomfort Survey** investigation, were there reports of discomfort for the Knee or Hip/Thigh? (see Worksheet 2 in the Implementation Guide)		☐Yes ☐No

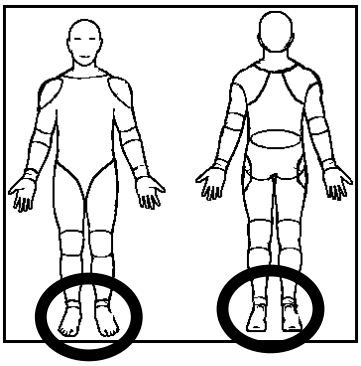


Body parts within the circled area will be classified as KNEE issues.

ANKLE/FOOT

Repetition	N	Y		Comments:
Are identical or similar motions performed over and over again?			S O	
Static Posture				
Are workers required to stand in a stationary position for long periods of time during the shift?			S O	
Awkward Posture				
Flexion 			S O	
Extension 			S O	
Vibration				
Ask the worker: Is your whole body exposed to vibration for significant portions of the work shift? (e.g., standing on vibrating surface)			S O	

Please indicate whether the following direct risk factors were identified at the **ANKLE/FOOT**.		
Direct Risk Factors	Repetition	☐Yes ☐No
	Static Posture	☐Yes ☐No
	Awkward Posture	☐Yes ☐No
	Vibration	☐Yes ☐No
In the **Injury Statistics** investigation, were there injury reports for the Ankle or Foot? (see Worksheet 1 in the Implementation Guide)		☐Yes ☐No
In the **Discomfort Survey** investigation, were there reports of discomfort for the Ankle or Foot? (see Worksheet 2 in the Implementation Guide)		☐Yes ☐No



Body parts within the circled area will be classified as ANKLE/FOOT issues.

CHARACTERISTICS OF OBJECTS BEING HANDLED

	N	Y		Comments:
Are there problems handling a load due to its size or shape? (e.g., paper roll)			S O	
Are there problems handling a load due to its fragile, unbalanced, or non-rigid conditions?			S O	
Ask the worker: Do you experience situations where mechanical aids or equipment are not readily available to assist with manipulating an object? (e.g., hoist)			S O	
Are handles for tools and equipment inappropriate in terms of size or shape? (e.g., hand tools)			S O	
Ask the worker: Do any objects that you work with (other than tools or equipment) have handles? If the answer is **No**, check the **No** box and go to the next section.			S O	
If the answer to the above question is **Yes**, ask the worker: Are the handles an inappropriate size or shape for the characteristics of the object?			S O	

ENVIRONMENTAL CONDITIONS

Temperature				
Ask the worker: Are your hands or arms exposed to cold from exhaust air, cold liquids or solids? (e.g., cleaning stencils)			S O	
Ask the worker: Are you exposed directly to temperature extremes that may cause you to use more force or cause you to fatigue quicker than normal? (e.g., hot or cold, either by equipment or natural environment)			S O	
Lighting				
Ask the worker: Do you assume awkward postures to overcome problems associated with glare, inadequate lighting, or poor visibility?			S O	

ENVIRONMENTAL CONDITIONS [CONTINUED]

Noise	N	Y		Comments:
Have there been complaints on the level of noise in the work area?			S O	
Ask the worker: Are there any distracting or annoying noises at the workstation?			S O	

WORK ORGANISATION

	N	Y		Comments:
Is the work externally-paced or controlled by a machine or the process?			S O	
Do peak workloads or sudden increases in pace occur with the tasks?			S O	
Ask the worker: Are there indications of excessive fatigue or pain, or symptoms of adverse health effects due to extended work days or overtime?			S O	
Ask the worker: Are there indications of excessive fatigue or adverse health effects due to shiftwork?			S O	
Ask the worker: Are rest periods or task variety insufficient to prevent the build-up of fatigue or the risk of adverse health effects?			S O	
Ask the worker: Are tasks in a job rotation program similar to one another, and therefore not providing a variation in movements?			S O	

Work Manual

Industrial
Musculoskeletal
Injury
Reduction
Program




Packaging End

(Packaging Press Operator, Load Strapper/Bander, Tallyman, Stenciller/End Sealer)

This Work Manual contains information about the body parts found to be at risk of musculoskeletal injury (MSI) for the Packaging End workers (Injury Education), and how to reduce the risk of MSIs using various control measures (Injury Prevention). Each Work Manual is intended to help Occupational Health and Safety Committee members establish effective solutions to reduce MSIs, and as a resource for workers to understand the MSI risks that they may encounter on the job.

The Body Manual, referenced throughout the Work Manual, is a separate document that contains information on how to prevent common MSIs through exercise. Please note exercises described in the Body Manual should only be used after consulting a healthcare practitioner.

The General Risk Factor Solutions Manual, referenced throughout the Work Manual, is a separate document that contains general, preventative information on Environmental Conditions and Work Organisation issues.

Work Manual

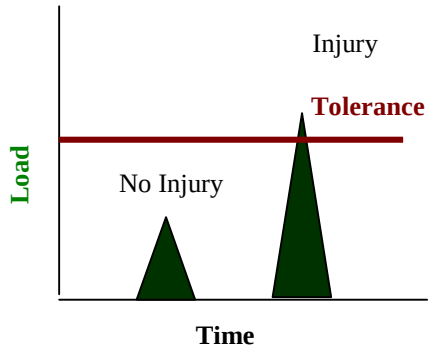
Packaging End

(Packaging Press Operator, Load Strapper/Bander, Tallyman, Stenciller/End Sealer)

WM Table of Contents

Injury Education

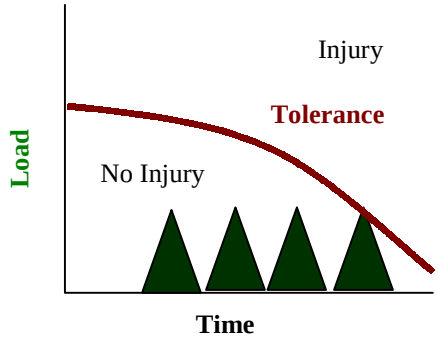
Injuries occur when …
Loads exceed tissue tolerances



Excessive Force

This type of injury occurs from a single event, where the loads or forces are so great they exceed tissue tolerances and cause an immediate injury. This type of injury is more common with trips and falls.

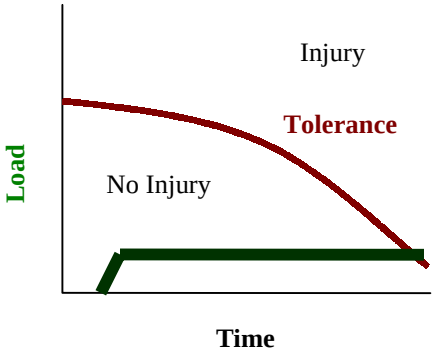
Example – a worker going over on their ankle and spraining it.



Excessive Repetition

This type of injury occurs from repeated loading weakening tissue to the point of failure. It progresses slowly to the point where a subfailure load can cause an injury. This type of injury is more common with repetitive tasks.

Example – a worker pulling lumber off a chain developing a herniated disc.



Excessive Duration

This type of injury occurs from constant loading weakening tissue to the point of failure. This type of injury is more common with tasks that require workers to adopt static or awkward postures for extended periods.

Example – a Grader developing neck tension.

Body Parts at Risk

The previous page on injury education explains how injuries can occur. The Injury Education section of this Work Manual expands on these principles, relating them to the specific body parts at risk of being injured.

After all of the appropriate information is collected during the investigation of the Packaging Press job (i.e., injury statistics, discomfort surveys, results from the Identification Checklist), the next steps are to:

1. Match the body parts of concern from your investigation to those described in this section of the Work Manual.

2. Note the direct risk factors associated with each body part of concern.

3. Read the information on the page and try to understand why a body part, in combination with each of the direct risk factors, is of concern.

4. Discover which indirect risk factors are associated with a particular body part problem and the headings under which they are found in the Injury Prevention section of the Work Manual.

5. Note the consequences of the direct risk factor relative to a body part.

6. Note where the potential solutions can be found within the Injury Prevention section of the Work Manual. In addition, for many of the body parts, a reference may be provided to refer to specific sections of the Body Manual.

At the end of the Body Parts at Risk Section, there is a summary page of all the body parts of concern for the Packaging End Operators. In addition, a reference table, with a summary of the direct and indirect risk factors by body part, is provided.

In the last section on Injury Prevention, the Work Manual discusses specific solution options for each of the body parts at risk.

NECK

Direct Risk Factors:
Awkward Postures
Static Postures
Repetition

A Packaging End worker may frequently hold their head forward, backward, or to the side in order to operate controls, wrap and staple loads, prepare labels, and/or change banding and paper rolls.

BACKGROUND INFORMATION

- A number of smaller muscles around the neck produce the forces necessary to support and move the head. These muscles remain relatively relaxed when the head is balanced over the spine (neutral posture). The neutral posture occurs when the head is upright, and the ears and shoulders are aligned.

DIRECT RISK FACTORS

Awkward Postures

- Neck muscles are required to turn the head to the side. The further the head is turned to the side, the greater the load on the muscles and tendons.
- Neck muscles must support the weight of the head while in a forward bent position. The more the neck bends, the greater the load on the muscles and tendons.

Static Postures

- When the neck is held still in an awkward position, the muscles of the neck must remain tense to support the weight of the head. With no time allowed for recovery, the constant state of tension in the neck muscles may cause fatigue. If the constant stress is sufficient, and recovery is not adequate, the tissues may fatigue to the point of injury.

Repetition

- When the head is repeatedly turned to the side or bent forward/backward, the muscles of the neck are subjected to repeated stress with little time for recovery. If the repetitive stress is excessive, and recovery is not adequate, the tissues can fatigue to the point of injury.

INDIRECT RISK FACTORS

Workstation Design

Working Heights

- Loading to the neck muscles increases when a worker has to adopt and maintain awkward postures. The height of the controls operated, loads being wrapped, label preparation area, and banding or paper rolls can cause the Packaging End worker to assume these postures.

Work Organisation

Task Variability

- Loading to the neck muscles increases because many of the tasks performed by a Packaging End worker require bending of the neck. This frequent bending leads to accumulated stress in the neck tissues.

Work Rate

- Loading to the neck muscles increases with an increase in work rate. As the number of loads per shift increases, the number of neck movements performed per shift increases.

CONSEQUENCES

- When the head is held in an awkward posture, muscles and soft tissues of the neck may fatigue. Fatigue leads to an accumulation of waste products and/or a decrease in the ability to tolerate additional stress.
- Signs and symptoms include pain, tenderness, muscle spasm in the neck area, and headaches.

SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Neck, please see the column labelled “Neck” in the Summary of Solutions on pages 96 to 98.
- For exercises that can help to prevent ***neck*** injuries, see the ***Neck section of the Body Manual.***

NECK/SHOULDER

Direct Risk Factors:
Awkward Postures
Static Postures
Repetition

A Packaging End worker may frequently hold the arms away from the body in order to scan bar codes, operate controls, seal ends, stencil loads, band or strap loads, and wrap and staple loads.

BACKGROUND INFORMATION

- The neck and shoulder regions work together to produce certain movements, or to hold certain postures. The larger muscles of the neck and upper back (e.g., trapezius) elevate the shoulders, and the larger muscles of the shoulders (e.g., deltoids) raise the arms.

DIRECT RISK FACTORS

Awkward Postures

- Neck and shoulder muscles must support the weight of the arms when they are away from the body. The farther away the arms are from the body, the greater the load on the muscles and tendons.

Static Postures

- When the arms are repeatedly held away from the body, the muscles of the neck and shoulder must remain tense to support the weight. This constant state of tension in the neck and shoulder muscles, with no time allowed for recovery, can cause fatigue. If the constant tension is sufficient, and recovery is not adequate, then the tissue can fatigue to the point of injury.

Repetition

- When the arms are repeatedly lifted, the muscles of the neck and shoulder are subjected to repeated stress with little or no time for recovery. If the repetitive stress is excessive, and recovery is not adequate, the tissues may fatigue to the point of injury.

INDIRECT RISK FACTORS

Workstation Design

Working Reaches

- Loading to the neck/shoulder increases because the working reaches force operators to hold their arms unsupported and away from the body. As muscles and tissues fatigue in this position, the likelihood of injury increases.

Working Heights

- Loading to the neck/shoulder increases because the working heights require the operator to frequently work with the arms at or above shoulder level. This can put the operator at risk for shoulder and neck tissue injuries.

Additional Workstation Design Options

- Loading to the neck/shoulder increases when manually banding loads or strips because the operator has to adopt awkward and static postures in order to perform these tasks.

CONSEQUENCES

- When working with the arms away from the body, muscles and soft tissues of the neck and shoulder may fatigue. Fatigue leads to an accumulation of waste products and/or a decrease in the ability to tolerate additional stress.
- Signs and symptoms include pain, tenderness, muscle spasm in the neck and shoulder area, and headaches.

SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Neck/Shoulder, please see the column labelled “Neck/Shoulder” in the Summary of Solutions on pages 96 to 98.
- For exercises that can help to prevent ***neck*** and ***shoulder*** injuries, see the ***Neck*** and ***Shoulder sections of the Body Manual.***

NECK/SHOULDER

Direct Risk Factors:
Force
Awkward Postures
Repetition

A Packaging End worker may lift objects to or above shoulder height in order to stencil the load, wash stencils, finish loads, re-stack spilled loads, and/or lift dunnage onto loads.

BACKGROUND INFORMATION

- The neck and shoulder regions work together to produce certain movements, or to hold certain postures. The larger muscles of the neck and upper back (e.g., trapezius) elevate the shoulders, and the larger muscles of the shoulders (e.g., deltoids) raise the arms.

DIRECT RISK FACTORS

Force

- Neck and shoulder muscles support the weight of objects held in the hands. The heavier the object, the greater the load on the muscles and tendons.

Awkward Postures

- Neck and shoulder muscles must support the weight of the arms when they are away from the body. The farther away the arms are from the body, the greater the load on the muscles and tendons.

Repetition

- When workers repeatedly lift stencils, boards, and/or dunnage, the muscles of the neck and shoulder are subjected to repeated stress with little time for recovery. If the repetitive stress is excessive, and recovery is not adequate, the tissues can fatigue to the point of injury.

INDIRECT RISK FACTORS

Workstation Design

Working Heights

- Loading to the neck/shoulder increases because the working heights require the operator to frequently handle objects with the arms at or above shoulder level. This can put the operator at risk for shoulder and neck tissue injuries.

Additional Workstation Design Options

- Loading to the neck/shoulder increases when spare boards used to finish loads are stored farther away from the roll cases. The neck/shoulder muscles must remain tense in order to carry a load; the farther away the boards are stored the longer the boards must be carried.

Characteristics of Objects Being Handled

Load Condition and Weight Distribution

- Loading to the neck/shoulder increases when carrying a stencil or a board. The weight of the board or stencil increases the force required by the neck/shoulder in order to lift, carry, or balance the object.

CONSEQUENCES

- Forceful and repeated lifting of stencils, boards, and/or dunnage can lead to neck and/or shoulder strain.
- Signs and symptoms include pain, tenderness, muscle spasm in the neck/shoulder area, and headaches.

SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Neck/Shoulder, please see the column labelled “Neck/Shoulder” in the Summary of Solutions on pages 96 to 98.
- For exercises that can help to prevent ***neck*** and ***shoulder*** injuries, see the ***Neck*** and ***Shoulder sections of the Body Manual.***

ELBOW/WRIST

Direct Risk Factors:
Force
Awkward Postures
Static Postures
Repetition

A Packaging End worker may grip tools or objects in order to finish a load, band/strap a load, wrap and staple a load, and place dunnage on a load.

BACKGROUND INFORMATION

- Muscles used for gripping are found in the forearm. The tendons of these muscles cross over the elbow and the wrist joints before connecting to bones. The elbow area may be affected by tension generated in the forearm muscles.

DIRECT RISK FACTORS

Force

- Gripping an object requires activation of the forearm muscles, which generates tension at the tendon/bone connection of the elbow. The harder that an object must be gripped, the greater the load on the tendon/bone connection.

Awkward Postures

- The width of an object affects how much muscle tension needs to be generated. There is an optimal grip width where the forearm muscles work efficiently. Outside this width, muscles have to work harder to generate equivalent tension. Consequently, objects that are too large (e.g., large cuts of wood) or too small (e.g., narrow tool handles) could increase the tension generated by muscles, and lead to tissue fatigue at the tendon/bone connection.

- The position of the wrist also affects how much muscle tension needs to be generated. There is an optimal wrist position where the forearm muscles work efficiently. This occurs when the wrist is in its natural relaxed (neutral) position. Bending the wrist forward or backward deviates from this position, and the forearm muscles have to work harder to maintain the grip. Consequently, gripping objects with the wrist bent increases the tension generated by muscles, and could lead to tissue fatigue at the tendon/bone connection.

Static Postures

- When the hand is held still in a grip position, the muscles of the forearm must remain tense to support the weight in the hand. With no time allowed for recovery, the constant state of tension in the forearm muscles may cause fatigue. If the constant stress is sufficient, and recovery is not adequate, the tissues may fatigue to the point of injury.

Repetition

- Repeated stress to the elbow without adequate rest could slowly fatigue tissues to the point of injury.

INDIRECT RISK FACTORS

Workstation Design

Working Height

- Loading to the elbow/wrist increases when the operator must work at heights requiring awkward wrist postures. Gripping with awkward wrist postures can increase the tension generated in the forearm muscles, which in turn increases loading on the elbow.

Additional Workstation Design Options

- Loading on the elbow/wrist is increased when manually banding loads or strips because the operator has to adopt awkward and static postures in order to use the tools required to perform this task.

Characteristics of Objects Being Handled

Size and Shape

- Loading to the elbow/wrist increases when tool handles are too large or too small for the operator's hand, as this can lead to an increased grip force required to maintain control of the tool. Increased grip force leads to an increased risk of injury at the elbow.

Container, Tool, and Equipment Handles

- Loading to the elbow/wrist increases when there is a lack of friction between a tool handle and the operator's hand/glove, as this can lead to an increase in the grip force required to maintain control of the tool. Increased grip force leads to an increased risk of injury at the elbow.

Work Organisation

Task Variability

- Loading to the elbow/wrist increases because many of the tasks performed by a Packaging End worker require gripping. This gripping leads to an increase in the repetitive movements of the elbow/wrist.

Work Rate

- Loading to the elbow/wrist increases with an increase in work rate. As the number of loads per shift increases, the number of times objects are gripped increases.

CONSEQUENCES

- Repeated forceful gripping may lead to fatigue at the tendon/bone connection near the elbow.
- Signs and symptoms include pain in the elbow area and decreased grip strength.

SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Elbow/Wrist, please see the column labelled "Elbow/Wrist" in the Summary of Solutions on pages 96 to 98.
- For exercises that can help to prevent ***elbow*** injuries, see the ***Elbow section of the Body Manual.***

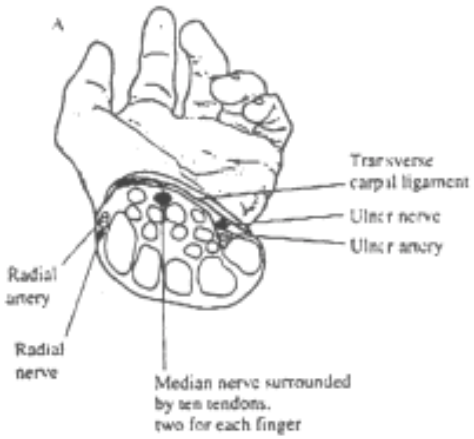
WRIST/HAND

Direct Risk Factors:
Force
Awkward Postures
Static Postures
Repetition

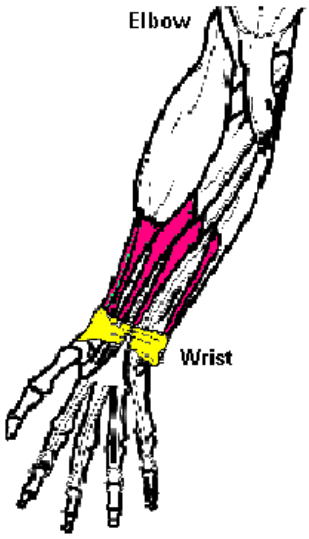
A Packaging End worker may grip and active staple or paint guns in order to secure the wrapping, apply labels, and seal the load.

BACKGROUND INFORMATION

- Most of the muscles involved in gripping and manoeuvring the hands are found in the forearms. These muscles attach at the elbow and their tendons (surrounded by a protective sheath) run down the forearm into the hand. At the wrist, the tendons and a nerve run under a thick band (see pictures below), which forms the roof of the carpal tunnel.



The Carpal Tunnel



DIRECT RISK FACTORS

Force

- Gripping an object requires activation of the forearm muscles, which generates tension in the tendons and tendon sheaths running through the wrist. The harder an object is gripped, the greater the tension in the tendons. As tension increases, the pressure within the carpal tunnel may also increase.

Awkward Postures

- As the wrist is bent, the tendon sheaths will rub up against the walls of the carpal tunnel. The farther the wrist is bent, the more friction experienced in the tendon sheaths.

Static Postures

- When the hands continually grip, the muscles of the wrist and hand must remain tense to support the weight. This constant state of tension in the wrist and hand muscles, with no time allowed for recovery, can cause fatigue. If the constant tension is sufficient, and recovery is not adequate, then the tissue can fatigue to the point of injury.

Repetition

- Repeated gripping and/or repeated bending of the wrist causes stress to the tendon sheaths. If the repetitive stress is excessive, and recovery is not adequate, the tendon sheaths may fatigue to the point of injury.
- When the fingers are repeatedly bent in order to activate a trigger control, the tendons in the fingers can rub against other soft tissues. If the repetitions are excessive, and recovery not adequate, the tendons can become irritated and lead to injury.

INDIRECT RISK FACTORS

Workstation Design

Working Height

- Loading to the wrist increases when the operator must work at heights requiring awkward wrist postures. This can increase the risk of wrist injuries.

Additional Workstation Design Options

- Loading to the wrist/hand increases when a pneumatic stapler is activated more than necessary to secure wrapping or a label to the load.
- Loading to the wrist/hand increases because frequent handling of paper tabs is required when wrapping loads.

Characteristics of Objects Being Handled

Size and Shape

- Loading to the wrist/hand increases because frequent handling of paper tabs is required when wrapping loads.

Load Condition and Weight Distribution

- Loading to the wrist/hand increases because frequent lifting and holding of objects (such as tools) can cause fatigue in the muscles of the wrist and forearm. The heavier the object, the greater the risk of injury to the tissues of the wrist/hand.

Environmental Conditions

Cold Temperature

- Loading to the wrist/hand increases when gripping objects in cold environments. The colder the hands, the greater the potential for decreased sensitivity and the greater the force required to grip objects.

CONSEQUENCES

- Repeatedly gripping objects with the wrist bent may lead to irritation and damage in the tendon sheaths of the hand and wrist.
- Repeatedly activating a trigger control can lead to irritation and damage in the tendons of the fingers.
- Signs and symptoms include pain, tenderness, and inflammation in the wrist area; and pain, clicking or creaking, and locking of the finger as it is bent.

SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Wrist, please see the column labelled “Wrist” in the Summary of Solutions on pages 96 to 98.

LOW BACK

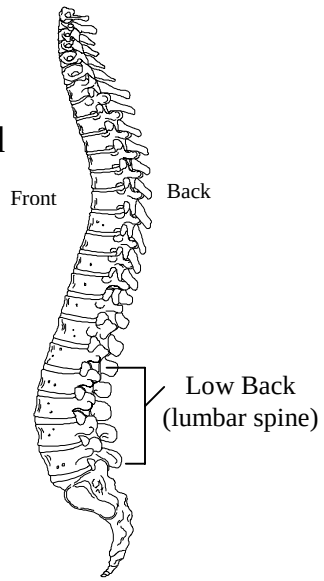
Direct Risk Factors:
Awkward Postures
Static Postures
Repetition

A Packaging End worker may frequently bend forward or to the side in order to finish a load, seal the ends, wrap and staple a load, and stencil a load.

BACKGROUND INFORMATION

- The spine is made up of 33 bones called vertebrae. Each of these vertebrae is specially designed to protect the spinal cord and provide support for the back. Between each of the vertebrae are discs. Discs have tough elastic walls that are filled with a watery gel-like substance. These discs are like jelly donuts; when they are pressed down on one side, the other side bulges and puts increased pressure on the wall of the disc. To maintain an even distribution of pressure across the discs, the spine has to be kept in the neutral posture.

Neutral Spine



DIRECT RISK FACTORS

Awkward Postures

- Back muscles must support the weight of the upper body when leaning forward or to the side. Increased bending of the back increases the loading on the spine and increases the pressure on the walls of the discs.

Static Postures

- When the upper body is held still in a forward or side bent position, the muscles of the back must remain tense to support the weight of the upper body. With no time allowed for recovery, the constant state of tension in the back muscles may cause fatigue. If the constant stress is sufficient, and recovery is not adequate, the tissues may fatigue to the point of injury.

Repetition

- Repeated forward or side bending can gradually fatigue the structures of the low back. If the repetitive stress is excessive, and recovery is not adequate, the disc walls may fatigue to the point of injury.

INDIRECT RISK FACTORS

Workstation Design

Working Reaches & Working Heights

- Loading to the soft tissues of the low back increases as the upper body bends farther away from the hips. Greater degrees of bending are required with longer operator reaches or lower working heights.

Work Organisation

Task Variability

- Loading to the soft tissues of the low back increases because many of the tasks performed by a Packaging End worker require bending of the back. Completing these tasks leads to an increase in repetitive movements.

Work Rate

- Loading to the soft tissues of the low back increases with an increase in work rate. As the number of loads per shift increases, the number of back movements required over the shift increases.

CONSEQUENCES

- Repeatedly bending forward or to the side may lead to damage in the disc walls.
- Signs and symptoms may include muscle spasm and sharp or radiating pain in the back and/or lower extremities.

SUGGESTED SOLUTIONS

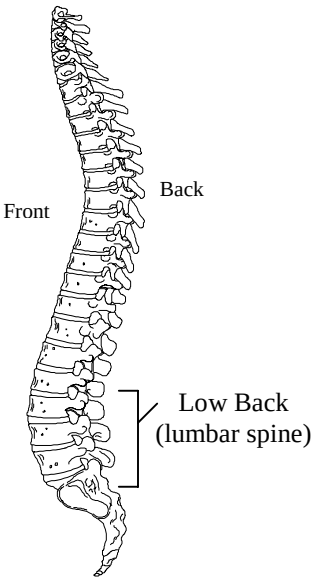
- For specific solutions that may prevent injuries to the Back, please see the column labelled “Back” in the Summary of Solutions on pages 96 to 98.
- For exercises that can help to prevent ***back*** injuries, see the ***Back section of the Body Manual.***

LOW BACK

Direct Risk Factors:
Force
Awkward Postures

A Packaging End worker may lift and carry boards in order to finish a load, re-stack spilled loads, lift and carry stencils when labelling a load, and/or lift and carry banding rolls in order to change empty rolls.

Neutral Spine



BACKGROUND INFORMATION

- The spine is made up of 33 bones called vertebrae. Each of these vertebrae is specially designed to protect the spinal cord and provide support for the back. Between each of the vertebrae are discs. Discs have tough elastic walls that are filled with a watery gel-like substance. These discs are like jelly donuts; when they are pressed down on one side, the other side bulges and puts increased pressure on the wall of the disc. To maintain an even distribution of pressure across the discs, the spine has to be kept in the neutral posture.

DIRECT RISK FACTORS

Force

- Lifting increases the loading on the spine. Weight held in the hands is transmitted to the low back. The greater the weight, the greater the loading on the structures of the low back.

Awkward Postures

- Back muscles must support the weight of the upper body when leaning forward/to the side. Increased bending of the back increases the loading on the spine and increases the pressure on the walls of the discs.

INDIRECT RISK FACTORS

Workstation Design

Working Heights

- Loading to the soft tissues of the low back increases when lifting heavy and/or unbalanced objects from the floor or low working heights (e.g., lifting banding rolls and/or spare lumber used to finish loads). This lifting can require high muscular exertion in awkward postures.

Additional Workstation Design Options

- Loading to the soft tissues of the low back increases when spare boards used to finish loads are stored farther away from the roll cases. The back muscles must remain tense when lifting and carrying objects; the farther away the boards are stored the longer the boards must be carried.

Characteristics of Objects Being Handled

Load Condition and Weight Distribution

- Loading to the soft tissues of the low back increases when handling boards, because the centre of gravity of the load is at a distance from the body. This increases the force on the soft tissues of the low back.

CONSEQUENCES

- Repeated lifting and carrying of boards can strain the back muscles.
- Signs and symptoms include pain and stiffness. Muscle spasms may also be present.

SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Back, please see the column labelled “Back” in the Summary of Solutions on pages 96 to 98.
- For exercises that can help to prevent ***back*** injuries, see the ***Back section of the Body Manual.***

KNEE

Direct Risk Factors:
Awkward Postures
Static Postures
Contract Stress
Repetition

A Packaging End worker frequently squats or kneels in order to finish a load, seal the ends of a load, stencil a load, and/or band/strap a load.

BACKGROUND INFORMATION

- At the knee joint, the knee cap (patella) is held in place over the thigh bone (femur) by connective tissue. When the leg is straight, there is little or no contact between these two bones. However, as the knee bends, the knee cap can come into contact with the thigh bone.

DIRECT RISK FACTORS

Awkward & Static Postures

- Bending the knee increases the contact stress between the knee cap and the thigh bone. Contact stress increases significantly when the knee is bent over 90 degrees.

Contact Stress

- Kneeling on a hard surface increases the contact stress between the knee cap and the thigh bone.

Repetition

- Repeated squatting and kneeling may gradually irritate the knee. Irritation of the knee may lead to muscle wasting, which in turn leads to poor tracking of the knee cap on the thigh bone and increased contact stress between these bones.

INDIRECT RISK FACTORS

Workstation Design

Working Heights

- Loading to the knee increases because very low working heights require the worker to crouch or kneel in order to perform tasks. These postures can increase the risk of knee injury.

Floor Surfaces

- Loading to the knee increases when workers kneel on hard and uneven floor surfaces as this increases the contact stress on the knee joint.

CONSEQUENCES

- Repeated squatting and kneeling could cause inflammation under the knee cap, which may cause pain and may change the mechanics of knee cap tracking. Changes in knee cap tracking may lead to premature wear of the knee cap and/or the thigh bone.
- Signs and symptoms include muscle wasting around the inner knee, creaking in the knee, and chronic pain if left unchecked.

SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Knee, please see the column labelled “Knee” in the Summary of Solutions on pages 96 to 98.
- For exercises that could help to prevent ***knee*** injuries, see the ***Knee section of the Body Manual.***

FOOT

A Packaging End worker must continually stand and/or walk in order to perform all tasks.

BACKGROUND INFORMATION

- Continual standing and/or walking may lead to discomfort in the feet.

SUGGESTED SOLUTIONS

- For specific solutions that may help to alleviate foot discomfort please see the ***Floor Surfaces*** section in the Injury Prevention Section of the Work Manual.
- For exercises that may help to alleviate ***foot*** discomfort, see the ***Foot section of the Body Manual.***

Summary of Body Parts at Risk

NECK

- A Packaging End worker may frequently hold their head forward, backward, or to the side in order to operate controls, wrap and staple loads, prepare labels, and/or change banding and paper rolls.

NECK/SHOULDER

- A Packaging End worker may frequently hold the arms away from the body in order to scan bar codes, operate controls, seal ends, band or strap loads, wrap and staple loads, and label loads.

- A Packaging End worker may lift objects to or above shoulder height in order to stencil the load, wash stencils, finish loads, re-stack spilled loads, and/or lift dunnage onto loads.

ELBOW/WRIST

- A Packaging End worker may grip tools or objects in order to finish a load, band/strap a load, wrap and staple a load, and when placing dunnage on a load.

WRIST/HAND

- A Packaging End worker may grip and activate staple or paint guns in order to secure the wrapping, apply labels, and seal the load.

LOW BACK

- A Packaging End worker must frequently bend forward or to the side in order to finish a load, seal the ends, wrap and staple a load, and label a load.

- A Packaging End worker may lift and carry boards in order to finish a load, re-stack spilled loads, lift and carry stencils when labelling a load, and/or lift and carry banding rolls in order to change empty rolls.

KNEE

- A Packaging End worker frequently squats or kneels in order to finish a load, seal the ends of a load, stencil a load, and/or band/strap a load.

FOOT

- A Packaging End worker must continually stand and/or walk in order to perform all tasks.

Risk Factors by Body Part

Direct Risk Factors		Neck	Neck/ Shoulder	Shoulder	Elbow/ Wrist	Wrist	Wrist/ Hand	Low Back	Hip	Knee	Ankle/ Foot	Foot
Force			✓		✓		✓	✓				
Repetition		✓	✓		✓		✓	✓		✓		
Awkward Postures		✓	✓		✓		✓	✓		✓		
Static Postures		✓	✓		✓		✓	✓		✓		
Contact Stress										✓		
Vibration – Whole body*												
Vibration - Hand Transmitted*												
Indirect Risk Factors		**Neck**	**Neck/ Shoulder**	**Shoulder**	**Elbow/ Wrist**	**Wrist**	**Wrist/ Hand**	**Low Back**	**Hip**	**Knee**	**Ankle/ Foot**	**Foot**
Duration**	Duration	✓	✓		✓		✓	✓		✓		
Workstation Design	Working Reaches		✓					✓				
	Working Heights	✓	✓		✓		✓	✓		✓		
	Seating											
	Floor Surfaces									✓		
Characteristics of Objects Being Handled	Size and Shape				✓		✓					
	Load Condition and Weight Distribution		✓				✓	✓				
	Container, Tool and Equipment Handles				✓							
Environmental Conditions	Heat Exposure	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
	Cold Exposure	♦	♦	♦	♦	♦	✓ ♦	♦	♦	♦	♦	♦
	Lighting	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
	Noise	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
	Vibration*	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Work Organisation	Work-Recovery Cycles	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
	Task Variability	✓ ♦	♦	♦	✓ ♦	♦	♦	✓ ♦	♦	♦	♦	♦
	Work Rate	✓ ♦	♦	♦	✓ ♦	♦	♦	✓ ♦	♦	♦	♦	♦

***** *Vibration is categorised under both direct and indirect risk factors. Vibration can directly increase the likelihood of injury to the back and wrist as well as indirectly (environmental conditions) promote injuries in other parts of the body.*

***** *Extended exposure to <u>any</u> risk factor can increase the likelihood of injury. For solutions designed to decrease the duration of exposure to any risk factor please refer to the Work Organisation section of the General Risk Factor Solutions Manual.*

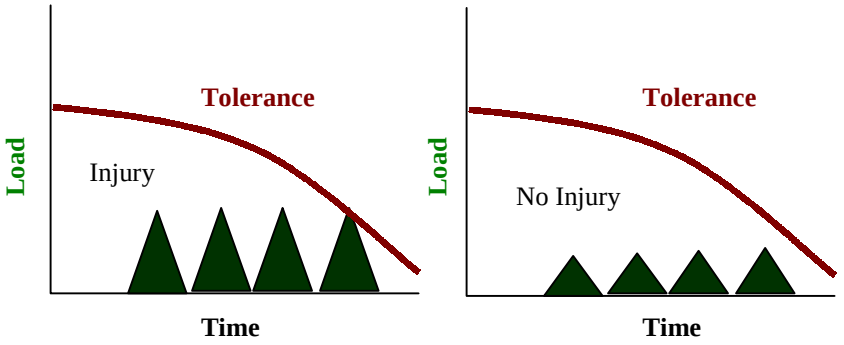
☐ = Indicates that the risk factor was assessed and was not found to be a contributor to the body part problem.

♦ = Indicates that the risk factor assessed is commonly found in sawmills, and may need to be addressed at your mill. See the appropriate section of the General Risk Factor Solutions Manual for more information.

✓ = Indicates that the risk factor was assessed as a contributor to the body part problem. Please see the Summary of Solutions Table on pages 96 to 98 for specific problem/solution information. Additional information on some risk factors can be found in the General Risk Factor Solutions Manual.

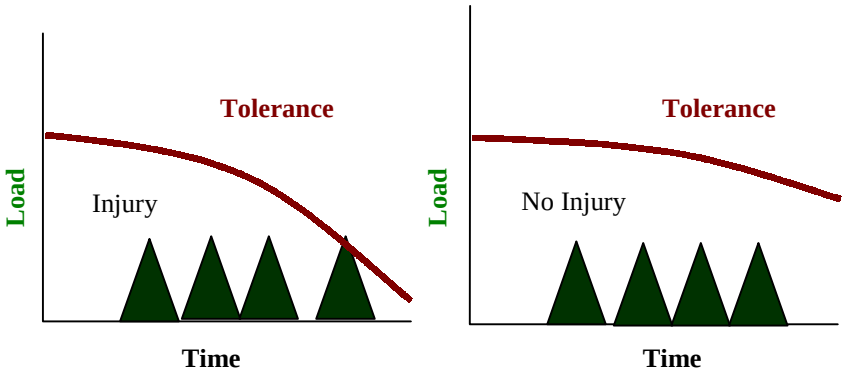
Injury Prevention

Injuries are prevented by …
Decreasing loads and increasing tissue tolerances



Injuries may be avoided by decreasing the size of the loads on the tissue.

Example – using a torque multiplier wrench to loosen bolts.



Injuries may be avoided by increasing tissue tolerances, and allowing the body to endure more loading.

Example – using maintenance exercises to strengthen tissues.

Suggested Solutions

The previous page explains how injuries may be prevented by decreasing the load on a tissue or by increasing the tissue tolerances. The Injury Prevention section of the Work Manual provides possible solutions that can be implemented to decrease the size of the loads on the tissues.

Each of the solutions described in the Work Manual has a risk control icon. The Risk Control Key provides guidelines on how to distinguish between different types of risk controls. Generally, engineering, administrative, and work practice controls are considered more effective than the use of personal protective equipment to decrease the risk of musculoskeletal injuries.

The focus of the Injury Prevention section is on solutions developed following the ergonomic investigation of the Packaging End jobs. The solutions are presented under the headings of Workstation Design, Characteristics of Objects Being Handled, Environmental Conditions, and Work Organisation.

The Summary of Solutions table provides a quick reference guide to solutions for specific body part problems.

Please note that the information provided in the Body Manual addresses the issue of injury prevention in terms of increasing tissue tolerances through exercise. This information is not provided in the Work Manual.

Risk Control Key

Risk control measures (solutions) are commonly grouped into four categories:

E

ENGINEERING CONTROLS
These include physical changes to workstations, equipment, materials, production facilities, or any other relevant aspect of the work environment, that reduce or prevent exposure to risk factors.

A

ADMINISTRATIVE CONTROLS
These include any change in procedure that significantly limits daily exposure to risk factors, by control or manipulation of the work schedule or manner in which work is performed. Administrative controls include, but are not limited to, job rotation, rest breaks, alternative tasks, job enlargement, redesign of work methods, and adjustment of work pace or output. Some models of risk control include work practice controls within this category.

WP

WORK PRACTICE CONTROLS
These include techniques used to perform the tasks of a job, such as reaching, gripping, using tools and equipment, or discarding objects, etc. Education and training are an integral part of work practice controls.

PPE

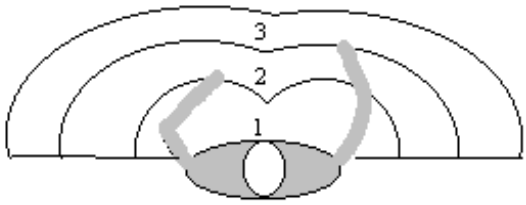
PERSONAL PROTECTIVE EQUIPMENT
These are devices worn by a worker to reduce the risk of injury, including gloves, kneepads, hearing protection, and leather aprons.

On the following pages, the icons next to the solution options indicate the type of risk control.

Workstation Design

WORKING REACHES

A working reach that is too far for the worker will require stressful shoulder, elbow, wrist, and back postures. Reaching to the side, behind, or too far in front of the body can put stress on the smaller muscles. Ideally, working reaches should be within a normal reach envelope, as laid out below, with the controls and materials that are handled most often closest to the body. It is also ideal to have controls that perform similar or combined functions grouped together to decrease awkward postures that may otherwise occur.



1 = Controls/items most frequently used
2 = Controls/items less frequently used
3 = Controls/items least frequently used

Generally, the most frequently used items should be placed within a forearm's reach, with less frequently used items placed within a comfortable arm's reach, and infrequently used items placed within a fully extended arm's reach. For more specific recommendations on working reaches, please consult anthropometric tables or an ergonomist.

Automate system to reduce reaching

E

In order to reduce awkward and repetitive neck, shoulder, and low back postures when wrapping loads, an automatic paper cutter can be used, instead of hand-held knives, to cut the paper. An automatic paper cutter can be controlled remotely, eliminating the need to reach and cut the paper. This will reduce the risk of injury in the neck/shoulder and low back region.

WORKING HEIGHTS

A working height that is too high for the worker will require stressful shoulder and arm postures, while a height that is too low will require stressful bending of the neck and trunk. The height of a work surface should allow room to change position and move the legs and feet (WCB Draft Ergonomic Regulations, 1994).

The ideal workstation is height adjustable, allowing a large percentage of the population to adjust the work surface height to suit their dimensions.

To determine the appropriate height specific for the Packaging End jobs, identify the body part of most concern. If the main concern is the:

Neck - minimise forward bending of the neck by increasing working height.
Shoulders - minimise elevation of the arms by lowering working height.
Low Back - minimise forward bending of the back by increasing working height.

For more specific guidelines on matching the working heights with the tasks performed please consult anthropometric tables or an ergonomist.

Automatic paper cutter

E

In order to reduce awkward and repetitive neck and shoulder postures when wrapping loads, an automatic paper drop system can be used to allow the operator to remain in a neutral posture and activate buttons in order to roll the paper down from the overhead storage area. This will reduce the risk of neck/shoulder injury caused by reaching overhead.

Wait for paper to drop

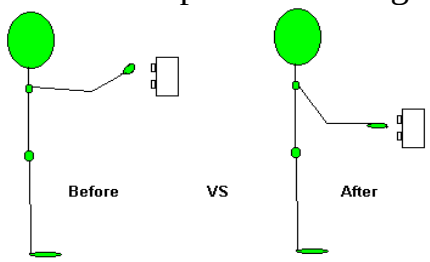
WP

In order to reduce awkward and repetitive neck and shoulder postures when wrapping loads, wait for the paper to drop from overhead rather than reaching up to grab it. This will reduce the risk of neck/shoulder injury caused by reaching overhead.

Control height and position

E

In order to reduce awkward and static shoulder postures, controls should be located between shoulder and waist height. If space permits, control panels can also be rotated to a horizontal position, as this would allow for more controls to be located at optimal working heights.



Bar code placement

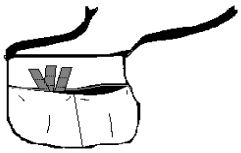
E

In order to reduce awkward, and at times static, neck and shoulder postures while scanning bar codes, position the bar codes on a slightly angled (e.g., tilted back from vertical about 10 degrees) surface around elbow height. This would allow the operator to keep the arms close to the body and the neck in a more upright position while viewing and scanning the codes, reducing the risk of injury.

Apron with pockets

WP
PPE

In order to reduce awkward postures of the low back while wrapping and stapling loads, an apron with large pockets containing the cardboard strips and tabs could be worn to help reduce the amount of bending required to retrieve strips and tabs from the storage area.



Pneumatic lift

E

In order to reduce awkward, static, and repetitive neck, neck/shoulder, elbow/wrist, wrist/hand, low back, and knee postures when wrapping/stapling, sealing, and labelling loads, a pneumatic lift could be added to the rollcase/chains. When wrapping/stapling the load, sealing the ends, and labelling, the load could be lifted up between hip and shoulder height, where the arms can remain close to the body and the back can stay straight while performing tasks. This would reduce the risk of injury to the neck/shoulder region and the low back.

Height of wash basin

E

In order to reduce awkward and static shoulder postures when washing stencils, decrease the height of the wash basin. This would decrease the lifting and lowering required to get the stencils into and out of the basin. Be aware that this change may introduce awkward postures of the low back.

Weight responsive pallet leveller

E
WP

In order to reduce awkward, and at times forceful, movements of the low back when placing dunnage, store dunnage on a weight responsive pallet leveller (e.g., one that will adjust its height in response to the weight it is bearing) near the operator. This will reduce the amount of bending required in combination with manual handling, reducing the risk of injury to the low back.

Store dunnage at waist height

E
WP

In order to reduce awkward, and at times forceful, movements of the low back when placing dunnage, store dunnage in a waist height rack near the operator. This will reduce the amount of bending required in combination with manual handling, reducing the risk of injury to the low back.

FLOOR SURFACES

Anti-fatigue matting

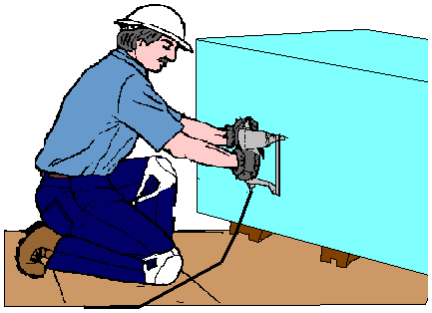
E

In order to minimise fatigue in the lower extremities and low back, anti-fatigue matting can be installed. The use of anti-fatigue matting in the work area will help to increase comfort and reduce muscle fatigue. The cushioned surface encourages continuous micro-movements of the feet, which minimises blood pooling in the feet and legs and the associated discomfort. If matting is not feasible, workers should be encouraged to use anti-fatigue/cushioning insoles in their work boots.

Knee pads or cushions

WP
PPE

In order to reduce contact stress at the knee, workers can be encouraged to wear kneepads or foam inserts in coveralls.

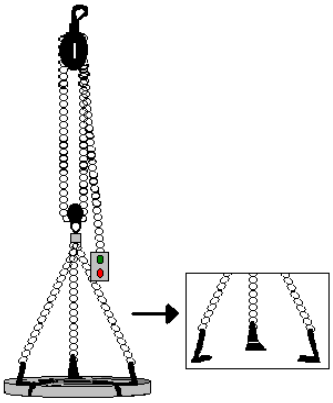


ADDITIONAL WORKSTATION DESIGN OPTIONS

Hoists for banding rolls

E
WP

In order to reduce forceful and awkward movements of the shoulder and low back when changing banding rolls, provide hoists for the banding rolls and store the spare banding rolls in close proximity to the banding machine. This will reduce the force that the shoulders and low back are experiencing during this task and thus reduce the risk of injury.



Automate banding

E

In order to reduce repetitive and awkward postures of the neck/shoulder, elbow/wrist, wrist/hand, and low back while banding, an automated or semi-automated banding system (which also places dunnage) can be chosen over manual banding. This will eliminate many of the repetitive and awkward motions associated with manual banding.

Location of spare boards

E
WP

In order to reduce forceful movements of the neck/shoulder and low back while finishing loads and re-stacking spilled loads, pile the spare boards in close proximity to the rollcases so that the worker can leverage boards onto the load rather than lift and carry boards. This will help to reduce the risk of injury to the neck/shoulder and the low back.

Use less staples

WP

In order to reduce awkward and repetitive motions of the wrist/hand, train and encourage workers to reduce the number of unnecessary staples used when wrapping a load. This would reduce the duration of finger contact and repetition of the hand/arm movements.

Staple policy

A

In order to reduce awkward and repetitive motions of the wrist/hand when wrapping loads, standard practice should be to use protective tabs behind staples for all loads. This would decrease the number of staples that are used to secure the wrapping.

Metal tabs

E

In order to reduce awkward and repetitive motions of the wrist/hand, use metal tabs to protect the loads from staples. A small magnet can be attached to the tip of the staple gun in order to eliminate the need to handle the tab.

Continual activation trigger for stapler

E

In order to reduce awkward and repetitive motions of the wrist/hand, an automatic trigger which releases staples at a pre-determined rate could be used on the pneumatic staplers. To ensure safety, staples would only be released when the trigger was engaged and the stapler was pressed against the load, similar to a nail gun. This would reduce the number of triggering motions made by the fingers and the risk of injury.

Multi-finger trigger

E

In order to reduce the force required by any one finger to activate a trigger, multi-finger trigger controls can be used on staple and paint guns. This will allow more than one finger to take the force of the trigger, thus reducing the risk for injury in any one finger.

Sticker label system

E
A

In order to reduce awkward, static, and repetitive neck/shoulder postures, a computerised sticker label system should be chosen over stapling the label to the load, or painting the label onto the load. A computerised system will print labels on sticker paper, and the labels can then be attached by peeling the backing off the label and sticking it to the load. The label will greatly reduce the repetition of stapling a paper label to the load or spraying the stencil onto the load.

Characteristics of Objects Being Handled

SIZE AND SHAPE

Paper/plastic or perforated tabs

E
A

In order to reduce awkward postures of the wrist/hand use large paper/plastic tabs, perforated paper strips of tabs or the metals tags that can attach to the end of the staple gun when wrapping loads. This will help to reduce the fine motor control required to staple the protective tabs onto the load.

LOAD CONDITION AND WEIGHT DISTRIBUTION

Keep objects close to the body

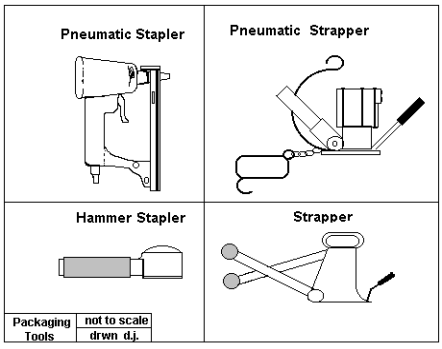
WP

In order to reduce forceful and awkward postures of the neck/shoulder and low back while lifting and carrying stencils or boards, keep the objects as close to the body as possible. This will help to reduce the strain on the neck/shoulder and the low back.

Pneumatic tools

E
WP

In order to reduce forceful and awkward movements of the elbow/wrist and wrist/hand, use pneumatic, rather than manual, staplers and strappers. This may help to reduce the risk of injury to the elbows, wrists, and hands.



Tool design

E

When purchasing tools for the packaging area, look for tools that minimise awkward postures of the wrists. Tools with the weight evenly distributed over the hand can help to reduce forceful and awkward positions of the elbow/wrists and wrist/hand.

Tool weight

E

In order to reduce the grip force required to use tools and manipulate stencils, reduce the weight of the tools and stencils as much as possible. The less the tool or stencil weighs, the less grip force required to control the tool or manipulate the stencil.

Balance tools

E

In order to reduce the force placed on the elbow/wrist and wrist/hand when lifting and using tools and stencils, place the items used most frequently on a balance or suspension system. This will reduce the weight that must be balanced by the operator's hand/arm, decreasing the risk of injury in the neck/shoulder, elbow, and wrist.

Adjustable paint gun

E

In order to reduce awkward and static neck/shoulder and elbow/wrist postures while painting labels on the loads, use paint guns with adjustable pressure settings and an adjustable diffuser. This will allow the operator to spray a greater area of the load at one time, and it will reduce the time taken to seal the ends and label the load, reducing the risk of injury in the neck/shoulder and elbow/wrist.

Extension wand

E

In order to reduce awkward shoulder and low back postures while sealing and stencilling loads, add a rigid extension wand to the discharge end of the paint gun/hose. This will allow the operator to maintain a more upright posture while sealing and stencilling loads.

CONTAINER, TOOL, AND EQUIPMENT HANDLES

Tool handles

E

In order to reduce the force required to grip hand tools, increase the friction between the tool handles and the operator's glove. Due to the smooth, slippery surface of tool handles (e.g., strapper, stapler) a Worker must use a higher grip force in order to maintain control of the tool. This can put the elbow, and possibly the wrist and hand, at risk of injury. Wrapping the tool handles with foam, rubber, medical/athletic tape, or modifying the surface using other friction increasing material (e.g., gritty paint if plastic substances are not allowed) would increase the friction between the handle and the Worker's glove, and thus decrease the grip forces required.

Close fitting gloves

PPE

In order to reduce the grip forces required by the operator, thin and close fitting gloves with a "sticky" palm surface should be provided to increase the friction between the gloves and the tool handles.

Environmental Conditions

Insulated gloves

PPE

In order to reduce loss of sensitivity in the hands in cold environments, ensure that Packaging End workers have warm, insulated gloves. Close fitting gloves that keep the hands warm are ideal, as they will interfere the least with manual tasks.

Heated compartments

E

In order to reduce loss of sensitivity in the hands when handling staple or paint guns, place these tools in a heated area/compartment when not in use. This will aid in keeping the hands warm while working in cold temperatures.

Please refer to the General Risk Factor Solutions Manual for more solutions regarding environmental conditions risk factors.

Work Organisation

Reducing the frequency and degree of awkward and static postures in the neck/shoulder, elbow/wrist, and low back is the main concern for reducing ergonomic related injuries in the Packaging End area. Evaluating task variability, job rotation, and other work organisation risk factors may reduce the exposure of the Packaging End workers to these risk factors.

Please refer to the General Risk Factor Solutions Manual for solutions regarding work organisation risk factors..

Summary of Solutions

Refer to the table below to help determine which solution alternatives will aid in addressing risk factors in the particular body parts of concern.

		Injury Prevention Potential										
SOLUTIONS	**Page**	Neck	Neck/ Shoulder	Shoulder	Elbow/aWrist	Wrist	Wrist/ Hand	Low Back	Hip	Knee	Ankle	Foot
Automate system to reduce reaching	**85**	**R A**	**R A**									
Automatic paper cutter	**86**	**R A**	**R A**									
Wait for paper to drop	**86**	**R A**	**R A**									
Control height and position	**87**		**A S**									
Bar code placement	**87**	**A S**	**A S**									
Apron with pockets	**87**							**A**				
Pneumatic lift	**87**	**R A S**	**R A S**		**R A S**		**R A S**	**R A S**				
Height of wash basin	**88**		**A S**									
Weight responsive pallet leveller	**88**							**F A**				
Store dunnage at waist height	**88**							**F A**				
Anti-fatigue matting	**88**							**S**	**S**	**S**	**S**	**S**
Knee pads or cushions	**89**									**C**		
Hoists for banding rolls	**89**		**F A**					**F A**				
Automate banding	**89**		**R A**		**R A**		**R A**	**R A**				

Direct Risk Factors

F = *Force* **R** = *Repetition* **A** = *Awkward Postures*
S = *Static Postures* **C** = *Contact Stress* **V** = *Vibration*

Summary of Solutions

Refer to the table below to help determine which solution alternatives will aid in addressing risk factors in the particular body parts of concern.

		Injury Prevention Potential										
SOLUTIONS	**Page**	Neck	Neck/ Shoulder	Shoulder	Elbow/Wrist	Wrist	Wrist/ Hand	Low Back	Hip	Knee	Ankle	Foot
Location of spare boards	**90**		**F**					**F**				
Use less staples	**90**						**A R**					
Staple policy	**90**						**A R**					
Metal tabs	**90**						**A R**					
Continual activation trigger for stapler	**90**						**A R**					
Multi-finger trigger	**90**						**F**					
Sticker label system	**91**		**R A S**									
Paper/plastic or perforated tabs	**92**						**A R**					
Keep objects close to the body	**92**		**F A**					**F A**				
Pneumatic tools	**92**				**F A**		**F A**					
Tool design	**92**				**F A**		**F A**					
Tool weight	**93**				**F**		**F**					
Balance tools	**93**				**F**		**F**					
Adjustable paint gun	**93**		**A S**		**A S**							

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Summary of Solutions

Refer to the table below to help determine which solution alternatives will aid in addressing risk factors in the particular body parts of concern.

		Injury Prevention Potential										
SOLUTIONS	**Page**	Neck	Neck/ Shoulder	Shoulder	Elbow/Wrist	Wrist	Wrist/ Hand	Low Back	Hip	Knee	Ankle	Foot
Extension wand	**93**		**A**				**A**					
Tool handles	**94**				**F**		**F**					
Close fitting gloves	**94**				**F**		**F**					
Insulated gloves	**95**				**F**		**F**					
Heated compartments	**95**				**F**		**F**					
Heat Exposure	◆	indirectly reduces risk of injury to the body										
Cold Exposure	◆	indirectly reduces risk of injury to the body										
Lighting	◆	indirectly reduces risk of injury to the body										
Noise	◆	indirectly reduces risk of injury to the body										
Vibration	◆	directly reduces risk of injury to the back and wrist										
Rest breaks	◆	indirectly reduces risk of injury to the body										
Job Rotation	◆	indirectly reduces risk of injury to the body										
Task Rotation	◆	indirectly reduces risk of injury to the body										
Work Pace	◆	indirectly reduces risk of injury to the body										
Scheduling	◆	indirectly reduces risk of injury to the body										

Direct Risk Factors

F = *Force* **R** = *Repetition* **A** = *Awkward Postures*
S = *Static Postures* **C** = *Contact Stress* **V** = *Vibration*
◆ = *See General Risk Factor Solutions Manual*

PACKAGING END MSI SAFETY GUIDE

OBJECTIVE: To identify ergonomic risks involved in Packaging loads and to reduce the potential for musculoskeletal injuries. More detailed information about risk reducing recommendations can be found in the Work Manual for the Packaging End.

CHECK IF THIS APPLIES	ACTIVITY OF RISK	DIRECT RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Neck A Packaging End worker may frequently hold their head forward, backward, or to the side in order to operate controls, wrap and staple loads, prepare labels, and/or change banding and paper rolls.	**Awkward Postures** **Static Postures** **Repetition**	• Neck muscles are required to turn the head to the side. The further the head is turned to the side, the greater the load on the muscles and tendons. • Neck muscles must support the weight of the head while in a forward bent position. The more the neck bends, the greater the load on the muscles and tendons. • When the neck is held still in an awkward position, the muscles of the neck must remain tense to support the weight of the head. With no time allowed for recovery, the constant state of tension in the neck muscles may cause fatigue. If the constant stress is sufficient, and recovery is not adequate, the tissues may fatigue to the point of injury. • When the head is repeatedly turned to the side or bent forward/backward, the muscles of the neck are subjected to repeated stress with little time for recovery. If the repetitive stress is excessive, and recovery is not adequate, the tissues can fatigue to the point of injury.	• Try to keep the head in an upright position while viewing loads. • Use the eyes and the neck (not just the neck) to look down at loads. • When the head is bent, try to keep the chin tucked in. • Avoid using earmuffs for noise protection. Choose custom-fitted ear plugs instead. • For exercises that can help prevent ***neck*** injuries, ***see the Neck section of the Body Manual***.

CHECK IF THIS APPLIES	ACTIVITY OF RISK	DIRECT RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Neck/Shoulder A Packaging End worker may frequently hold the arms away from the body in order to scan bar codes, operate controls, seal ends, stencil loads, band or strap loads, and wrap and staple loads. A Packaging End worker may lift objects to or above shoulder height in order to stencil the load, wash stencils, finish loads, re-stack spilled loads, and/or lift dunnage onto loads.	**Force** **Awkward Postures** **Static Postures** **Repetition**	• Neck and shoulder muscles support the weight of objects held in the hands. The heavier the object, the greater the load on the muscles and tendons. • Neck and shoulder muscles must support the weight of the arms when they are away from the body. The further away the arms are from the body, the greater the load on the muscles and tendons. • When the arms are repeatedly held away from the body, the muscles of the neck and shoulder must remain tense to support the weight. This constant state of tension in the neck and shoulder muscles, with no time allowed for recovery, can cause fatigue. If the constant tension is sufficient, and recovery is not adequate, then the tissue can fatigue to the point of injury. • When the arms are repeatedly lifted, the muscles of the neck and shoulder are subjected to repeated stress with little or no time for recovery. If the repetitive stress is excessive, and recovery is not adequate, the tissues may fatigue to the point of injury.	• When wrapping loads, wait for the paper to drop from the roll overhead rather than reaching up to grab it. • When changing banding and paper rolls, use any hoists that are available. • When lifting and/or carrying boards, tools, or stencils, keep the load as close to the body as possible. • Try to keep your tools close to you at your workstation for easy access. • Try to change posture frequently to reduce static postures of the shoulder. Dynamic motions are easier on the body, so move your whole shoulder when stapling or spraying the load, rather than just your wrist. • For exercises that can help prevent ***neck/shoulder*** injuries, ***see the Neck and Shoulder sections of the Body Manual.***

CHECK IF THIS APPLIES	ACTIVITY OF RISK	DIRECT RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Elbow/Wrist A Packaging End worker may grip tools or objects in order to finish a load, band/strap a load, wrap and staple a load, and when placing dunnage on a load.	**Force** **Awkward Postures** **Static Postures** **Repetition**	• Gripping an object requires activation of the forearm muscles, which generates tension at the tendon/bone connection of the elbow. The harder that an object must be gripped, the greater the load on the tendon/bone connection. • The width of an object and the position of the wrist also affect how much muscle tension needs to be generated. Bending the wrist forward or backward, or gripping an object that is too large or too small, deviates from the optimal position, and the forearm muscles have to work harder to maintain the grip. As muscles generate increased tension, tissue fatigue can occur at the tendon/bone connection. • When the hand is held still in grip position, the muscles of the forearm must remain tense to support the weight in the hand. With no time allowed for recovery, the constant state of tension in the forearm muscles may cause fatigue. If the constant stress is sufficient, and recovery is not adequate, the tissues may fatigue to the point of injury. • Repeated stress to the elbow without adequate rest could slowly fatigue tissues to the point of injury.	• When packaging a load, try to use as few staples as possible. • When using hand tools, try to alternate the hand you operate them with. • When available, try to use pneumatic tools over manual ones. • Try not to grip the staple and paint guns too hard, and set them down whenever possible. • For exercises that can help prevent ***elbow*** injuries, ***see the Elbow section of the Body Manual***.

CHECK IF THIS APPLIES	ACTIVITY OF RISK	DIRECT RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Wrist/Hand A Packaging End worker may grip and activate staple or paint guns in order to secure the wrapping, apply labels, and seal the load.	**Force** **Awkward Postures** **Static Postures** **Repetition**	• Gripping an object requires activation of the forearm muscles, which generates tension in the tendons and tendon sheaths running through the wrist. The harder an object is gripped, the greater the tension in the tendons. As tension increases, the pressure within the carpal tunnel may also increase. • As the wrist is bent, the tendon sheaths will rub up against the walls of the carpal tunnel. The further the wrist is bent, the more friction experienced in the tendon sheaths. • When the hands continually grip, the muscles of the wrist and hand must remain tense to support the weight. This constant state of tension in the wrist and hand muscles, with no time allowed for recovery, can cause fatigue. If the constant tension is sufficient, and recovery is not adequate, then the tissue can fatigue to the point of injury. • Repeated gripping and/or repeated bending of the wrist causes stress to the tendon sheaths. If the repetitive stress is excessive, and recovery is not adequate, the tendon sheaths may fatigue to the point of injury. • When the fingers are repeatedly bent in order to activate a trigger control, the tendons in the fingers can rub against other soft tissues. If the repetitions are excessive, and recovery not adequate, the tendons can become irritated and lead to injury.	• When packaging a load, try to use as few staples as possible. • When using hand tools, try to alternate the hand you operate them with. • When available, try to use pneumatic tools over manual ones. • Try not to grip the staple and paint guns too hard, and set them down whenever possible. • For exercises that can help prevent ***wrist*** and ***hand*** injuries, ***see the Wrist section of the Body Manual.***

CHECK IF THIS APPLIES	ACTIVITY OF RISK	DIRECT RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Low Back A Packaging End worker may frequently bend forward or to the side in order to finish a load, seal the ends, wrap and staple a load, and stencil a load. A Packaging End worker may lift and carry boards in order to finish a load, re-stack spilled loads, lift and carry stencils when labelling a load, and/or lift and carry banding rolls in order to change empty rolls.	**Force** **Awkward Postures** **Static Postures** **Repetition**	• Lifting increases the loading on the spine. Weight held in the hands is transmitted to the low back. The greater the weight, the greater the loading on the structures of the low back. • Back muscles must support the weight of the upper body when leaning forward or to the side. Increased bending of the back increases the loading on the spine and increases the pressure on the walls of the discs. • When the upper body is held still in a forward or side bent position, the muscles of the back must remain tense to support the weight of the upper body. With no time allowed for recovery, the constant state of tension in the back muscles may cause fatigue. If the constant stress is sufficient, and recovery is not adequate, the tissues may fatigue to the point of injury. • Repeated forward or side bending can gradually fatigue the structures of the low back. If the repetitive stress is excessive, and recovery is not adequate, the disc walls may fatigue to the point of injury.	• When lifting and/or carrying boards, tools, banding rolls, or stencils, keep the load as close to the body as possible. • When changing banding and paper rolls, use any hoists that are available. • When lifting and/or carrying boards, tools, or stencils, keep the load as close to the body as possible. • For exercises that can help prevent ***back*** injuries***, see the Back section of the Body Manual.***

CHECK IF THIS APPLIES	ACTIVITY OF RISK	DIRECT RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Knee A Packaging End worker frequently squats or kneels in order to finish a load, seal the ends of a load, stencil a load, and/or band/strap a load.	**Awkward Postures** **Static Postures** **Contact Stress** **Repetition**	• Bending the knee increases the contact stress between the knee cap and the thigh bone. Contact stress increases significantly when the knee is bent over 90 degrees. • Kneeling on a hard surface increases the contact stress between the knee cap and the thigh bone. • Repeated squatting and kneeling may gradually irritate the knee. Irritation of the knee may lead to muscle wasting, which in turn leads to poor tracking of the knee cap on the thigh bone and increased contact stress between these bones.	• When kneeling on a hard surface, wear kneepads or insert knee cushions into your overalls or pants. • For exercises that can help prevent ***knee*** injuries***, see the Knee section of the Body Manual.***
	Foot A Packaging End worker continually stands and/or walks in order to perform all tasks.		• Continual standing and/or walking may lead to discomfort in the feet.	• For exercises that may help to alleviate ***foot*** discomfort, ***see the Foot section of the Body Manual.***