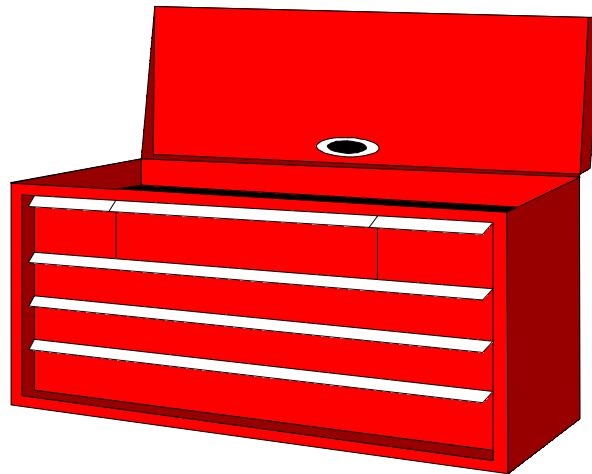


# INDUSTRIAL MUSCULOSKELETAL INJURY REDUCTION PROGRAM

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## Common Industry Jobs (CIJs) Block Piler Tool Kit



**IMIRP** program coordinated by:

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Council of  
Forest  
Industries



Industrial  
Wood & Allied  
Workers of  
Canada



Advanced  
Ergonomics  
Inc.

In cooperation with the Workers' Compensation Board of British Columbia

# BLOCK PILER TOOL KIT

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# Overview

## Block Piler

### Job Summary

A Block Piler is responsible for sorting trimmed lumber to retrieve good blocks for resale. A Block Piler inspects, sorts, and stacks blocks. A Block Piler may also trim blocks, strap loads, wrap loads, position loads for removal, clear jam-ups, and clean the work area. Refer to the Physical Demands Analysis for more detail.

### Physical Demands

The physical demands of the Block Piler may include:

- a) Forceful movements of the neck/shoulder, shoulder, elbow/wrist, wrist, and back
- b) Repetitive movements of the neck, neck/shoulder, shoulder, elbow/wrist, wrist, and back
- c) Awkward postures of the neck, neck/shoulder, shoulder, elbow/wrist, wrist, back and knee
- d) Static postures of the neck, back, and foot
- e) Vibration transmitted to the back and foot
- f) Walking around loads
- g) Sitting to sort blocks
- h) Standing to inspect, sort, and stack blocks
- i) Climbing around load and when clearing jam-ups
- j) Kneeling to strap loads
- k) Lifting blocks
- l) Pushing/pulling load backboards

### Mental Demands

A Block Piler sorts blocks for defects and by size. Decisions are made based on a specific set of criteria. Once a decision is made blocks are either discarded or stacked on a load.

## Major Variations

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

- 1) A Block Piler may:
  - a) Inspect and sort blocks
  - b) Inspect, sort, and stack blocks
  - c) Stack blocks
  - d) Rotate between sorting and stacking stations
- 2) Sorting may require a Block Piler to:
  - a) Sit
  - b) Stand
  - c) Remove blocks to a conveyor in front of the operator
  - d) Remove blocks to a conveyor behind the operator
- 3) Work pace may vary due to:
  - a) Pulling off two conveyors
  - b) Pulling off one conveyor
  - c) Wage by piecework
- 4) Stacking loads may vary by using a:
  - a) Scissors lift
  - b) Backboard
- 5) A Block Piler may position a load for pick-up by:
  - a) Operating a chain that moves a load
  - b) Removing load backboards manually

## Minor Variations

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

- 1) A Block Piler may use the following tools:
  - a) Manual strapper
  - b) Manual stapler
  - c) Pike pole
  - d) Plastic wrap dispenser

# Physical Demands Analysis

## Block Piler

### PDA General Instructions: Block Piler

This Physical Demands Analysis (PDA) identifies the physical demands of the Block Piler job as assessed by IMIRP ergonomists. The information reported was collected from a sample of Block Pilers 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 Block Piler 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.*

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# Physical Demands Analysis

## Block Piler

### Task List

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

#### **Inspect blocks**

A Block Piler visually inspects blocks for size and defects. Blocks may need to be turned to view both sides.

*Does this task occur at your mill?*

Yes       No



#### **Sort blocks**

A Block Piler sorts blocks according to quality. Depending on workstation layout either the waste blocks or the usable blocks are removed to a separate conveyor.

*Does this task occur at your mill?*

Yes       No



## Stack blocks

A Block Piler lifts good quality blocks off a conveyor onto a load.

*Does this task occur at your mill?*

Yes       No



## Trim blocks

A Block Piler may trim defects off blocks using an automatic trimmer.

*Does this task occur at your mill?*

Yes       No



## Strap loads

A Block Piler straps loads using a manual strapper.

*Does this task occur at your mill?*

Yes       No



## Wrap loads

A Block Piler may wrap loads with plastic wrap using a hand-held dispenser.

*Does this task occur at your mill?*

Yes       No



## Position loads for removal

A Block Piler moves the backboard away from loads for removal by a forklift.

*Does this task occur at your mill?*

Yes       No

OR

A Block Piler operates a chain that moves loads into position for removal by a forklift.

*Does this task occur at your mill?*

Yes       No

## Clear jam-ups

A Block Piler manually clears jam-ups on the infeed conveyors.

*Does this task occur at your mill?*

Yes       No

A Block Piler uses controls to clear jam-ups on the infeed conveyors.

*Does this task occur at your mill?*

Yes       No



## Clean work area

A Block Piler cleans up the work area by removing debris.

*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?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
If yes, check all that apply:	<input type="checkbox"/> Modified Job	<input type="checkbox"/> Modified Worksite	<input type="checkbox"/> Graduated RTW

## Work Organisation

### Task Description

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

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%	
	<i>Inspect blocks</i>			✓		<ul style="list-style-type: none"> <li>• Visually checks for size and defects</li> <li>• May turn blocks to inspect</li> <li>• Cycle time = 1 second</li> <li>• Frequency = 20 to 30 times per minute</li> </ul>
	<i>Sort blocks</i>			✓		<ul style="list-style-type: none"> <li>• Pick good blocks off conveyor to stack</li> <li>• Removes lumber to waste chutes</li> <li>• Cycle time = 1 to 2 seconds</li> <li>• Frequency = 20 to 30 times per minute</li> </ul>
	<i>Stack blocks</i>			✓		<ul style="list-style-type: none"> <li>• If two workers are present there may be rotation between sorting and stacking</li> <li>• 1 to 10 blocks are lifted at one time</li> </ul>
	<i>Trim blocks</i>	✓				<ul style="list-style-type: none"> <li>• Cycle time = 2 seconds</li> <li>• Frequency = 12 times per hour</li> </ul>
	<i>Strap loads</i>		✓			<ul style="list-style-type: none"> <li>• Cycle time = 2 to 5 minutes</li> <li>• Frequency = 3 to 13 loads per shift</li> <li>• Frequency depends on dimension of lumber</li> </ul>
	<i>Wrap loads</i>	✓				<ul style="list-style-type: none"> <li>• Cycle time = 1 to 2 minutes</li> <li>• Frequency = 3 to 13 loads per shift</li> <li>• Frequency depends on dimension of lumber</li> </ul>
	<i>Position loads for removal</i>	✓				<ul style="list-style-type: none"> <li>• Cycle time 1 to 2 minutes</li> <li>• Frequency = 3 to 13 loads per shift</li> </ul>
	<i>Clear jam-ups</i>	✓				<ul style="list-style-type: none"> <li>• Cycle time = 5 seconds to 1 minute</li> <li>• Frequency = 1 to 2 times per shift</li> </ul>
	<i>Clean work area</i>	✓				<ul style="list-style-type: none"> <li>• Varies depending on type of lumber the mill is running</li> </ul>

## Organisational Factors

The table below contains a list of organisational factors for a Block Piler. 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'.

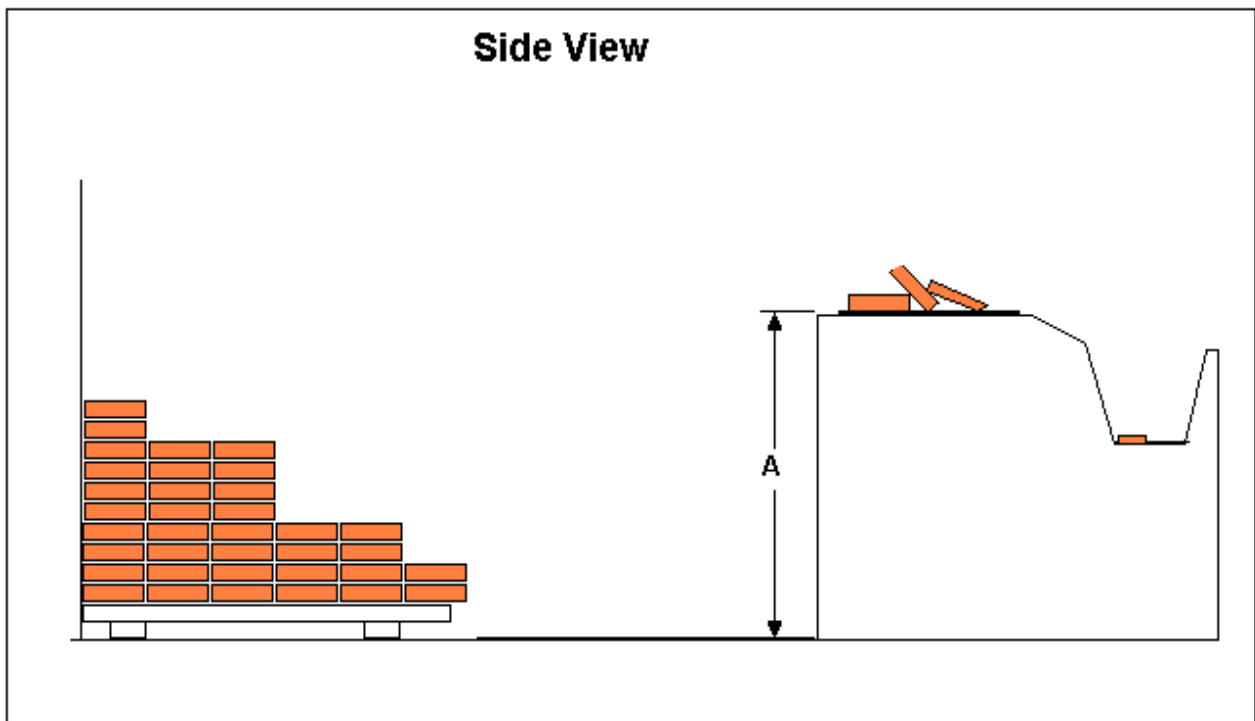
<b>Length of shift</b>	<input type="checkbox"/> <i>8 hours</i> <input type="checkbox"/>
<b>Formal breaks</b>	<input type="checkbox"/> <i>Two 10 minute breaks</i> <input type="checkbox"/> <i>30 minute lunch</i> <input type="checkbox"/>
<b>Informal breaks</b>	<input type="checkbox"/> <i>Up to 20 minutes</i> <input type="checkbox"/>
<b>Work pace</b>	<input type="checkbox"/> <i>8 to 30 blocks per minute</i> <input type="checkbox"/>
<b>Work pace control</b>	<input type="checkbox"/> <i>Machine paced</i> <input type="checkbox"/> <i>Dwell area</i> <input type="checkbox"/>
<b>Job rotation</b>  <input type="checkbox"/> Yes <input type="checkbox"/> No <i>(Check one)</i>	If <b>Yes</b> : 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) Conveyor height	cm



*Figure 1: Block Piler Workstation (right side view)*



## Equipment & Machinery Controls

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

**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
<input type="checkbox"/>	<i>Push button</i>	<ul style="list-style-type: none"> <li>• <i>Controls conveyer</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>1 to 3 times per shift</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Depending on workstation layout operator may use push button controls up to 6 times per hour</i></li> </ul>
<input type="checkbox"/>	<i>Pull cord</i>	<ul style="list-style-type: none"> <li>• <i>Controls conveyer</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>1 to 3 times per shift</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Stop/start conveyer</i></li> <li>• <i>Jog conveyer forward/reverse during jam-ups</i></li> </ul>
<input type="checkbox"/>	<i>Lever</i>	<ul style="list-style-type: none"> <li>• <i>Lockout</i></li> <li>• <i>Controls gate to conveyer</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>1 to 2 times per shift</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Usage may vary from day to day</i></li> </ul>
<input type="checkbox"/>	<i>Rotary switch</i>	<ul style="list-style-type: none"> <li>• <i>Controls scissors lift height</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>2 to 6 times per shift</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Scissors lift is operated to keep the load at an appropriate height</i></li> </ul>
<input type="checkbox"/>	<i>Foot pedal</i>	<ul style="list-style-type: none"> <li>• <i>Control conveyer</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>1 to 3 times per shift</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Jog conveyer forward/reverse during jam-ups</i></li> </ul>

## Physical Demands

### Whole Body Physical Demands

Identify each of the physical demands required by a Block Piler, 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 the physical demands.

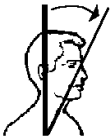

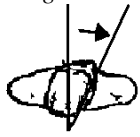
Physical Demands	Tasks or Activity	Percent of Task				Comments
		Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
Walking	• Clear jam-up		✓			• Amount varies depending on workstation layout
	• Clean work area		✓			
	• Wrap loads			✓		
	• Strap loads			✓		
Sitting	• Inspect blocks		✓			• A Block Piler may sit when at the sorting station
	• Sort blocks		✓			
Standing	• Inspect blocks				✓	• Standing includes dynamic standing within a 3 meter area
	• Sort blocks				✓	
	• Stack blocks				✓	
Climbing (stairs)	• Around workstation		✓			• Depends on workstation layout
Climbing (other)	• Clear jam-ups		✓			• Depending on location of the jam-up, operator may climb on machinery
Balancing						Not Applicable
Kneeling/ Crouching	• Strap loads • Clean work area	✓				• Depending on workstation layout


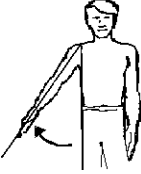

## Body Postures








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

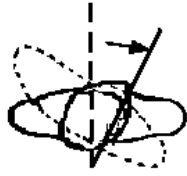

For each of the postures identified, indicate whether it occurs by placing a check mark (✓) in the far left column.

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%	
<b>Neck</b>						
Flexion 	• Inspect blocks			✓		<ul style="list-style-type: none"> <li>• Posture can be static or repetitive</li> <li>• Depends on height of load</li> </ul>
	• Sort blocks			✓		
	• Stack blocks		✓			
	• Wrap loads		✓			
Extension 						Not Applicable
Twisting 	• Inspect a block			✓		• Viewing incoming blocks
	• Sort a block			✓		• Removing and stacking blocks to a location behind operator
	• Stack a block			✓		

Body Posture	Task(s)	Percent of Task				Comments
		Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
<b>Shoulder</b>						
Flexion 	• Sort blocks			✓		• Depends on height of conveyor and worker
	• Stack blocks			✓		• Depends on height of load
	• Strap loads			✓		
	• Wrap loads			✓		
Abduction 	• Sort blocks			✓		• When standing sideways to conveyor
	• Stack blocks		✓			• Depends on work technique
	• Wrap loads			✓		
Extension 	• Sort blocks			✓		<ul style="list-style-type: none"> <li>• Depends on workstation</li> <li>• Occurs when removing blocks behind the operator</li> </ul>

Body Posture	Task(s)	Percent of Task				Comments
		Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
<b>Forearm</b>						
Rotation 	<ul style="list-style-type: none"> <li>Inspect blocks</li> </ul>			✓		<ul style="list-style-type: none"> <li>Turning blocks to view all sides</li> </ul>
	<ul style="list-style-type: none"> <li>Sort blocks</li> </ul>			✓		
<b>Wrist</b>						
Flexion 	<ul style="list-style-type: none"> <li>Sort blocks</li> </ul>			✓		<ul style="list-style-type: none"> <li>Depends on work technique</li> </ul>
	<ul style="list-style-type: none"> <li>Stack blocks</li> </ul>		✓			<ul style="list-style-type: none"> <li>When lifting many blocks at once</li> </ul>
	<ul style="list-style-type: none"> <li>Strap loads</li> </ul>		✓			<ul style="list-style-type: none"> <li>Gripping lever of strapper</li> </ul>
Extension 	<ul style="list-style-type: none"> <li>Sort blocks</li> </ul>			✓		<ul style="list-style-type: none"> <li>Turning blocks</li> </ul>
	<ul style="list-style-type: none"> <li>Stack blocks</li> </ul>		✓			<ul style="list-style-type: none"> <li>Handling blocks depends on work technique</li> </ul>
Ulnar Deviation 	<ul style="list-style-type: none"> <li>Stack blocks</li> </ul>		✓			<ul style="list-style-type: none"> <li>When stacking to the back of the load</li> </ul>
Radial Deviation 						Not Applicable
<b>Back</b>						
Flexion 	<ul style="list-style-type: none"> <li>Sort blocks</li> </ul>			✓		<ul style="list-style-type: none"> <li>Depends on height of conveyor and worker</li> </ul>
	<ul style="list-style-type: none"> <li>Stack blocks</li> </ul>		✓			<ul style="list-style-type: none"> <li>Depends on height of load</li> </ul>
	<ul style="list-style-type: none"> <li>Strap loads</li> </ul>		✓			<ul style="list-style-type: none"> <li>Placing strap under load</li> </ul>
	<ul style="list-style-type: none"> <li>Wrap loads</li> </ul>		✓			<ul style="list-style-type: none"> <li>Wrapping bottom of load</li> </ul>
	<ul style="list-style-type: none"> <li>Clean work area</li> </ul>			✓		<ul style="list-style-type: none"> <li>Depends on task</li> </ul>
Lateral Flexion 						Not Applicable





Body Posture	Task(s)	Percent of Task				Comments
		Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
<b>Back</b>						
<i>Twisting</i> 	<ul style="list-style-type: none"> <li>Sort blocks</li> </ul>		✓			<ul style="list-style-type: none"> <li>Viewing incoming blocks</li> </ul>
	<ul style="list-style-type: none"> <li>Stack blocks</li> </ul>			✓		<ul style="list-style-type: none"> <li>Depends on orientation of load to conveyor</li> </ul>
<i>Extension</i> 						Not Applicable
<b>Other:</b>						

## Hand Grips

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

**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%	
<i>Power</i> 	• <i>Strap loads</i>		✓			• <i>Holding lever of manual strapper</i>
	• <i>Clear jam-ups</i>	✓				• <i>Holding pike pole</i>
<i>Pinch</i> 	• <i>Sort blocks</i>			✓		• <i>Handling blocks</i>
	• <i>Stack blocks</i>			✓		
<i>Hook</i> 	• <i>Stack blocks</i>	✓				• <i>Modified hook grip used when carrying many blocks in a stacked orientation</i>
<i>Precision</i> 						<i>Not Applicable</i>

## 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 Block Piler.

**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).**

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 details regarding characteristics of the object handled.

Task Description	Weight (kg)	Percent of Task				Comments
		Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
<i>Lifting blocks off conveyor</i>	<i>0.6 to 1.9</i>			✓		<ul style="list-style-type: none"> <li>• <i>Weight of the blocks varies depending on the type of lumber running in the mill</i></li> <li>• <i>Blocks may be lifted as a group of 6 to 10 blocks</i></li> </ul>
<i>Pushing/pulling load backboard</i>	<i>N/A</i>	✓				<ul style="list-style-type: none"> <li>• <i>Moving backboard for load removal by forklift</i></li> <li>• <i>Force = 8.0 kg</i></li> </ul>
<i>Other:</i>						

## Hand Tools

Indicate the hand tools used by a Block Piler 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%	
<i>Manual strapper</i>	<ul style="list-style-type: none"> <li>Strap loads</li> </ul>	6.5		✓			
<i>Stapler</i>	<ul style="list-style-type: none"> <li>Wrap loads</li> </ul>	1.0 to 1.5	✓				<ul style="list-style-type: none"> <li>Used to staple plastic wrap to a load</li> </ul>
<i>Pike pole</i>	<ul style="list-style-type: none"> <li>Clear jam-up</li> </ul>	0.8 to 1.2	✓				<ul style="list-style-type: none"> <li>Usage depends on workstation layout and work technique</li> </ul>
<i>Plastic wrap dispenser</i>	<ul style="list-style-type: none"> <li>Wrap loads</li> </ul>	4.5	✓				<ul style="list-style-type: none"> <li>Usage depends on type of load</li> </ul>

## Environmental Conditions

### Work Environment

The table below contains a list of environmental conditions that may be of concern at the Block Piler 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 Block Piler. For the lighting level, include the location of the measurements within the workstation.

<b>Factor</b>	
<b>Vibration</b>  <input type="checkbox"/> Yes  <i>(Check one)</i>	<input type="checkbox"/> Whole body <input type="checkbox"/> Seat <input type="checkbox"/> Floor
<input type="checkbox"/> No	<input type="checkbox"/> Hand transmitted <input type="checkbox"/> Tool <input type="checkbox"/> Other: _____

<b>Noise level (dB)</b>	<i>Range found: 94.3 to 96.9</i>  <i>Mill specific:</i>
<b>Lighting level (lux)</b>	<i>Range found: 160 to 810 (on conveyor)</i>  <i>Mill specific:</i>
<b>Temperature (°C)</b>	<i>See Regional Temperatures on next page</i>

## 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	
<input type="checkbox"/>	Outside uncovered
<input type="checkbox"/>	Outside covered
<input type="checkbox"/>	Inside enclosed
<input type="checkbox"/>	Inside exposed
<input type="checkbox"/>	Heater present
<input type="checkbox"/>	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.
<input type="checkbox"/> Vancouver Island	22.5 °C	-0.6 °C	36.1 °C	-18.8 °C
<input type="checkbox"/> Southwestern BC	22.9 °C	0.4 °C	35.6 °C	-18.3 °C
<input type="checkbox"/> Cariboo Chilcotin Coast	22.2 °C	-11.6 °C	36.4 °C	-42.5 °C
<input type="checkbox"/> High Country	26.3 °C	-9.9 °C	39.6 °C	-39.7 °C
<input type="checkbox"/> Okanagan Similkameen	26.5 °C	-8.4 °C	36.0 °C	-36.3 °C
<input type="checkbox"/> Kootenay Country	26.2 °C	-6.7 °C	38.5 °C	-32.0 °C
<input type="checkbox"/> British Columbia Rockies	24.7 °C	-12.3 °C	37.5 °C	-42.2 °C
<input type="checkbox"/> North by Northwest	19.5 °C	-11.7 °C	32.9 °C	-38.1 °C
<input type="checkbox"/> 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 Block Piler 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.

$$[(\text{Dimensions of wood}) \times 12] / 144 = \text{Multiple}$$

**For example:** For a 5 by 5 piece of wood  $[(5 \times 5) \times 12] / 144 = 2.08$

### 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
8 foot		14 foot	20 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.

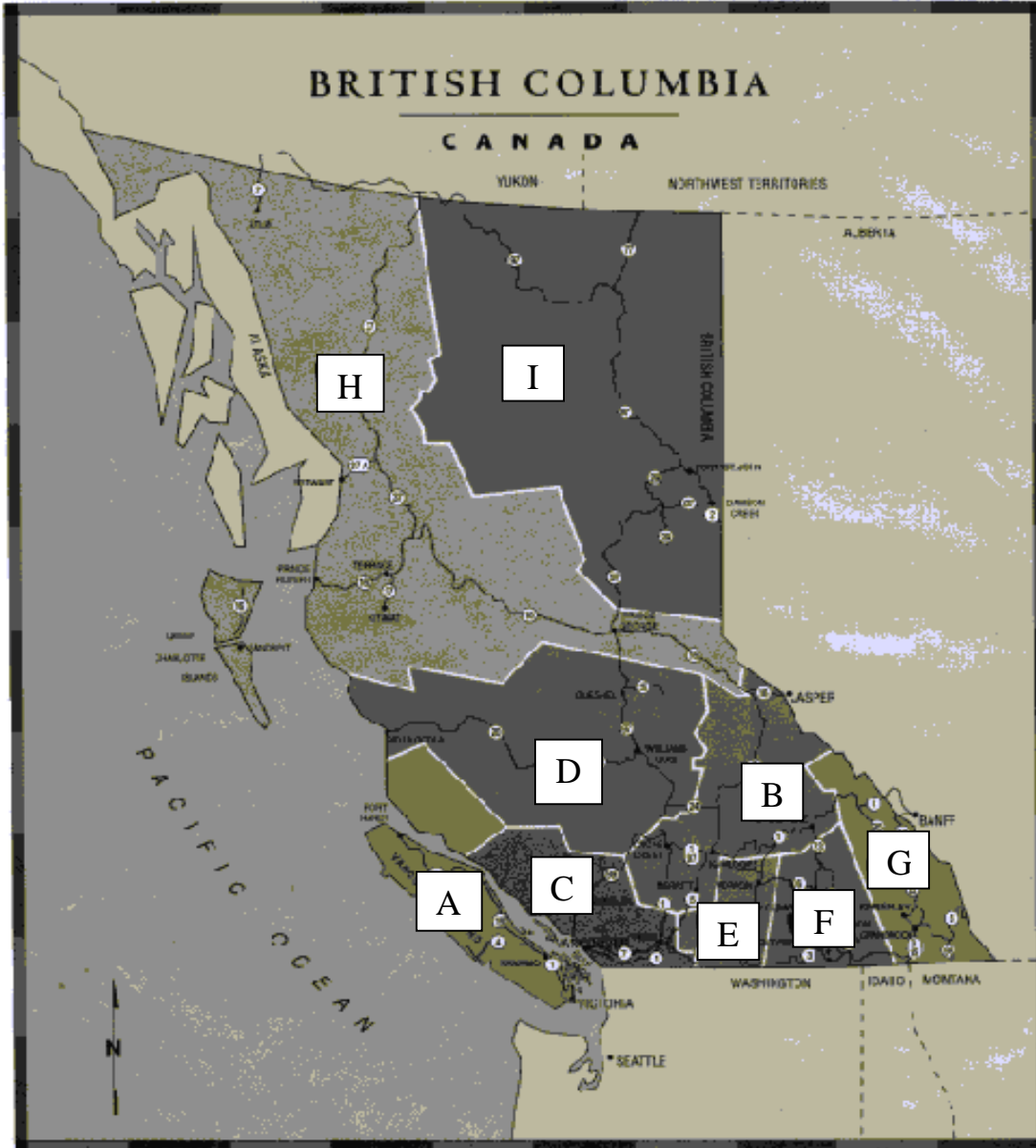
For the lightest species handled, enter the lb./board foot value, the multiple for the smallest size of wood, and the shortest length of this wood. Multiply these values together to determine the weight of the board in pounds.

*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) <i>From Section 1</i>	x	Multiple (size of wood) <i>From Section 2</i>	x	Length of Wood <i>From Section 3</i>	=	Weight of the Board in pounds	Divide by 2.2 to calculate value in kilograms
<b>Heaviest Species Handled</b>	x		x		=		
<b>Most Common Species Handled</b>	x		x		=		
<b>Lightest Species Handled</b>	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

## Block Piler

### Purpose

The Risk Factor Identification Checklist for a Block Piler 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 – Block Piler

Management Representative \_\_\_\_\_

Risk Identification completed:

Worker Representative \_\_\_\_\_

Before implementation of solutions

Date \_\_\_\_\_

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.

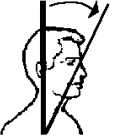
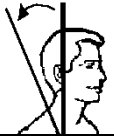
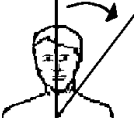
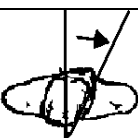
**Static Postures:** Static loading (sustained exertions) is physical effort (body postures) that is held, requiring muscle contraction for more than a short time.

**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.

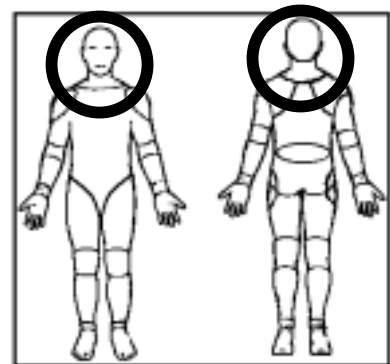
**Awkward Postures:** Awkward postures occur when there is a deviation from a power working posture. Some examples of awkward postures typically include reaching behind, twisting, working overhead, and forward or backward bending.

**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)			S	
			O	
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., inspecting blocks)			S	
			O	
Static Posture				
Ask the worker: Do tasks require your neck or shoulders to be maintained in a fixed or static posture? (e.g., looking down at blocks)			S	
			O	
Awkward Posture				
Flexion			S	
			O	
Extension			S	
			O	
Lateral Bending			S	
			O	
Rotation			S	
			O	



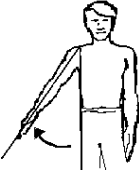
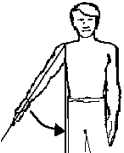
Please indicate whether the following direct risk factors were identified at the <b>NECK</b> .		
Direct Risk Factors	Repetition	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Static Posture	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Awkward Posture	<input type="checkbox"/> Yes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



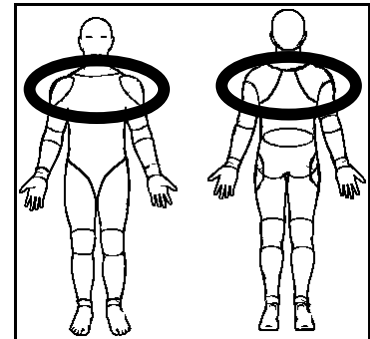
Body parts within the circled area will be classified as **NECK** issues.

## SHOULDER

<b>Force</b>	<b>N</b>	<b>Y</b>	<b>Comments:</b>
Is forceful physical handling performed? Such as: Lifting		S O	
Lowering		S O	
Pushing		S O	
Pulling		S O	
Carrying		S O	
<b>Repetition</b>			
Are identical or similar motions performed over and over again? (e.g., turning blocks)		S O	
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., stacking blocks)		S O	
<b>Static Posture</b>			
Ask the worker: Do tasks require your shoulders to be maintained in a fixed or static posture? (e.g., strapping loads)		S O	
Ask the worker: Do you hold parts, tools, or objects for long periods?		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 <b>SHOULDER</b> .		
<b>Direct Risk Factors</b>	Force	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Repetition	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Static Posture	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Awkward Posture	<input type="checkbox"/> Yes <input type="checkbox"/> No
In the <b>Injury Statistics</b> investigation, were there injury reports for the Shoulder or Neck or Upper Back? (see Worksheet 1 in the Implementation Guide)		<input type="checkbox"/> Yes <input type="checkbox"/> No
In the <b>Discomfort Survey</b> investigation, were there reports of discomfort for the Shoulder or Neck or Upper Back? (see Worksheet 2 in the Implementation Guide)		<input type="checkbox"/> Yes <input type="checkbox"/> No



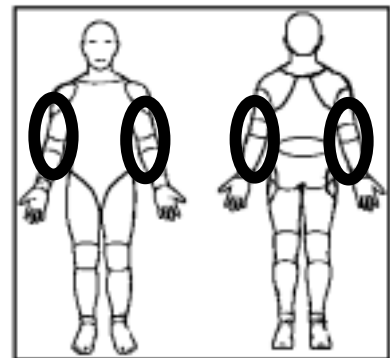
*Body parts within the circled area will be classified as SHOULDER issues.*

## ELBOW

Force		N	Y	Comments:
Is forceful physical handling performed? Such as:				S
Lifting				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., manual strapper)				S
				O
Are objects handled in a pinch grip? (e.g., blocks)				S
				O
Are objects handled in a hook grip? (e.g., carrying manual strapper)				S
				O
Ask the worker: Do you wear gloves while performing your job? If the answer is <b>No</b> , check the <b>No</b> box and go to next section.			*	S
				O
*If the answer to the above question is <b>Yes</b> , 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., turning blocks)				S
				O
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., stacking blocks)				S
				O




<b>Static Posture</b>		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?			S O	
<b>Contact Stress</b>				
Ask the worker: Do <b>any</b> objects, tools or parts of the workstation put pressure on <b>any</b> 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	
<b>Vibration</b>				
Ask the worker: Is vibration transmitted to your hand through a tool or piece of equipment?			S O	





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



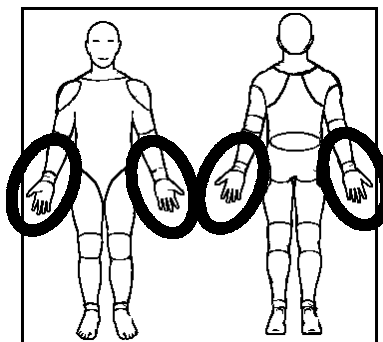
*Body parts within the circled area will be classified as ELBOW issues.*

## WRIST/HAND

Force		N	Y	Comments:
Is forceful physical handling performed? Such as:			S	
Lifting			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., manual strapper)			S	
			O	
Are objects handled in a pinch grip? (e.g., blocks)			S	
			O	
Are objects handled in a hook grip? (e.g., carrying manual strapper)			S	
			O	
Ask the worker: Do you wear gloves while performing your job? If the answer is <b>No</b> , check the <b>No</b> box and go to next section.			*	S
				O
*If the answer to the above question is <b>Yes</b> , 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., turning blocks)				S
				O
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., stacking blocks)				S
				O

<b>Static Posture</b>		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	
<b>Contact Stress</b>					
Ask the worker: Do <b>any</b> objects, tools or parts of the workstation put pressure on <b>any</b> 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?				S	
				O	
<b>Awkward Posture</b>					
Flexion				S	
				O	
Extension				S	
				O	
Ulnar Deviation				S	
				O	
Radial Deviation				S	
				O	
<b>Vibration</b>					
Ask the worker: Is vibration transmitted to your hand through a tool or piece of equipment?				S	
				O	





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



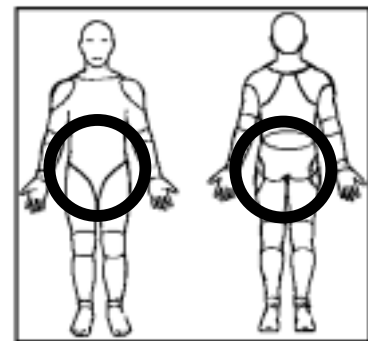
*Body parts within the circled area will be classified as WRIST issues.*

## LOW BACK OR HIP/THIGH

Force	N	Y	Comments:
Is forceful physical handling performed? Such as:			S
Lifting			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., stacking blocks)			S
			O
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., stacking blocks)			S
			O
Static Posture			
Ask the worker: Do tasks require your trunk and upper body to be maintained 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
Contact Stress			
Ask the worker: Do <b>any</b> objects, tools or parts of the workstation put pressure on <b>any</b> parts of your hip/thigh? (e.g., workstation that digs into the hip or thigh)			S
			O


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

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

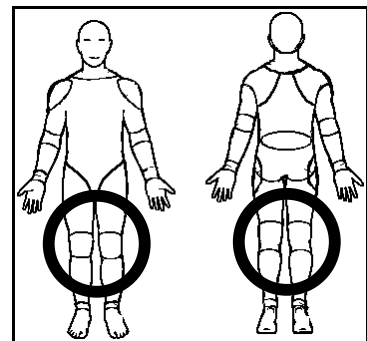


*Body parts within the circled area will be classified as LOW BACK issues.*

# 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? (e.g., kneeling)			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 <b>any</b> 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 <b>KNEE</b> .		
<b>Direct Risk Factors</b>	Repetition	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Static Posture	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Contact Stress	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Awkward Posture	<input type="checkbox"/> Yes <input type="checkbox"/> No
In the <b>Injury Statistics</b> investigation, were there injury reports for the Knee or Hip/Thigh? (see Worksheet 1 in the Implementation Guide)		<input type="checkbox"/> Yes <input type="checkbox"/> No
In the <b>Discomfort Survey</b> investigation, were there reports of discomfort for the Knee or Hip/Thigh? (see Worksheet 2 in the Implementation Guide)		<input type="checkbox"/> Yes <input type="checkbox"/> No

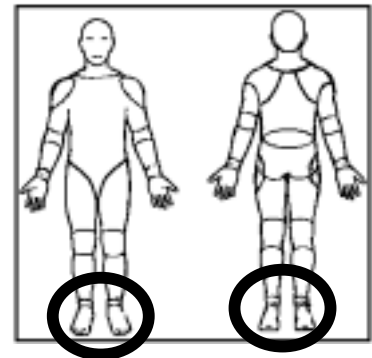


Body parts within the circled area will be classified as KNEE issues.

## 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 <b>ANKLE/FOOT</b> .		
<b>Direct Risk Factors</b>	Repetition	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Static Posture	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Awkward Posture	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Vibration	<input type="checkbox"/> Yes <input type="checkbox"/> No
In the <b>Injury Statistics</b> investigation, were there injury reports for the Ankle or Foot? (see Worksheet 1 in the Implementation Guide)		<input type="checkbox"/> Yes <input type="checkbox"/> No
In the <b>Discomfort Survey</b> investigation, were there reports of discomfort for the Ankle or Foot? (see Worksheet 2 in the Implementation Guide)		<input type="checkbox"/> Yes <input type="checkbox"/> 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?			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?			S O
Are handles for tools and equipment inappropriate in terms of size or shape? (e.g., manual strapper)			S O
Ask the worker: Do any objects that you work with (other than tools or equipment) have handles? If the answer is <b>No</b> , check the <b>No</b> box and go to the next section.			S O
If the answer to the above question is <b>Yes</b> , ask the worker: Are the handles an inappropriate size or shape for the characteristics of the object?			S O

## ENVIRONMENTAL CONDITIONS

<b>Temperature</b>			
Ask the worker: Are your hands or arms exposed to cold from exhaust air, cold liquids or solids?			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
<b>Lighting</b>			
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**



# **Block Piler**

This Work Manual contains information about the body parts found to be at risk of musculoskeletal injury (MSI) for the Block Piler job (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.

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## Work Manual

# Block Piler

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### **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 Supervisors 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.*

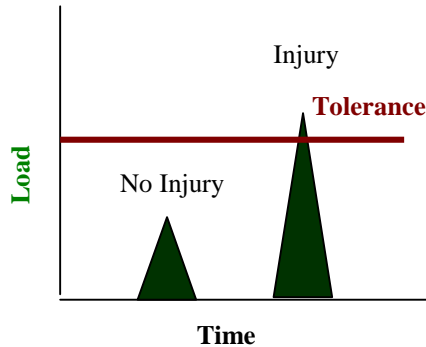
*Neither AEI nor the IMIRP Society accepts any responsibility for the use or misuse of these documents.*

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# Injury Education

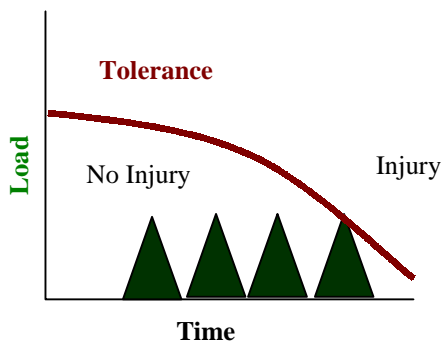
*Injuries occur when ...  
Loads exceed tissue tolerances*



## ***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.

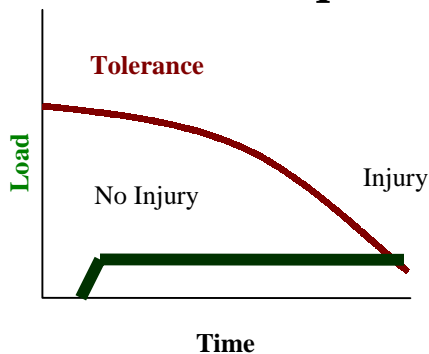
***Example – a worker going over on their ankle and spraining it.***



## ***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 Block Piler 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 a Block Piler. 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  
Repetition  
Static Postures



**A Block Piler may hold their head forward in order to inspect and sort the blocks.**



**A Block Piler may repeatedly look down and to the side in order to inspect, sort, and stack the blocks.**

## 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 and side bent position. The more the neck bends, the greater the load on the muscles and tendons.

### *Repetition*

- When the head is repeatedly turned to the side or bent forward, 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.

### ***Static Postures***

- When the neck is held still in a forward 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.

## **INDIRECT RISK FACTORS**

### ***Workstation Design***

#### **Working Heights**

- Loading on the neck muscles is increased because the head is held in a forward bent position when inspecting and sorting blocks.
- Loading on the neck muscles is increased due to the orientation of the worker with respect to the conveyor and load. An 180<sup>0</sup> orientation requires the operator to repeatedly twist the neck in order to pull blocks off a conveyor and stack them directly behind on a load.

### ***Environmental Factors***

#### **Lighting**

- Low lighting levels may cause Block Pilers to adopt awkward postures while inspecting and sorting blocks.

## **CONSEQUENCES**

- When the head is held in a forward bent, side bent, or twisted 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 89 & 90.
- For exercises that can help to prevent *neck* injuries, see the *Neck section of the Body Manual*.

## NECK/SHOULDER

### Direct Risk Factors:

Force  
Awkward Postures  
Repetition



**A Block Piler may lift blocks off a conveyor to sort and stack them.**



**A Block Piler frequently works with the arms away from the body in order to sort and stack blocks and strap loads.**

### BACKGROUND INFORMATION

- The neck and shoulder 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 and/or greater the downward pulling force, 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 blocks, 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**

- Working with the arms at or above shoulder level can put the operator at risk for shoulder and neck tissue injuries.

#### **Size and Shape**

- Lifting many blocks at one time increases the amount of force on the shoulder.

## **CONSEQUENCES**

- Forceful and repeated lifting of blocks can lead to neck and/or shoulder strain.
- 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/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 89 & 90.
- To help prevent *neck* discomfort, see the upper trapezius stretch in the *Neck section of the Body Manual*. To help prevent *shoulder* discomfort, *see the Shoulder section of the Body Manual*.

## SHOULDER

### Direct Risk Factors:

Force  
Awkward Postures  
Repetition



**A Block Piler may push and pull on the manual strapper lever with the arm above shoulder height in order to strap a load.**

**A Block Piler may reach across the conveyor to pick up blocks.**

## BACKGROUND INFORMATION

- The shoulder joint is designed for mobility. The joint is held together by muscles and soft tissues. The larger muscle groups around the shoulder are responsible for producing movement (e.g., deltoids). The deeper muscles stabilise the shoulder joint as well as produce movement. These deeper muscles and their tendons are referred to as the rotator cuff.

## DIRECT RISK FACTORS

### *Force*

- The rotator cuff stabilises the shoulder joint when objects are pushed and pulled. The larger the force required, the greater the load on the rotator cuff.
- If the force placed on the rotator cuff exceeds the tissue tolerances, injury may occur.

### *Awkward Postures*

- The rotator cuff stabilises the shoulder joint when the arms are away from the body. The farther away the arms are from the body, the greater the load on the rotator cuff.

### *Repetition*

- When the arms are repeatedly raised, the rotator cuff is subjected to repeated stress with little 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 Heights**

- Working with the arms at or above shoulder level can put the operator at risk for shoulder and neck tissue injuries.

#### **Working Reaches**

- Working with the arms away from the body puts a greater load on the shoulder therefore, increasing the risk of shoulder injuries.

## CONSEQUENCES

- When using the arms to push and pull on a lever, the rotator cuff may fatigue. Fatigue leads to an accumulation of waste products and/or a decrease in the ability to tolerate additional stress.
- Stressing a fatigued shoulder may lead to degeneration or injury in the rotator cuff muscles of the shoulder joint.
- Signs and symptoms include pain, tenderness, and decreased range of motion and strength in the shoulder joint.

## SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Shoulder, please see the column labelled “Shoulder” in the Summary of Solutions on pages 89 & 90.
- For exercises that can help to prevent *shoulder* injuries, see the *Shoulder section of the Body Manual*.

## ELBOW/WRIST

### Direct Risk Factors:

Force  
Awkward Postures  
Repetition



**A Block Piler may grip blocks in order to stack them onto a load.**



**A Block Piler may also grip the lever of the manual strapper to strap 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.

### ***Repetition***

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

## **INDIRECT RISK FACTORS**

### ***Characteristics of Objects Being Handled***

#### **Size and Shape**

- Gripping many blocks (in a stacked configuration) at one time requires larger grip forces. A number of blocks held at one time can spread the operator's grip outside of the power range, requiring more force to maintain the grasp.
- Grasping many blocks (in a row configuration) at once requires the operator to apply force to avoid the middle blocks from dropping, this increases the load on the elbow joint.

#### **Container, Tool, and Equipment Handles**

- Grip forces are increased when the size of the strapper handle is too large or too small for the operator's hand. Increased force leads to an increased risk of injury.
- Tools with grips poorly designed for their tasks can lead to awkward wrist postures and increased contact stress.

## **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, see the column labelled "Elbow/Wrist" in the Summary of Solutions on pages 89 & 90.
- For exercises that can help to prevent *elbow/wrist* injuries, see the ***Elbow and Wrist sections of the Body Manual.***

# WRIST

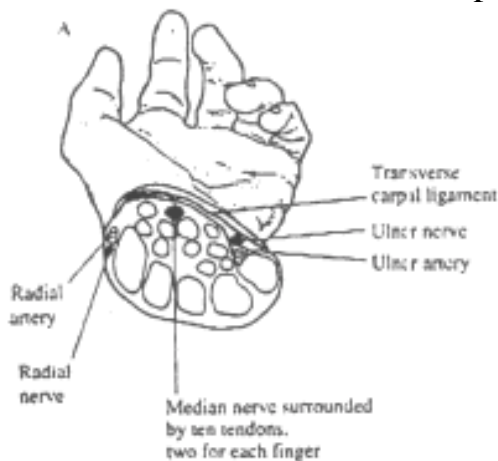
**Direct Risk Factors:**  
Force  
Awkward Postures  
Repetition



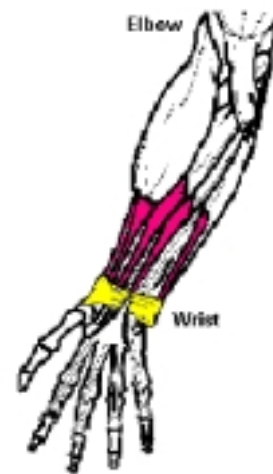
**A Block Piler may grip blocks with the wrist bent in order to turn and/or stack the blocks.**

## 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 further the wrist is bent, the more friction experienced in the tendon sheaths.

### ***Repetition***

- Repeated gripping 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.

## **INDIRECT RISK FACTORS**

### ***Workstation Design***

#### **Work Heights**

- Using the manual strapper above shoulder height can cause awkward postures of the wrist.

### ***Characteristics of Objects Being Handled***

#### **Size and Shape**

- Gripping many blocks at one time requires larger grip forces. A number of blocks held at one time can spread the operator's grip outside of the power range, requiring more force to maintain the grasp.
- The size and shape of the blocks may also require the operator to extend and/or ulnar deviate his wrists when carrying/stacking the blocks.

## **CONSEQUENCES**

- Repeatedly gripping objects with the wrist bent may lead to irritation and damage in the tendon sheaths.
- Signs and symptoms include pain, tenderness, and inflammation in the wrist area.

## **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 89 & 90.
- To prevent injuries by increasing tissue tolerances, ***refer to the Wrist section of the Body Manual***. Strengthening exercises should be used by new employees or employees who have been off work for extended periods.

# LOW BACK

**Direct Risk Factors:**  
Force  
Awkward Postures  
Repetition



**A Block Piler may bend forward and/or twist to stack blocks on a load.**

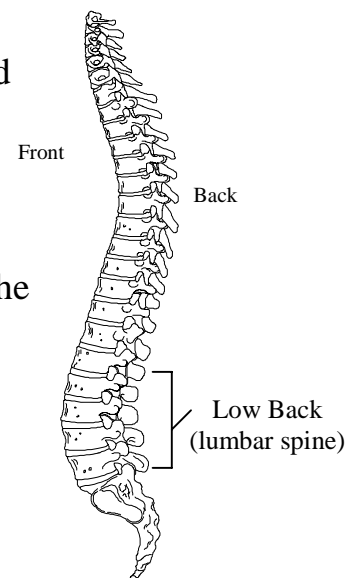


**A Block Piler may also bend forward when reaching for blocks on the far side of the conveyor or placing blocks on the back of a load.**

## 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

### *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. Increased bending of the back increases the loading on the spine and increases the pressure on the walls of the discs.

### ***Repetition***

- Repeated forward and lifting 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**

- Placing blocks on the back of the load forces a Block Piler to adopt awkward back postures.
- Depending on the design of the conveyor system, blocks may need to be picked up off the far side of the conveyor, increasing the reach distance.

#### **Working Heights**

- Inappropriate working heights, when stacking at the start of the load, can force workers to do more bending, leading to an increased risk of low back injury.

#### **Floor Surfaces**

- Floor surfaces that are uneven or too hard can cause low back discomfort or injury.

### ***Additional Workstation Design***

- Workstation layout can cause increased back twisting. Orientation of the conveyor to the loads should be considered to reduce back twisting.

## **CONSEQUENCES**

- Repeatedly bending forward 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 89 & 90.
- For exercises that can help to prevent **back** injuries, see the ***Back section of the Body Manual.***

## LOW BACK (Sitting)

**Direct Risk Factors:**  
Awkward & Static Postures  
Vibration

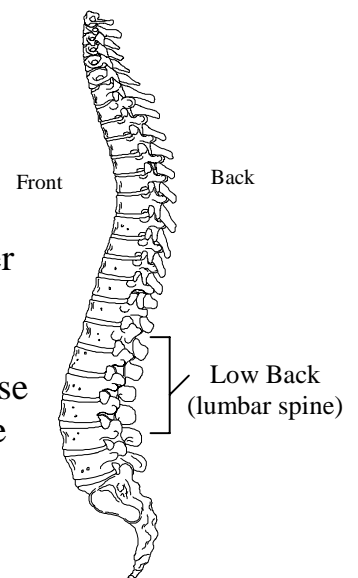


**A Block Piler may sit on a vibrating surface while sorting blocks.**

### 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. Sitting will cause the pelvis to rotate out of a neutral posture, as the lumbar spine will flatten.

*Neutral Spine*



### DIRECT RISK FACTORS

#### *Awkward & Static Postures*

- Sitting increases the loading on the walls of the discs. If the duration of sitting is excessive, and the recovery is not adequate (e.g., spine not returned to neutral posture), the tissues may deform to the point of injury.

## ***Vibration***

- Whole body vibration is usually transmitted through the seat into the low back. Exposure to whole body vibration introduces a unique mechanical stress to the structures of the spine that can significantly increase the loading on the low back. Prolonged sitting on a vibrating surface may contribute to the gradual weakening of the lumbar discs.

## **INDIRECT RISK FACTORS**

### ***Workstation Design***

#### **Seating**

- Manually handling boards from a seated posture can increase the strain on the back and upper body.

## **CONSEQUENCES**

- Continually sitting on a vibrating surface may lead to deformation in the disc walls and accelerated degeneration of the tissues.
- Signs and symptoms 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 89 & 90.
- For exercises that can help to prevent *back* injuries, see the ***Back section of the Body Manual.***

# KNEE

**Direct Risk Factors:**  
Awkward Postures  
Contact Stress



**A Block Piler frequently squats and/or kneels to manually 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 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.

## **INDIRECT RISK FACTORS**

### ***Workstation Design***

#### **Working Heights**

- Low working heights lead to more work being done from a kneeling posture, increasing the risk of knee injury.

#### **Floor Surfaces**

- Hard and uneven floor surfaces increase the contact stress in the knee during kneeling and may also increase the impact load on the knee joints when walking is involved in the task.

## **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 89 & 90.
- To prevent injuries by increasing tissue tolerance, refer to the ***Knee section of the Body Manual***. Strengthening exercises should be used by new employees or employees who have been off work for extended periods.

# FOOT

**Direct Risk Factors:**  
Static Postures  
Vibration



**A Block Piler may stand on a hard, vibrating surface when inspecting, sorting, and stacking blocks.**

## BACKGROUND INFORMATION

- There are a number of small muscles in the base of the foot, as well as a tough band that attaches to the heel bone and runs down towards the toes. This band is called the plantar fascia, and is responsible for producing the arch in our feet.

## DIRECT RISK FACTORS

### *Static Postures*

- While standing, the weight of the body loads the plantar fascia. If the duration of standing is excessive, and recovery is not adequate, the fascia may deform to the point of injury.

### *Vibration (whole body)*

- Vibrating floors can increase the loading on the foot. Factors like vibration level and vibration frequency increase the amount of loading on the foot, and could lead to irritation. The longer the Block Piler is exposed to vibration, the greater the risk of injury.

## INDIRECT RISK FACTORS

### *Workstation Design*

#### **Additional Workstation Design**

- Platforms that are not isolated from machinery produce more vibration.
- Floor surfaces that are uneven or too hard can cause discomfort in the feet.

## CONSEQUENCES

- Continual standing may cause damage to the plantar fascia.
- Signs and symptoms include pain and stiffness at the base of the heel, initially in the morning. As problems progress the pain may become chronic.

## SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Foot, please see the column labelled “Ankle/Foot” in the Summary of Solutions on pages 89 & 90.
- To prevent injuries by increasing tissue tolerance, refer to the ***Foot section of the Body Manual***. Strengthening exercises should be used by new employees or employees who have been off work for extended periods.

# Summary of Body Parts at Risk

## NECK

- A Block Piler may hold their head forward in order to inspect and sort the blocks.
- A Block Piler may repeatedly look down and to the side in order to inspect, sort, and stack the blocks.



## NECK/SHOULDER

- A Block Piler may lift blocks off a conveyor to sort and stack them.
- A Block Piler frequently works with the arms away from the body in order to sort and stack blocks and strap loads.



## SHOULDER

- A Block Piler may push and pull on the manual strapper lever with the arm above shoulder height in order to strap a load.
- A Block Piler may reach across the conveyor to pick-up blocks.



## ELBOW/WRIST

- A Block Piler may grip blocks in order to stack them onto a load.
- A Block Piler may also grip the lever of the manual strapper to strap a load.



## WRIST

- A Block Piler may grip blocks with the wrists bent in order to turn and/or stack the blocks.



## LOW BACK

- A Block Piler may bend forward and/or twist to stack blocks on a load.
- A Block Piler may also bend forward when reaching for blocks on the far side of the conveyor or placing blocks on the back of a load.
- A Block Piler may sit on a vibrating surface while sorting blocks.



## KNEE

- A Block Piler frequently squats and/or kneels to manually strap a load.



## FOOT

- A Block Piler may stand on a hard, vibrating surface when inspecting, sorting and stacking blocks.



# 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
<b>Duration**</b>	Duration	✓	✓	✓	✓		✓		✓		✓
<b>Workstation Design</b>	Working Reaches			✓			✓				
	Working Heights	✓	✓	✓		✓	✓		✓		
	Seating						✓				
	Floor Surfaces						✓		✓		✓
<b>Characteristics of Objects Being Handled</b>	Size and Shape		✓		✓	✓					
	Load Condition and Weight Distribution										
	Container, Tool and Equipment Handles				✓						
<b>Environmental Conditions</b>	Heat Exposure	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
	Cold Exposure	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
	Lighting	✓	♦	♦	♦	♦	♦	♦	♦	♦	♦
	Noise	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
	Vibration*	♦	♦	♦	♦	♦	♦	♦	♦	♦	✓
<b>Work Organisation</b>	Work-Recovery Cycles	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
	Task Variability	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
	Work Rate	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦

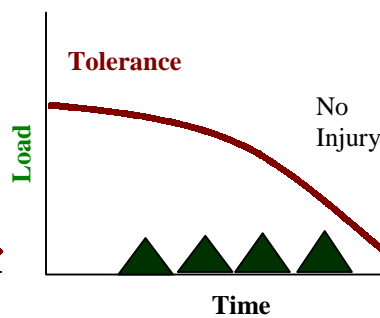
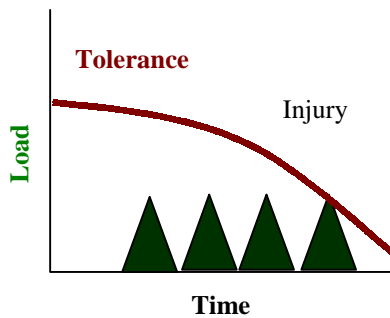
\* Vibration is categorised under both direct and indirect risk factors. Vibration can directly increase the likelihood of injury to the back and wrist as well as indirectly (environmental conditions) promote injuries in other parts of the body.

\*\* Extended exposure to any 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 89 & 90 for specific problem/solution information. Additional information on some risk factors can be found in the General Risk Factor Solutions Manual.

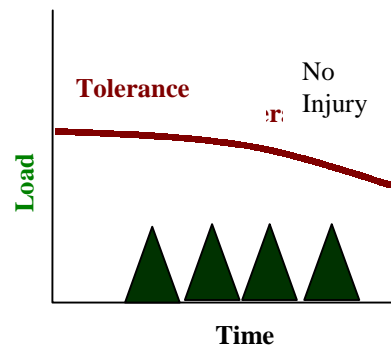
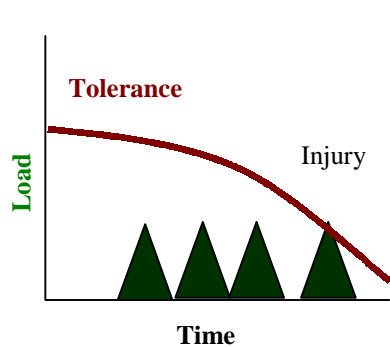
# Injury Prevention

*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 Block Piler job. 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**

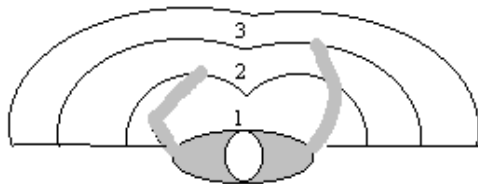
These are devices worn by a worker to reduce the risk of injury, including gloves, kneepads, hearing protection, and leather aprons.

**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.

### *Diverter*

**E** In order to reduce the need to reach across the width of a conveyor to grab blocks, subsequently reducing the force, repetition, and awkward postures at the shoulder, wrists, and back, a diverter could be installed to push the blocks closer to the Block Piler. Investigation into the design of the diverter is necessary, to ensure that blocks are pushed closer to the Block Piler without increasing the number of jam-ups.

### *Width of conveyor*

**E** In order to reduce the amount of reaching needed to grab blocks off the far side of the conveyor, reducing the force, repetition, and awkward postures at the shoulder, wrists, and back, a narrower conveyor could be used. Consider the size of the blocks when deciding on the appropriate width of the conveyor.

### ***Build from the back of the load***

WP

In order to reduce the amount of reaching necessary to place blocks on the back of the load, an operator should build the back of the load first. This will allow the operator to get closer and reduce the amount of reaching needed.

### ***Location of controls***

E

To reduce the amount of reaching when operating controls (thus reducing awkward postures of the shoulder and wrist), the location of the controls should be between shoulder and waist height.

## 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 Block Piler, 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.

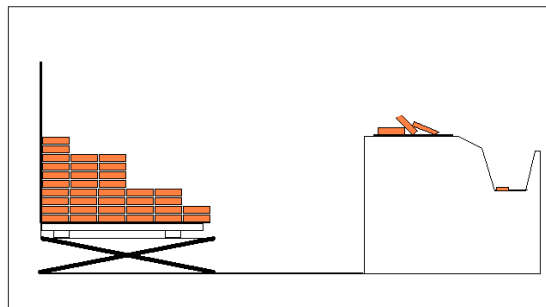
**Low Back** - minimise forward bending of the back by increasing working height.

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

### *Scissors lift*

E

In order to decrease forceful and awkward postures, the conveyor and load should be located between shoulder and waist height. The use of a scissors lift under the load can position the load at the appropriate height.



### *Adjustable platform*

E

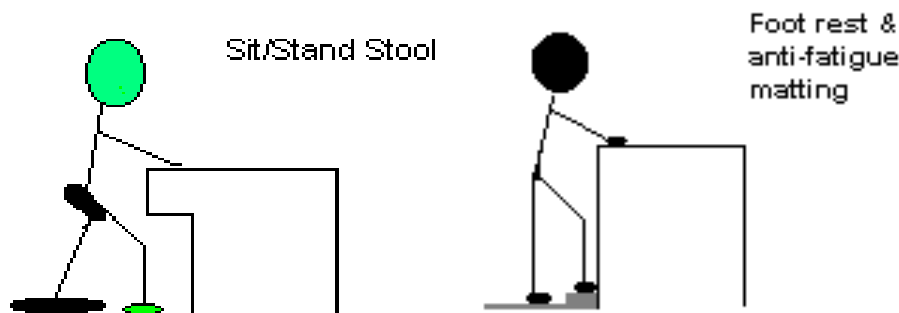
Building an adjustable platform at the workstation for the worker to stand on will allow different Block Pilers to work at the appropriate height.

## SEATING

### *Sit/stand stool*

E  
WP

In order to minimise fatigue in the lower extremities, sit/stand stools can be provided. Sit/stand stools are preferred over regular stools, as the design makes it easier to alternate between sitting and standing, and allows the larger muscles of the lower extremities to be recruited when handling objects. If sit/stand stools are not possible, foot rests or foot rails can be provided to encourage frequent changes in posture. A sit/stand stool should only be used at the sorting station.



## FLOOR SURFACES

### *Anti-fatigue matting*

E

In order to minimise fatigue in the lower extremities, 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. Addition of anti-fatigue matting may also aid in damping vibration levels.

## ADDITIONAL WORKSTATION DESIGN OPTIONS

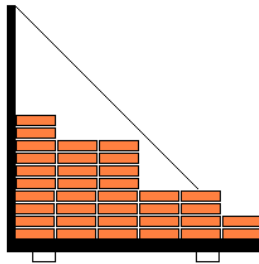
### *Moveable slide*

- E**  
**WP** A slide may be used to connect the infeed conveyor with the outfeed conveyor for sorting blocks. The use of a moveable slide at the sorting station will reduce repetitive and awkward movements of the shoulder. The slide can be moved to either side of the operator to allow the worker to use either side of the body.



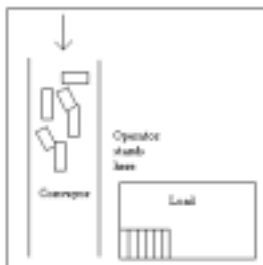
### *Load backboards*

- E** Provide load backboards that can be easily moved out of the way when the load is finished. Backboards provide a guide for stacking blocks, which decreases the accuracy needed for load placement.



### *Position the load*

- E**  
**WP** If the workstation layout permits, position the load so that it is at a 90 degree angle to the conveyor. This will reduce the amount of neck and back twisting when stacking blocks.



# Characteristics of Objects Being Handled

## SIZE AND SHAPE

### *Number of blocks lifted at one time*

WP Reduce the number of blocks lifted at once. Repetition would be increased, but force needed to grip the blocks would decrease.

### *Pneumatic strapper*

E To reduce the forceful gripping of the strapper handle, investigate the use of a pneumatic strapper (keep in mind that a pneumatic strapper may have an increased weight associated with it), or redesign the lever on the strapper to require less force to operate.

## LOAD CONDITION AND WEIGHT DISTRIBUTION

### *Grab the middle of the block*

WP When lifting up individual blocks, grab the middle of the block. This will reduce torque at the wrist.

### *Wrist in a neutral position*

WP Keep wrist in a neutral position.

### *Use both sides of the body*

WP When workstation layout permits, remove blocks from conveyor on alternate sides of the body.

### *Reduce twisting*

WP When stacking, turn completely towards the load before placing the block on the load.

## CONTAINER, TOOL AND EQUIPMENT HANDLES

### *Wrapping handle*

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 metal or wooden tool handles (e.g., pike pole, picaroon) a Block Piler 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 Block Piler's glove, and thus decrease the grip forces required.

### *Proper gloves*

PPE

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

## **Environmental Conditions**

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

## **Work Organisation**

Reducing the frequency and degree of awkward and repetitive postures in the neck/shoulder, elbow/wrist, and low back is the main concern for reducing ergonomic related injuries for the Block Piler. Improving task variability, job rotation, and other work organisation risk factors may reduce the exposure of the Block Pilers 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.

		<b>Injury Prevention Potential</b>										
<b>SOLUTIONS</b>	<b>Page</b>	Neck	Neck/ Shoulder	Shoulder	Elbow/ Wrist	Wrist	Wrist/ Hand	Low Back	Hip	Knee	Ankle	Foot
Diverter	81			F R A	F R A	F A		F R A				
Width of conveyor	81			F R A	F R A	F A		F R A				
Build from the back of the load	82			F R A	F R A	F A		F R A				
Location of controls	82			A								
Scissors lift	83	A S	F A	F R A	F R A			F R A		A C		
Adjustable platform	83	A S	F A	F R A	F R A			F R A				
Sit/stand stool	84	A						S				S
Anti-fatigue matting	84							S		C		S C
Moveable slide	85			R	R	R						
Load backboards	85	S						A				
Number of blocks lifted at one time	86			F	F A	F A		F				

### Direct Risk Factors

**F** = Force

**S** = Static Postures

**R** = Repetition

**C** = Contact Stress

**A** = Awkward Postures

**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.

		<b>Injury Prevention Potential</b>										
<b>SOLUTIONS</b>	<b>Page</b>	Neck	Neck/ Shoulder	Shoulder	Elbow/Wrist	Wrist	Wrist/Hand	Low Back	Hip	Knee	Ankle	Foot
<b>Pneumatic strapper</b>	<b>86</b>			<b>F</b>		<b>F</b>		<b>F</b>				
<b>Grab the middle of the block</b>	<b>86</b>			<b>F</b>	<b>F</b>	<b>F</b>						
<b>Wrist in a neutral position</b>	<b>86</b>				<b>A</b>	<b>A</b>						
<b>Use both sides of the body</b>	<b>86</b>			<b>R</b>	<b>R</b>	<b>R</b>						
<b>Reduce twisting</b>	<b>86</b>	<b>A</b>						<b>A</b>				
<b>Wrapping handle</b>	<b>87</b>					<b>F</b> <b>A</b>						
<b>Proper gloves</b>	<b>87</b>					<b>F</b>						
<b>Heat Exposure</b>	♦	indirectly reduces risk of injury to the body										
<b>Cold Exposure</b>	♦	indirectly reduces risk of injury to the body										
<b>Lighting</b>	♦	indirectly reduces risk of injury to the body										
<b>Noise</b>	♦	indirectly reduces risk of injury to the body										
<b>Vibration</b>	♦	directly reduces risk of injury to the back and wrist										
<b>Rest breaks</b>	♦	indirectly reduces risk of injury to the body										
<b>Job Rotation</b>	♦	indirectly reduces risk of injury to the body										
<b>Task Rotation</b>	♦	indirectly reduces risk of injury to the body										
<b>Work Pace</b>	♦	indirectly reduces risk of injury to the body										
<b>Scheduling</b>	♦	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



CHECK IF THIS APPLIES	ACTIVITY OF RISK	DIRECT RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	<p><b>Neck/Shoulder</b></p> <p>A Block Piler must lift blocks off a conveyor to sort and stack them.</p> <p>A Block Piler frequently works with the arms away from the body in order to sort and stack blocks and strap loads.</p>	<p><b>Force</b></p> <p><b>Repetition</b></p> <p><b>Awkward Posture</b></p>	<ul style="list-style-type: none"> <li>• Neck and shoulder muscles support the weight of objects held in the hands. The heavier the object and/or greater the downward pulling force, the greater the load on the muscles and tendons.</li> <li>• When workers repeatedly lift blocks, 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.</li> <li>• 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.</li> </ul>	<ul style="list-style-type: none"> <li>• When stacking blocks, lift an appropriate number of blocks at one time, according to grip size.</li> <li>• If workstation layout permits, lift blocks off the conveyor using alternate arms.</li> <li>• When lifting blocks, hold them as close into the body as possible.</li> <li>• For exercises that can help prevent <i>neck</i> and <i>shoulder</i> injuries, <i>see the Neck and Shoulder sections of the Body Manual.</i></li> </ul>

CHECK IF THIS APPLIES	ACTIVITY OF RISK	DIRECT RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	<p><b>Shoulder</b></p> <p>A Block Piler must push and pull on the manual strapper lever with the arm above shoulder height in order to strap a load.</p>	<p><b>Force</b></p> <p><b>Repetition</b></p> <p><b>Awkward Postures</b></p>	<ul style="list-style-type: none"> <li>• The rotator cuff stabilises the shoulder joint when objects are pushed and pulled. The larger the force required, the greater the load on the rotator cuff. If the force placed on the rotator cuff exceeds the tissue tolerances, injury may occur.</li> <li>• When the arms are repeatedly raised, the rotator cuff is subjected to repeated stress with little time for recovery. If the repetitive stress is excessive, and recovery is not adequate, the tissues may fatigue to the point of injury.</li> <li>• The rotator cuff stabilises the shoulder joint when the arms are away from the body. The further away the arms are from the body, the greater the load on the rotator cuff.</li> </ul>	<ul style="list-style-type: none"> <li>• When strapping the load, try to position the lever of the strapper between waist and shoulder height by using a step or positioning the scissors lift to the proper height.</li> <li>• Try to rotate between tasks, reducing the amount of continuous time spent at a particular task.</li> <li>• For exercises that can help prevent <i>shoulder</i> injuries, <i>see the Shoulder sections of the Body Manual</i>.</li> </ul>

CHECK IF THIS APPLIES	ACTIVITY OF RISK	DIRECT RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	<p><b>Elbow/Wrist</b></p> <p>A Block Piler must grip blocks in order to stack them onto a load.</p> <p>A Block Piler must also grip the lever of the manual strapper to strap a load.</p>	<p><b>Force</b></p> <p><b>Awkward Posture</b></p> <p><b>Repetition</b></p>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• Repeated stress to the elbow without adequate rest could slowly fatigue tissues to the point of injury.</li> </ul>	<ul style="list-style-type: none"> <li>• Do not over grip blocks.</li> <li>• Reduce the number of blocks lifted at once. This will reduce the force needed to grip the blocks.</li> <li>• When lifting individual blocks, grab the middle of the block. This will reduce torque at the wrist.</li> <li>• Keep the wrist in a neutral position.</li> <li>• When workstation layout permits, remove blocks from conveyor on alternate sides of the body.</li> <li>• To prevent injuries by increasing tissue tolerance, <b>refer to the Elbow and Wrist sections of the Body Manual.</b> Strengthening exercises should be used by new employees or employees who have been off work for extended periods.</li> </ul>

CHECK IF THIS APPLIES	ACTIVITY OF RISK	DIRECT RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	<p><b>Wrist</b></p> <p>A Block Piler must grip blocks with the wrists bent in order to turn and stack the blocks</p>	<p><b>Force</b></p> <p><b>Awkward Posture</b></p> <p><b>Repetition</b></p>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• Repeated gripping 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.</li> </ul>	<ul style="list-style-type: none"> <li>• Do not over grip blocks.</li> <li>• Reduce the number of blocks lifted at once. This will reduce the force needed to grip the blocks.</li> <li>• When lifting individual blocks grab the middle of the block. This will reduce torque at the wrist.</li> <li>• Keep the wrist in a neutral position.</li> <li>• When workstation layout permits, remove blocks from conveyor on alternate sides of the body.</li> <li>• To prevent injuries by increasing tissue tolerances, <i>refer to the Wrist section of the Body Manual</i>. Strengthening exercises should be used by new employees or employees who have been off work for extended periods.</li> </ul>

CHECK IF THIS APPLIES	ACTIVITY OF RISK	DIRECT RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	<p><b>Low Back</b></p> <p>A Block Piler may bend forward and/or twist to stack blocks on a load. A Block Piler may also bend forward when reaching for blocks on the far side of the conveyor.</p> <p>A Block Piler may continually sit on a vibrating surface while sorting blocks.</p>	<p><b>Force</b></p> <p><b>Awkward Posture</b></p> <p><b>Repetition</b></p> <p><b>Static Posture</b></p> <p><b>Vibration</b></p>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Back muscles must support the weight of the upper body when leaning forward. Increased bending of the back increases the loading on the spine and increases the pressure on the walls of the discs.</li> <li>• Repeated forward and lifting 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.</li> <li>• Sitting increases the loading on the walls of the discs. If the duration of sitting is excessive, and the recovery is not adequate (e.g., spine not returned to neutral posture), the tissues may deform to the point of injury.</li> <li>• Whole body vibration is usually transmitted through the seat into the low back. Exposure to whole body vibration introduces a unique mechanical stress to the structures of the spine that can significantly increase the loading on the low back. Prolonged sitting on a vibrating surface may contribute to the gradual weakening of the lumbar discs.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce the number of blocks lifted at once.</li> <li>• In order to reduce the amount of reaching necessary to place blocks on the back of the load, an operator should build the load from the back. This will allow the operator to get closer and reduce the amount of reaching needed.</li> <li>• Do not sit or stand for long periods of time. Rotate between sitting and standing while sorting.</li> <li>• For exercises that can help prevent <i>back</i> injuries <i>see the Back section of the Body Manual</i>.</li> </ul>

CHECK IF THIS APPLIES	ACTIVITY OF RISK	DIRECT RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	<p><b>Knee</b></p> <p>A Block Piler frequently squats and kneels to manually strap a load.</p>	<p><b>Awkward Posture</b></p> <p><b>Contact Stress</b></p>	<ul style="list-style-type: none"> <li>Bending the knee increases the contact stress between the kneecap and the thighbone. Contact stress increases significantly when the knee is bent over 90 degrees.</li> <li>Kneeling on a hard surface increases the contact stress between the kneecap and the thighbone.</li> </ul>	<ul style="list-style-type: none"> <li>If a scissors lift is available to strap a load, position it so that kneeling is not necessary.</li> <li>Position the strapping under the load before starting to stack blocks.</li> <li>Use kneepads when kneeling on hard surfaces.</li> <li>To prevent injuries by increasing tissue tolerance, <i>refer to the Knee section of the Body Manual</i>. Strengthening exercises should be used by new employees or employees who have been off work for extended periods.</li> </ul>
	<p><b>Foot</b></p> <p>A Block Piler may stand on a hard, vibrating surface when inspecting, sorting, and stacking blocks.</p>	<p><b>Static Posture</b></p> <p><b>Vibration</b></p>	<ul style="list-style-type: none"> <li>While standing, the weight of the body loads the plantar fascia. If the duration of standing is excessive, and recovery is not adequate, the fascia may deform to the point of injury.</li> <li>Vibrating floors can increase the loading on the foot. Factors like vibration level and vibration frequency increase the amount of loading on the foot, and could lead to irritation. The longer the Block Piler is exposed to vibration, the greater the risk of injury.</li> </ul>	<ul style="list-style-type: none"> <li>Try to move around the work area to reduce static standing.</li> <li>To prevent injuries by increasing tissue tolerance, <i>refer to the Foot section of the Body Manual</i>. Strengthening exercises should be used by new employees or employees who have been off work for extended periods.</li> </ul>