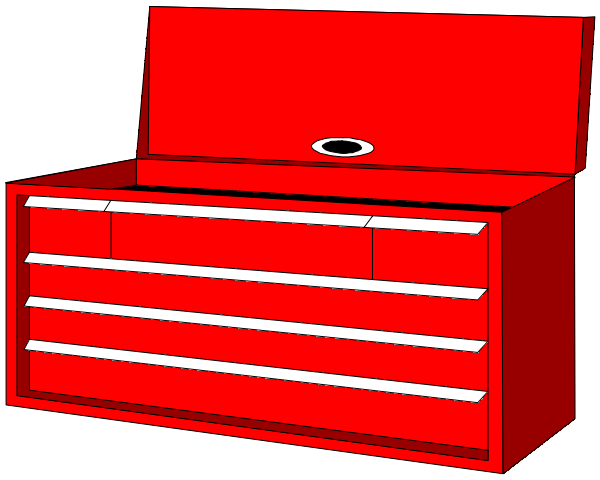
Industrial Musculoskeletal Injury Reduction Program

Common Industry Jobs (CIJs)

Tilt Hoist Operator Tool Kit



IMIRP program coordinated by:

Council of Forest Industries

Industrial Wood & Allied Workers of Canada

Advanced Ergonomics Inc.

In cooperation with the Workers' Compensation Board of British Columbia

TILT HOIST OPERATOR TOOL KIT
Table of Contents

Overview

Tilt Hoist Operator

Job Summary

The Tilt Hoist (breakdown hoist) Operator must unstack either a solid or a separated load of wood. The load is placed on the infeed by a forklift and the operator must advance the load on the chain to the tilt (breakdown) hoist. The operator must operate the hoist and conveying equipment, using controls or foot pedals to singulate the lumber and to keep the table in the following process supplied with lumber. Refer to the Physical Demands Analysis for more detail.

Physical Demands

The physical demands of the Tilt Hoist Operator may include:

a) Repetitive motions of the neck, shoulders, arms, and wrists
b) Awkward postures of the neck, shoulders, wrists, and back
c) Pushing/pulling lumber
d) Turning boards
e) Balancing while using foot pedals
f) Continual standing/sitting
g) Climbing onto and off of equipment/stairs

Mental Demands

The Tilt Hoist Operator has to keep the next process supplied with a steady flow of lumber. The worker has to operate multiple controls, as well as handle the wood, in order to accomplish this task. This can take considerable physical and mental co-ordination. Further co-ordination is necessary when trimming the wood.

Major Variations

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

1) The tilt hoist may breakdown:
   a) Green (wet) loads
   b) Dry loads
   c) Separated loads
   d) Full loads

2) Machinery operated may include:
   a) A tilt hoist
   b) Conveyors
   c) Transfer chains
   d) Trimsaws
   e) Strip piling machines

3) The tilt hoist job may require the operator to:
   a) Trim the lumber
   b) Tend to strip removal
   c) Remove broken and defective stock
   d) Remove carrier blocks
   e) Keep track of the number of loads
   f) Assist in unplugging jam-ups

4) The operator singulates the lumber:
   a) Manually - the operator physically handles the boards to singulate them
   b) Automatically - singulation is controlled by operator but done automatically

5) Postures while operating the tilt hoist may include:
   a) Standing
   b) Sitting
   c) Sit/standing

Minor Variations

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

1) The pace that the operator works depends upon the mill. The average work pace is 32-100 loads/shift. This pace is:
   a) Dependent upon the dwell area
   b) Group-paced

2) To pull the lumber closer the operator may also use aids such as:
   a) A pike pole
   b) A picaroon
   c) Rollers

3) Controls used at this type of workstation may include:
   a) Foot pedals
   b) Push/pull buttons

Physical Demands Analysis
Tilt Hoist Operator

PDA General Instructions: Tilt Hoist Operator

This Physical Demands Analysis (PDA) identifies the physical demands of the Tilt Hoist Operator job as assessed by IMIRP ergonomists. The information reported was collected from a sample of Tilt Hoist Operators 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 Tilt Hoist Operator 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 PDAs site-specific, or wishing to implement options from the Work Manuals, are advised to first complete the two-day OHSC and Supervisor Ergonomics Training Session. Modifications to a PDA must be within the scope of competence of those individuals making the changes and must be reported to any rehabilitation professional using the PDA. Neither AEI nor the IMIRP Society accepts any responsibility for the use or misuse of these documents.

PDA Table of Contents

Physical Demands Analysis
Tilt Hoist Operator

Task List

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

Bring in a load

A Tilt Hoist Operator brings in a load using an infeed or jog chain.

Does this task occur at your mill?

☐ Yes ☐ No

Singulate lumber

A Tilt Hoist Operator singulates (breaks down) a load into single pieces by hand.

Does this task occur at your mill?

☐ Yes ☐ No

A Tilt Hoist Operator singulates (breaks down) a load into single pieces by using controls.

Does this task occur at your mill?

☐ Yes ☐ No

Unjam

A Tilt Hoist Operator clears any jam-ups or cross-ups that occur at the workstation.

Does this task occur at your mill?

☐ Yes ☐ No

Clean work area

A Tilt Hoist Operator cleans up the workstation.

Does this task occur at your mill?

☐ Yes ☐ No

Company Profile

Company Name:_____ Division:_____

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

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

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

Work Organisation

Task Description

The table below contains a list of tasks performed on an everyday basis by a Tilt Hoist Operator.

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

Note the corresponding values for the percentage of the shift spent performing the task (Percent of Shift) as 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%	
	Bring in a load		✓			*Cycle time = Approximately 1 to 2 minutes*
	Singulate lumber			✓		*Cycle time = Approximately 5 to 10 minutes*
	Unjam		✓			*Cycle time = Approximately 1 to 5 minutes*
	Clean work area		✓			*Cycle time = Approximately 5 to 15 minutes*
	Other:					

Organisational Factors

The table below contains a list of organisational factors for a Tilt Hoist Operator. For each of the items, place a check beside the statements (i.e. 30 minute lunch) that reflect the situation at your mill. Additional check boxes have been provided for you to enter your mill-specific information if it is not stated.

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

Length of shift	☐ *8 to 10 hours* ☐
Formal breaks	☐ *Two 10 minute breaks* ☐ *30 minute lunch* ☐
Informal breaks	☐ *15 minutes (downtime)* ☐
Work pace	☐ *32 to 100 loads per shift* ☐
Work pace control	☐ *Group paced* ☐ *Dwell area* ☐
Job rotation ☐ Yes *(Check one)* ☐ No	If **Yes:** Rotation with what job(s):_____ _____ How often: (e.g., every 2 hours)_____

Workstation Characteristics

Dimensions & Layout

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

Workstation Dimensions	
(A) Height of transfer chain	cm
(B) Height of controls (panel)	cm

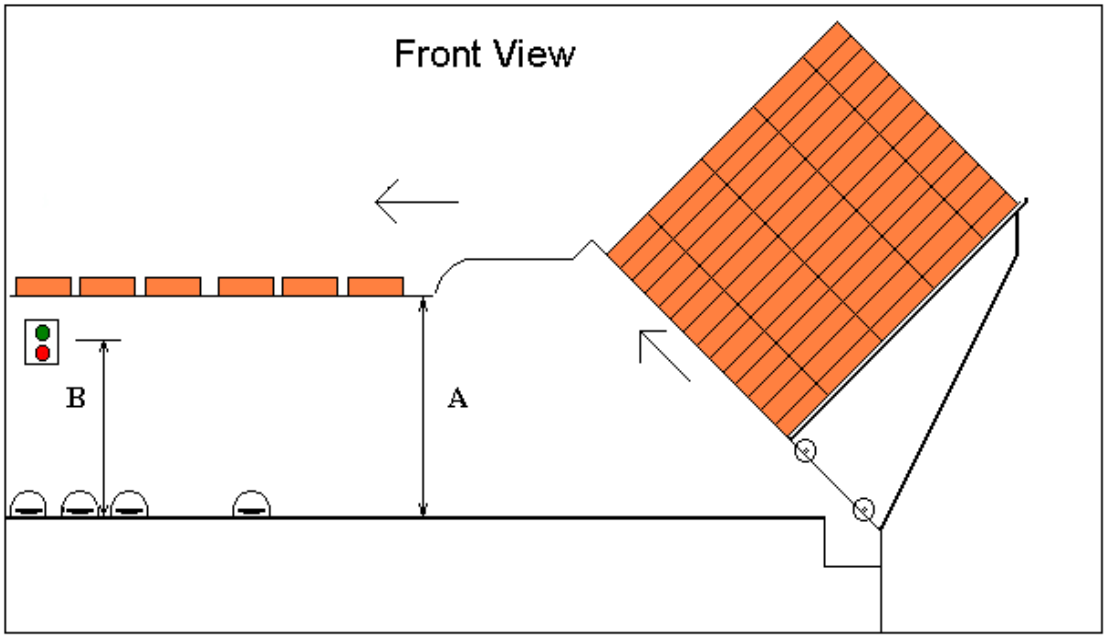


Figure 1: Tilt Hoist Workstation (Front View)

Flooring, Displays and Seating

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

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

Workstation Characteristics	
Flooring	*Check all that apply* ☐ Cement ☐ Wood ☐ Rubber Matting ☐ Metal ☐ Other (e.g., tile, carpet) _____
Displays	*Check all that apply* ☐ Lights on Console ☐ Mirrors ☐ Video Monitors ☐ Computer Monitors ☐ None ☐ Scrolling Display ☐ Signal Lights ☐ Other _____
Seating: ☐ Yes *(Check one)* ☐ No	☐ Sit/stand ☐ Office ☐ Industrial ☐ In-house Design Height of seat: _____cm Depth of seat: _____cm Width of seat: _____cm
	Check all that apply ☐ Armrests ☐ Backrest ☐ Swivel Seat ☐ Slide track ☐ Castors #_____ Covering type: _____ Seat adjustable? ☐ Yes ☐ No If yes, adjustable: ☐ Height ☐ Armrests ☐ Backrest ☐ Forward tilt

Equipment & Machinery Controls

The table below contains a list of the types of controls used by a Tilt Hoist Operator.

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

Indicate their corresponding functions by checking off the applicable box(es). The Comments section may contain information that describes variations between mills.

	Type of Control	Function	Frequency	Comments
	Foot pedals	Operate: ☐ *Hoist* ☐ *Chain* ☐ *Drop gate* ☐	*Approximately 1 to 20 times per minute*	• *The number of foot pedals ranges from 2 to 5* • *Frequency dependent on number of loads and use of other controls to perform the same functions*
	Push buttons	Stop/start: ☐ *Transfer chain* ☐ *Main controls for hoist* ☐	*Up to approximately 20 times per hour*	• *Foot pedals tend to be used more often than push buttons to activate the hoist*
	Other:			

Physical Demands

Whole Body Physical Demands

Identify each of the physical demands required by a Tilt Hoist Operator, by placing a check mark (✓) in the far left column.

The Comments section may contain information relating to duration, frequencies and other variations in the physical demands.

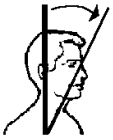
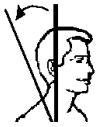
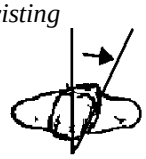
Physical Demands		Tasks	Percent of Shift				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	Walking						*Not Applicable*
	Sitting	• *Bring in a load* • *Singulate lumber*			✓		• *Depends on availability of seating, operator preference, and the design of the workstation area*
	Standing	• *Bring in a load* • *Singulate lumber* • *Unjam* • *Clean work area*				✓	• *Depends on the availability of seating, operator preference, and the design of the workstation area* • *Where seating is inadequate for the task or unavailable, operators are required to stand while on duty*
	Climbing	• *Unjam* • *Clean work area*		✓			• *Climbing on to the chain or stairs*
	Balancing	• *Bring in a load* • *Singulate lumber*				✓	• *Using foot pedal controls*
	Kneeling/ Crouching						*Not Applicable*
	Other:						

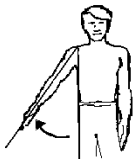
Body Postures

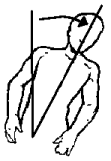
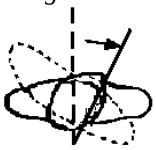
The table below outlines the body postures held or repeated throughout the shift by a Tilt Hoist Operator.

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

The Comments section may contain information relating to duration, frequencies, and other variations in posture.

	Body Posture	Task(s)	Percent of Shift				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
Neck							
	Flexion 	• *Bring in a load* • *Singulate lumber* • *Unjam*		✓			• *Monitoring infeed from hoist* • *Viewing lumber on chain* • *Frequency and duration dependent upon the design of the workstation, worker dimensions*
	Extension 						*Not Applicable*
	Twisting 	• *Bring in a load* • *Singulate lumber* • *Unjam*			✓		• *Monitoring infeed from hoist* • *Viewing lumber on chain* • *Frequency and duration are dependent upon the design of the workstation, worker dimensions*

Body Posture	Task(s)	Percent of Shift				Comments
		Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
Shoulder						
Flexion 	• *Singulate lumber* • *Unjam*		✓			• *Lumber is handled an average of 5 to 10 times per minute*
Abduction 	• *Bring in a load* • *Singulate lumber*		✓			• *Occurs more frequently if worker uses control panels more than fool pedals when bringing in a load* • *Operators will guide the lumber down to the chain*
Extension 						*Not Applicable*
Forearm						
Rotation 	• *Singulate lumber*			✓		• *Turning boards to have wane side up for Planer Feeder*
Wrist						
Flexion 	• *Singulate lumber* • *Unjam*		✓			• *Frequency and duration dependent on load conditions, quality of wood*
Extension 						*Not Applicable*
Ulnar Deviation 	• *Singulate lumber* • *Unjam*		✓			• *Frequency and duration dependent on load conditions, quality of wood*
Radial Deviation 						*Not Applicable*

Body Posture		Task(s)	Percent of Shift				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
Back							
	Flexion 	• *Singulate lumber* • *Unjam*		✓	✓		• *Dependent on chain height* • *A greater frequency and a longer duration of back flexion is required if operator has to bend to handle lumber when obstacles are in the way (e.g., placement of foot pedals)*
	Lateral Flexion 						*Not Applicable*
	Twisting 						*Not Applicable*
	Extension 						*Not Applicable*

Hand Grips

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

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.

The Comments section may contain information relating to duration, frequencies, hand used, etc.

	Type	Task(s)	Percent of Shift				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	Power 	• *Unjam*		✓			• *Use of pike pole or picaroon* • *Duration held dependent on severity of cross-up or jam-up* • *Major jam-ups do not occur very frequently*
	Pinch 	• *Singulate lumber*		✓			• *Straightening and/or turning lumber (lifting, lowering, and pulling)*
	Hook 						*Not Applicable*
	Precision 						*Not Applicable*
	Other:						

Manual Material Handling

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

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

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

	Task Description	Weight	Percent of Shift				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	• *Pushing and pulling lumber to straighten*	*See weight of wood equation*	✓				• *Lumber is pushed and pulled at the height of the conveyor* • *One or both hands are used.*
	• *Pushing and pulling with pike pole or picaroon to clear cross-ups or jam-ups*	*See weight of wood equation*		✓			• *One or both hands are used.*
	Other:						

Hand Tools

Indicate the hand tools used by a Tilt Hoist Operator 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.

The Comments section may contain information relating to duration and frequencies of use.

	Type of Tool	Task(s)	Weight of Tool (kg)	Percent of Shift				Comments
				Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	Pike pole	• *Unjam*	*3.5*		✓			• *Use dependent upon severity of cross-up or jam-up and distance away from the operator*
	Picaroon	• *Unjam*	*1.3*		✓			• *Use dependent upon the severity of cross-up or jam-up and distance from the operator*
	Cutting shears	• *Bring in a load*		✓				• *Use dependent on the number of re-man loads*
	Other:							

Environmental Conditions

Work Environment

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

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

Noise level	*84 to 95 dB*
Lighting level	*180 lux to 605 klux* *Workstation*
Other	

Location of Workstation

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

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

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

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

Temperature

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

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

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

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

Personal Protective Equipment

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

For the Tilt Hoist Operator job at your mill, indicate which of the PPE items are required with a check mark (✓).

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

Appendix A – Weight of Wood Equation

1. Type of Wood Handled

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

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

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

2. Size of Wood*

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

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

* Conservative estimates of actual wood dimensions

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

[(Dimensions of wood) x 12] / 144 = Multiple

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

3. Length of Wood

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

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

4. Weight of Wood Equation*

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

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

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

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

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

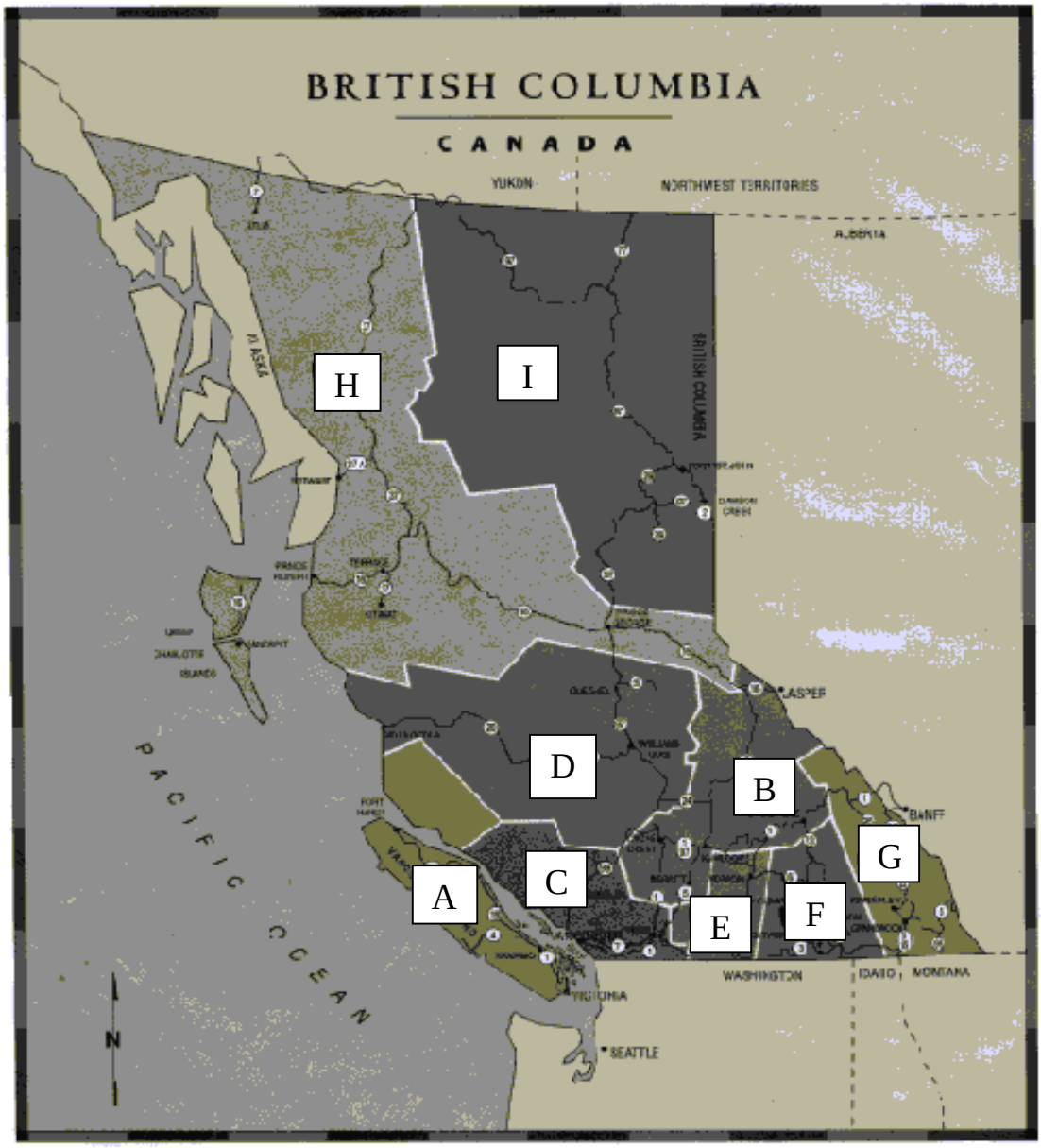
For the lightest species handled, enter the lb./board foot value, the multiple for the smallest size of wood, and the shortest length of this wood. Multiply these values together to determine the weight of the board in pounds.

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

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

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

Appendix B – Regional Map



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

Risk Factor Identification Checklist
Tilt Hoist Operator

Purpose

The Risk Factor Identification Checklist for a Tilt Hoist Operator 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 – Tilt Hoist Operator

Management Representative _____

Worker Representative _____

Date _____

Risk Identification completed:

☐ Before implementation of solutions

☐ After implementation of solutions

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

Definitions

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

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

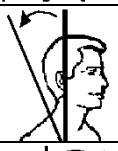
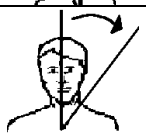
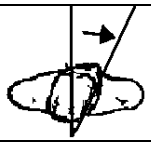
Static Postures: Static loading (sustained exertions) is physical effort (body postures) that is held, requiring muscle contraction for more than a short time.

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

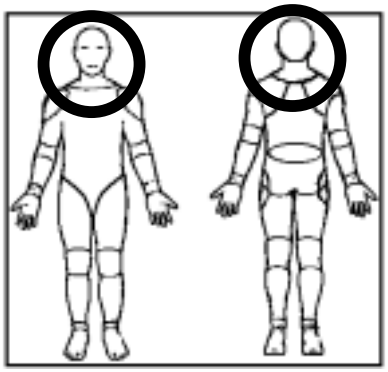
Awkward Postures: Awkward postures occur when there is a deviation from a power working posture. Some examples of awkward postures typically include reaching behind, twisting, working overhead, and forward or backward bending.

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

NECK

Repetition	N	Y		Comments:
Are identical or similar motions performed over and over again? (e.g., looking down and up)			S O	
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., monitoring flow of lumber)			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 lumber)			S O	
Awkward Posture				
Flexion 			S O	
Extension 			S O	
Lateral Bending 			S O	
Rotation 			S O	

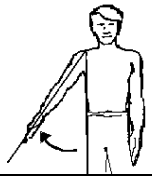
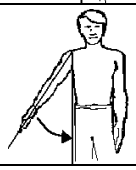
Please indicate whether the following direct risk factors were identified at the **NECK**.		
Direct Risk Factors	Repetition	☐Yes ☐No
	Static Posture	☐Yes ☐No
	Awkward Posture	☐Yes ☐No
In the **Injury Statistics** investigation, were there injury reports for the Neck or Head/Eye or Upper Back? (see Worksheet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



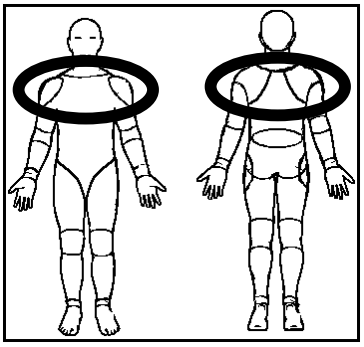
Body parts within the circled area will be classified as NECK issues.

SHOULDER

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

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

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



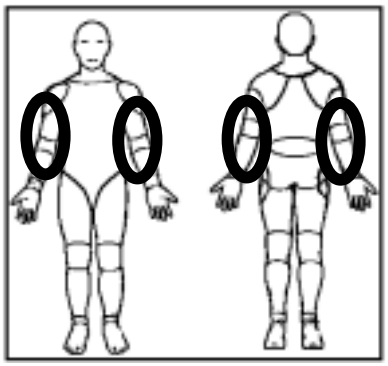
Body parts within the circled area will be classified as SHOULDER issues.

ELBOW

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

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

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



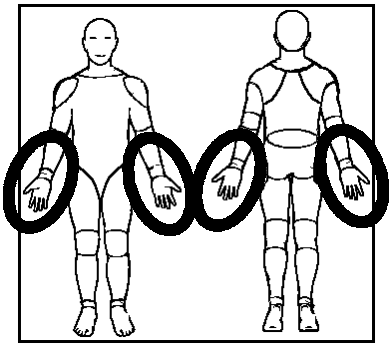
Body parts within the circled area will be classified as ELBOW issues.

WRIST/HAND

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

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

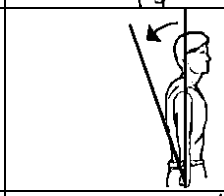
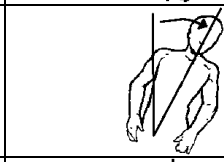
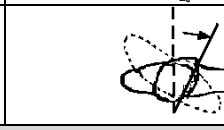
Please indicate whether the following direct risk factors were identified at the **WRIST/HAND**.		
Direct Risk Factors	Force	☐Yes ☐No
	Repetition	☐Yes ☐No
	Static Posture	☐Yes ☐No
	Contact Stress	☐Yes ☐No
	Awkward Posture	☐Yes ☐No
	Vibration	☐Yes ☐No
In the **Injury Statistics** investigation, were there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



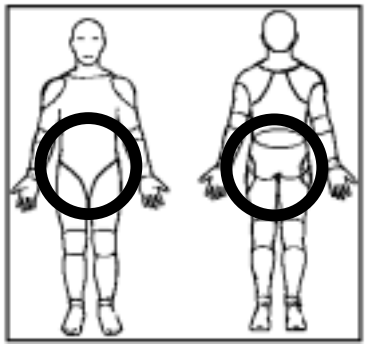
Body parts within the circled area will be classified as WRIST issues.

LOW BACK OR HIP/THIGH

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

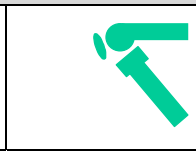
Awkward Posture		N	Y		Comments:
Flexion				S O	
Extension				S O	
Lateral Bending				S O	
Twisting				S O	
Vibration					
Ask the worker: Is your whole body exposed to vibration for significant portions of the work shift? (e.g., standing on vibrating surface)				S O	

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

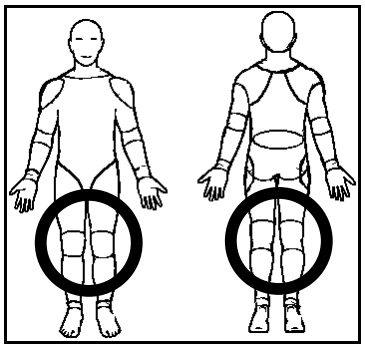


Body parts within the circled area will be classified as LOW BACK issues.

KNEE

Repetition	N	Y		Comments:
Are identical or similar motions performed over and over again?			S O	
Static Posture				
Ask the worker: Do tasks require you to maintain your knee(s) in a fixed or static posture? (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 **any** objects or parts of the workstation put pressure on your knee(s)?			S O	
Awkward Posture				
Extreme Flexion 			S O	

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

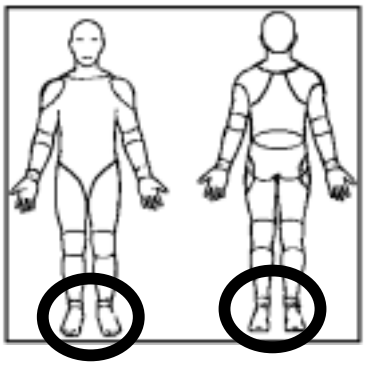


Body parts within the circled area will be classified as KNEE issues.

ANKLE/FOOT

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

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



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

CHARACTERISTICS OF OBJECTS BEING HANDLED

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

ENVIRONMENTAL CONDITIONS

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

ENVIRONMENTAL CONDITIONS [CONTINUED]

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

WORK ORGANISATION

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

Work Manual

Industrial
Musculoskeletal
Injury
Reduction
Program

Tilt Hoist Operator

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

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

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

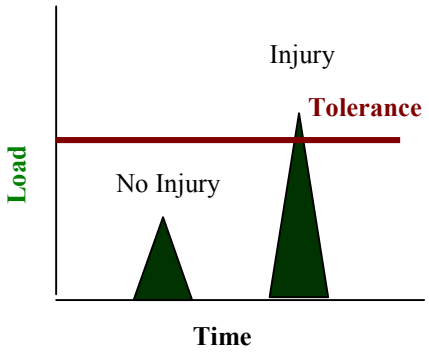
Work Manual

Tilt Hoist Operator

WM Table of Contents

Injury Education

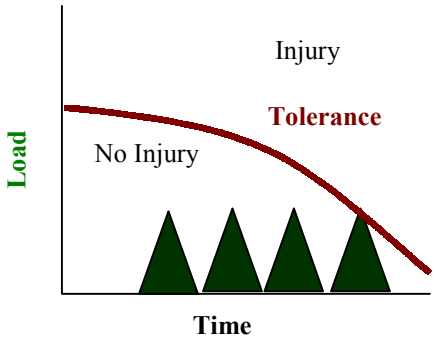
Injuries occur when ...
Loads exceed tissue tolerances



Excessive Force

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

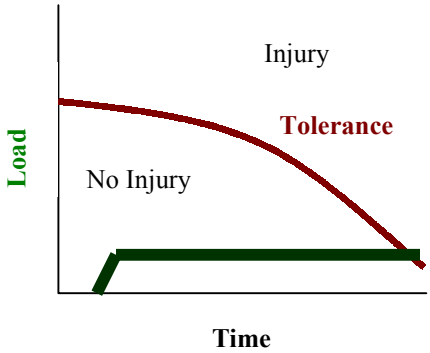
Example – a worker going over on their ankle and spraining it.



Excessive Repetition

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

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



Excessive Duration

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

Example – a grader developing neck tension.

Body Parts at Risk

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

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

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

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

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

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

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

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

At the end of the Body Parts at Risk Section, there is a summary page of all the body parts of concern for the Tilt Hoist Operator. 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:
Repetition
Awkward Postures
Static Postures

A Tilt Hoist Operator must look down and to the sides in order to inspect lumber for defects..

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

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.

Awkward Postures

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

Static Postures

- When the neck is held still in a forward or twisted 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

- The working height of a station may cause the Tilt Hoist Operator to repeatedly bend the neck to perform visual inspection.

CONSEQUENCES

- When the head is held in a forward 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 84 & 85.
- For exercises that can help to prevent ***neck*** injuries, see the ***Neck section of the Body Manual.***

Direct Risk Factors:
Repetition
Awkward Postures

NECK/SHOULDER

A Tilt Hoist Operator frequently holds their arms away from the body in order to guide lumber from the stack to the sorting table, or to turn lumber.

BACKGROUND INFORMATION

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

DIRECT RISK FACTORS

Repetition

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

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.

INDIRECT RISK FACTORS

Workstation Design

Working Reaches

- Excessive working reaches, such as reaching for lumber or jammed kiln sticks, can increase the risk of shoulder injuries.

Working Heights

- Increased shoulder flexion can result when working at inappropriate heights, or using controls at or above shoulder level.

CONSEQUENCES

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

SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Neck/Shoulder, please see the column labelled "Neck/Shoulder" in the Summary of Solutions on pages 84 & 85.
- For exercises that can help to prevent ***neck*** and ***shoulder*** injuries, see the ***Neck*** and ***Shoulder sections of the Body Manual.***

SHOULDER

Direct Risk Factors:
Force
Repetition
Awkward Postures

A Tilt Hoist Operator must push and pull lumber in order to straighten pieces and look for defects.

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 manipulated. The heavier the object, the greater the load on the rotator cuff.
- If the force placed on the rotator cuff exceeds the tissue tolerances, injury may occur.

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.

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.

INDIRECT RISK FACTORS

Workstation Design

Working Reaches

- Reaching for lumber can put the shoulder into awkward postures, where it is more susceptible to injury.

Working Heights

- Handling lumber at or above shoulder level can require awkward shoulder postures, increasing the risk of shoulder injury.

CONSEQUENCES

- When using the arms to manipulate lumber, 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 84 & 85.
- For exercises that can help to prevent ***shoulder*** injuries, see the ***Shoulder section of the Body Manual.***

ELBOW/WRIST

Direct Risk Factors:
Force
Repetition
Awkward Postures

A Tilt Hoist Operator must grip boards in order to turn pieces to look for defects.

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.

Repetition

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

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.

INDIRECT RISK FACTORS

Characteristics of Objects Being Handled

Size and Shape

- Turning larger lumber pieces requires a wider grip span and more muscle force. This increased force also increases the risk of injury.

CONSEQUENCES

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

SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Elbow/Wrist, please see the column labelled "Elbow/Wrist" in the Summary of Solutions on pages 84 & 85.
- For exercises that can help to prevent ***elbow*** injuries, see the ***Elbow section of the Body Manual.***

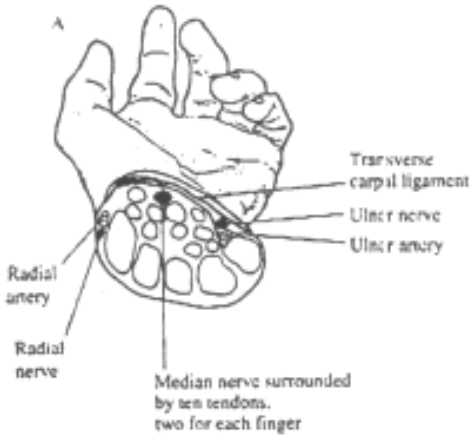
WRIST

Direct Risk Factors:
Force
Repetition
Awkward Postures

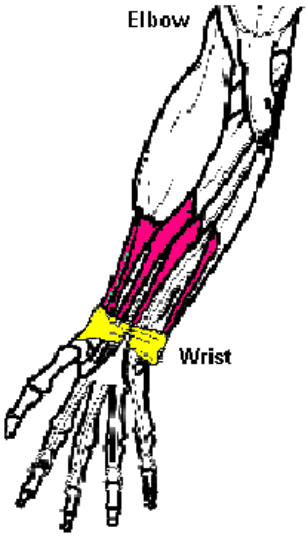
A Tilt Hoist Operator must grip pieces with the wrists bent in order to turn them.

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.

Repetition

- Repeated gripping and bending of the wrist causes stress to the tendon sheaths. If the repetitive stress is excessive, and recovery is not adequate, the tendon sheaths may fatigue to the point of injury.

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.

INDIRECT RISK FACTORS

Characteristics of Objects Being Handled

Size and Shape

- Turning larger lumber pieces requires a wider grip span and more muscle force. This increased force also increases the risk of injury.

Environmental Conditions

Cold Temperatures

- Extreme cold temperatures, in combination with the previously mentioned factors, can increase the risk of wrist injury.

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

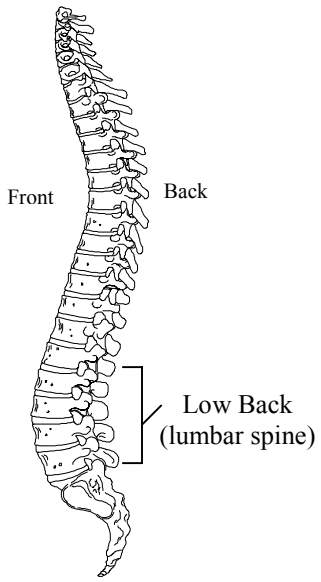
- For specific solutions that may prevent injuries to the Wrist, please see the column labelled “Wrist” in the Summary of Solutions on pages 84 & 85.

LOW BACK

Direct Risk Factors:
Force
Repetition
Awkward Postures

A Tilt Hoist Operator must bend forward in order to handle lumber.

Neutral Spine



BACKGROUND INFORMATION

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

DIRECT RISK FACTORS

Force

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

Repetition

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

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.

INDIRECT RISK FACTORS

Workstation Design

Working Reaches

- The large working reaches required to grab and turn lumber can increase the risk of back injury.

Working Heights

- Low heights for lumber chains or process controls can increase the risk of back injury.

Seating

- Manually handling lumber from a seated position can lead to low back injury.

Floor Surfaces

- Flooring that is too hard, too soft, or uneven, can add to low back discomfort.

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 84 & 85.
- For exercises that can help to prevent ***back*** injuries, see the ***Back section of the Body Manual.***

Direct Risk Factors:
Repetition
Awkward Postures

ANKLE

A Tilt Hoist Operator frequently activates foot pedals in order to operate the hoist and chains.

BACKGROUND INFORMATION

- The muscle responsible for pulling the foot upwards is found in the front of the shin. Its tendon runs beneath thick bands at the ankle before attaching to the foot bones.

DIRECT RISK FACTORS

Awkward Postures

- Lifting the foot to activate a foot pedal puts the ankle into an awkward posture, which increases the loading in the muscle on the front of the shin. The further away from the neutral posture the ankle is, the greater the loading to this muscle. If the shoes worn are rigid or heavy, the loading is also increased.

Repetition

- Repetitive use of foot pedals may gradually cause small tears in the muscle on the front of the shin. If the repetitive stress is excessive, and recovery is not adequate, the small tears in the muscle on the front of the shin may progress to a more significant problem.

INDIRECT RISK FACTORS

Workstation Design

Working Heights

- Foot pedals with more height force larger ankle movements, increasing the risk of injury.

CONSEQUENCES

- Repeated use of foot pedals can cause damage to the tissues in the shin.
- Signs and symptoms include inflammation, and pain with walking.

SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Ankle, please see the column labelled "Ankle" in the Summary of Solutions on pages 84 & 85.

FOOT

Direct Risk Factors:
Awkward Postures
Static Postures

A Tilt Hoist Operator must continually press down on foot pedals in order to activate the hoist and chains.

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 it contributes to the arch in our feet.

DIRECT RISK FACTORS

Awkward Postures

- Pressing down on a foot pedal while the ankle is bent leads to increased loading on the plantar fascia.

Static Postures

- Continual standing on foot pedals can cause tissue in the foot to deform and breakdown over time. If the tissue deformation is excessive and recovery not adequate, an injury may occur.

INDIRECT RISK FACTORS

Workstation Design

Working Heights

- Loading on the plantar fascia is increased because the height of the foot pedals requires a Tilt Hoist Operator to repeatedly activate foot pedals with the ankle bent.

CONSEQUENCES

- Continual use of foot pedals 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 the problem progresses the pain may become chronic.

SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Foot, please see the column labelled "Foot" in the Summary of Solutions on pages 84 & 85.
- For exercises that can help to prevent ***foot*** injuries, see the ***Foot section of the Body Manual.***

Summary of Body Parts at Risk

NECK

- A Tilt Hoist Operator must look down and to the sides in order to inspect lumber for defects.

NECK/SHOULDER

- A Tilt Hoist Operator frequently holds their arms away from the body in order to guide lumber from the stack to the sorting table, or to turn lumber.

SHOULDER

- A Tilt Hoist Operator must push and pull lumber in order to straighten pieces and look for defects.

ELBOW/WRIST

- A Tilt Hoist Operator must grip boards in order to turn pieces to look for defects.

WRIST

- A Tilt Hoist Operator must grip pieces with the wrists bent in order to turn them.

LOW BACK

- A Tilt Hoist Operator must bend forward in order to handle lumber.

ANKLE

- A Tilt Hoist Operator frequently activates foot pedals in order to operate the hoist and chains.

FOOT

- A Tilt Hoist Operator must continually press down on foot pedals in order to activate the hoist and chains.

Risk Factors by Body Part

Direct Risk Factors	Neck	Neck/ Shoulder	Shoulder	Elbow/ Wrist	Wrist	Wrist/ Hand	Low Back	Hip	Knee	Ankle/ Foot	Foot
Force			✓	✓	✓		✓				
Repetition	✓	✓	✓	✓	✓		✓			✓	
Awkward Postures	✓	✓	✓	✓	✓		✓			✓	✓
Static Postures	✓										✓
Contact Stress											
Vibration – Whole body*											
Vibration - Hand Transmitted*											

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

** Vibration is categorised under both direct and indirect risk factors. Vibration can directly increase the likelihood of injury to the back and wrist as well as indirectly (environmental conditions) promote injuries in other parts of the body.*
*** Extended exposure to <u>any</u> risk factor can increase the likelihood of injury. For solutions designed to decrease the duration of exposure to any risk factor please refer to the Work Organisation section of the General Risk Factor Solutions Manual.*

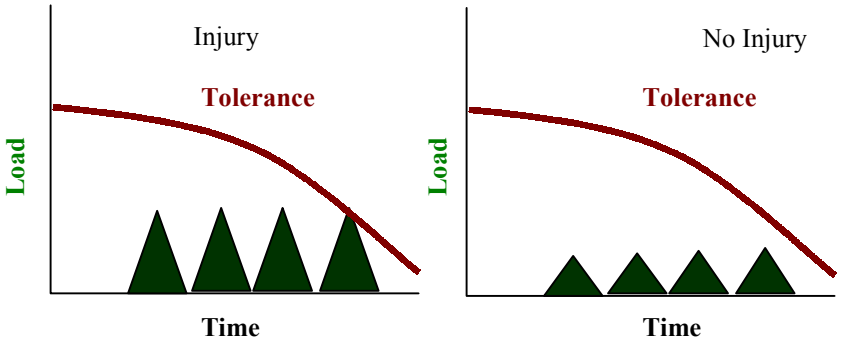
☐ = Indicates that the risk factor was assessed and was not found to be a contributor to the body part problem.

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

✓ = Indicates that the risk factor was assessed as a contributor to the body part problem. Please see the Summary of Solutions Table on pages 84 & 85 for specific problem/solution information. Additional information on some risk factors can be found in the General Risk Factor Solutions Manual.

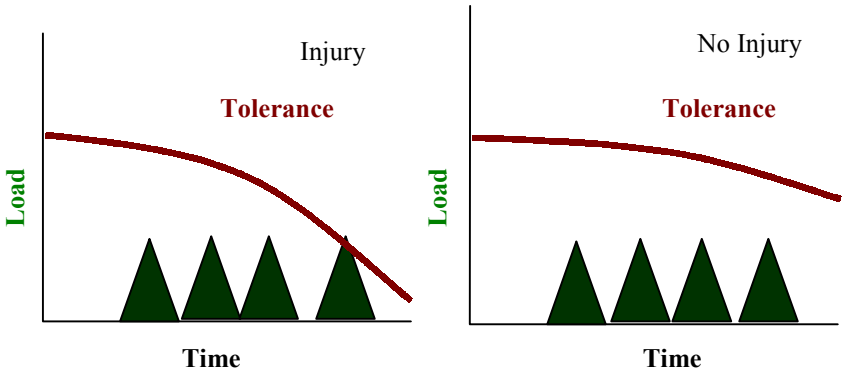
Injury Prevention

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 Tilt Hoist 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

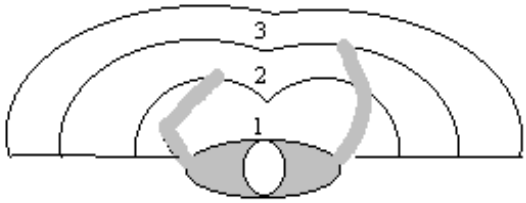
PERSONAL PROTECTIVE EQUIPMENT
These are devices worn by a worker to reduce the risk of injury, including gloves, kneepads, hearing protection, and leather aprons.

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

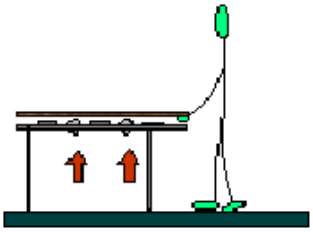
Generally, the most frequently used items should be placed within a forearm's reach, with less frequently used items placed within a comfortable arm's reach, and infrequently used items placed within a fully extended arm's reach. For more specific recommendations on working reaches, please consult anthropometric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

Camelback chains

E Use camelback chains to reduce the number of jam-ups occurring at the workstation.

Roller bars

E Add roller bars between the chains to reduce the amount of force needed to pull the lumber to trim.



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 Tilt Hoist Operator, identify the body part of most concern. If the main concern is the:

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

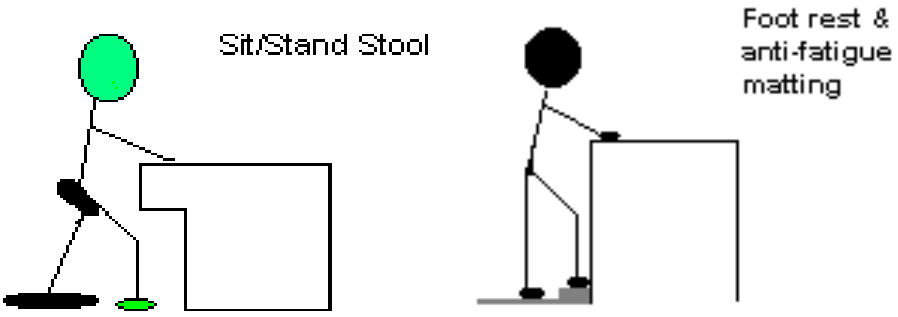
For more specific guidelines on matching the working heights with the tasks performed please consult anthropometric tables or an ergonomist.

SEATING

Sit/stand stool

E
WP

In order to minimise fatigue 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.



FLOOR SURFACES

Anti-fatigue matting

E

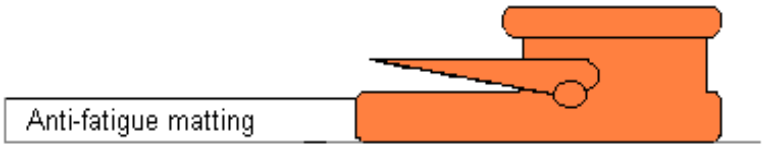
In order to minimise fatigue in the lower extremities, anti-fatigue matting can be installed. The use of anti-fatigue matting in the work area will help to increase comfort and reduce muscle fatigue. The cushioned surface encourages continuous micro-movements of the feet, which minimises blood pooling in the feet and legs and the associated discomfort. Addition of anti-fatigue matting may also aid in damping vibration levels.

FOOT PEDALS

Recessed foot pedals

E

In order to minimise awkward postures of the ankle, recess foot pedals into anti-fatigue matting to decrease the height of the foot pedal base. To recess foot pedals, and provide a more comfortable standing surface in the process, position anti-fatigue matting as close as possible to the foot pedal base. If the pedals are stationary, cut the matting to surround the front of the foot pedal. For moveable foot pedals, place the matting as close to the base of the foot pedal as possible. The height of the matting should not exceed the base of the foot pedal (see diagram below). It is important to ensure pedals are kept clean of debris and are well maintained.



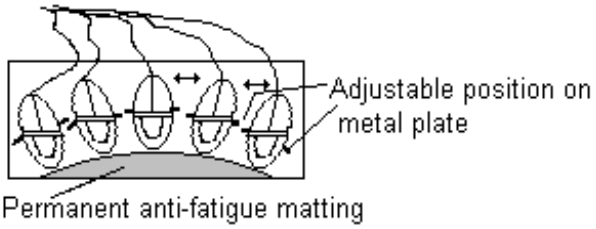
Moveable foot pedals

E
WP

In order to reduce awkward postures of the lower extremities, allow operators to choose the most appropriate position for the pedals, based on their body dimensions and the workstation design.

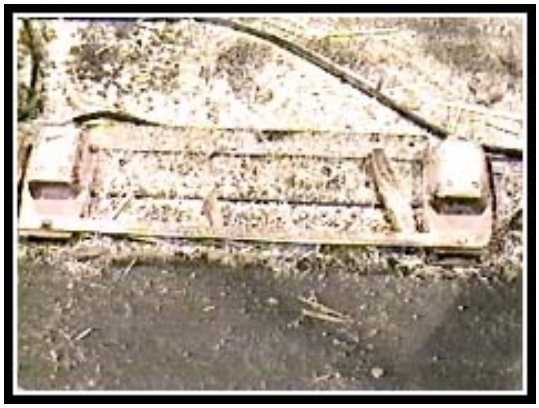
Securing the foot pedals may be required or desirable. Three solutions include:

1) Providing moveable foot pedals on a metal plate. The foot pedals are positioned in slide tracks cut into the metal, which allow pedals to move into the desired positions. The pedals are then fastened into place. The operator is able to move the set of foot pedals to any desired position in the workstation.



2) Providing several positions on the floor where clips or nails may be used to secure foot pedals. If this option is considered, make sure each possible position is highly visible to all operators, to prevent tripping or injuries.

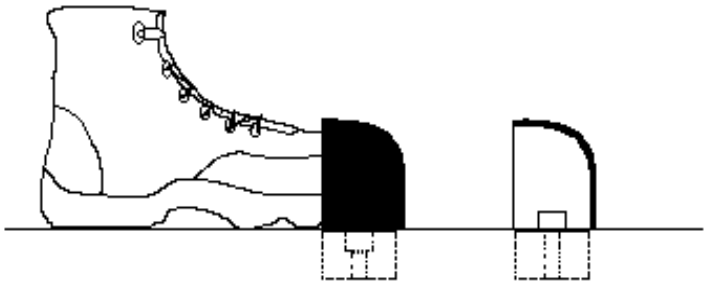
3) Providing a physical link (e.g., a metal bar) between two foot pedals with the same function. This solution is most appropriate where a worker may move to manipulate lumber but still needs to operate the foot pedals.



Foot push buttons

E

In order to eliminate awkward ankle postures, foot buttons can be chosen over foot pedals in certain circumstances. In general, foot controls leave the upper body free to manipulate or handle items, while still maintaining control over the process or equipment. For processes or equipment that require a control to produce a discrete action (e.g., on/off, start/stop) or maintain a continuous process (e.g., movement of a chain), a foot push button may be appropriate. The desired operation (e.g., chain running) is easily activated by the weight of the operator on the push button. When the foot is removed, the switch is deactivated, causing the process to stop. For safety reasons, a foot push button needs to be protected from accidental activation. A guard, similar to those used on foot pedals, may be appropriate.

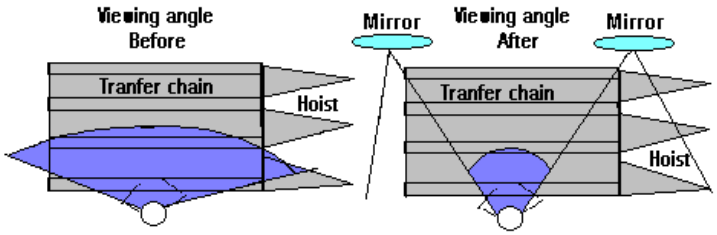


ADDITIONAL WORKSTATION DESIGN OPTIONS

Mirrors or monitors

E

Add mirrors or video cameras to decrease viewing angles (left and right) for the operator. This also may aid in seeing potential jam-ups before they occur.



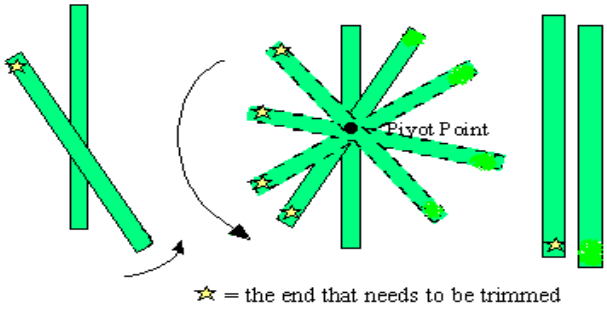
Characteristics of Objects Being Handled

LOAD CONDITION AND WEIGHT DISTRIBUTION

Turning boards

WP

Often boards need to be turned in order to view defects or to trim the lumber. By using the technique described below, one piece of lumber is used as a pivot point for the piece of lumber that is to be turned.



1) Place the piece of lumber that needs to be turned on top of the 2nd piece of lumber. Holding both pieces of lumber, pull the lumber that requires inspection out to the side (as seen in the figure).

2) Push the lumber that requires inspection counter-clockwise and let go allowing the lumber to rotate on the pivot point. This motion swings the end of the board that you want trimmed in towards you.

3) Pull the lumber out to its trim length.

CONTAINER, TOOL AND EQUIPMENT HANDLES

Tool handles

E

In order to reduce the force required to grip hand tools, increase the friction between the tool handles and the operator's glove. Due to the smooth, slippery surface of metal or wooden tool handles (e.g., pike pole, picaroon) a Tilt Hoist Operator 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 Tilt Hoist Operator's glove, and thus decrease the grip forces required.

Gloves

E

In order to reduce grip forces required by the Tilt Hoist Operator, 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

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

Summary of Solutions

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

		Injury Prevention Potential										
SOLUTIONS	**Page**	Neck	Neck/ Shoulder	Shoulder	Elbow/Wrist	Wrist	Wrist/ Hand	Low Back	Hip	Knee	Ankle	Foot
Working Reaches	**76**		**A**	**A**	**A**	**A**		**A**				
Camelback chains	**76**	**R**	**R**	**F R**	**R**	**R**		**F R**				
Roller bars	**76**			**F**	**F**	**F**		**F**				
Working Heights	**77**	**A**	**A**					**R A**				
Sit/stand stool	**78**	**A**						**S**			**A S**	
Anti-fatigue matting	**78**							**S**			**S**	
Foot pedals	**79**										**R A S**	**A S**

Direct Risk Factors

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

Summary of Solutions

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

		Injury Prevention Potential										
SOLUTIONS	**Page**	Neck	Neck/ Shoulder	Shoulder	Elbow/Wrist	Wrist	Wrist/ Hand	Low Back	Hip	Knee	Ankle	Foot
Mirrors or monitors	**81**	**A S**										
Turning boards	**81**		**R**	**F R**				**F A**				
Tool handles	**82**			**F**	**F A**	**F A**						
Gloves	**82**				**F**	**F**						
Heat Exposure	◆	indirectly reduces risk of injury to the body										
Cold Exposure	◆	indirectly reduces risk of injury to the body										
Lighting	◆	indirectly reduces risk of injury to the body										
Noise	◆	indirectly reduces risk of injury to the body										
Vibration	◆	directly reduces risk of injury to the back and wrist										
Rest breaks	◆	indirectly reduces risk of injury to the body										
Job Rotation	◆	indirectly reduces risk of injury to the body										
Task Rotation	◆	indirectly reduces risk of injury to the body										
Work Pace	◆	indirectly reduces risk of injury to the body										
Scheduling	◆	indirectly reduces risk of injury to the body										

Direct Risk Factors

F = *Force* **R** = *Repetition* **A** = *Awkward Postures*
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◆ = *See General Risk Factor Solutions Manual*

TILT HOIST OPERATOR MSI SAFETY GUIDE

OBJECTIVE: To identify ergonomic risks involved in tilt hoist operation and to reduce the potential for musculoskeletal injuries.
More detailed information about risk reducing recommendations can be found in the Work Manual for the Tilt Hoist Operator.

CHECK IF THIS APPLIES	ACTIVITY OF RISK	DIRECT RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Neck A Tilt Hoist Operator must look down and to the sides (neck) in order to inspect lumber for defects.	**Repetition** **Awkward Postures** **Static Postures**	• 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. • 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 or side bent position. The more the neck bends, the greater the load on the muscles and tendons. • When the neck is held still in a forward bent or twisted position, the muscles of the neck must remain tense to support the weight of the head. If the constant stress is sufficient, and recovery is not adequate, the tissues may fatigue to the point of injury.	• If twisting cannot be avoided, try to turn the head in both directions. • When bending or twisting the head, keep the chin tucked in and the ears in alignment with the shoulders. • Try to keep the head in an upright position while viewing the lumber. • Use the eyes and the neck (not just the neck) to view the lumber. • For exercises that can help prevent ***neck*** injuries, ***see the neck section of the Body Manual***.

CHECK IF THIS APPLIES	ACTIVITY OF RISK	ERGONOMIC RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Neck/Shoulder A Tilt Hoist Operator frequently holds their arms away from the body in order to guide lumber from the stack to the sorting table, or to turn lumber.	**Repetition** **Awkward Postures**	• When the arms are repeatedly lifted, the muscles of the neck and shoulder are subjected to repeated stress with little or no time for recovery. If the repetitive stress is excessive, and recovery is not adequate, the tissues may fatigue to the point of injury. • 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.	• Try to keep the arms as close to the body as possible. • When turning boards, use one piece of lumber as a pivot point for the piece of lumber that needs to be turned. • For exercises that can help prevent ***neck*** and ***shoulder*** injuries, ***see the neck and shoulder sections of the Body Manual***.
	Shoulder A Tilt Hoist Operator must push and pull lumber in order to straighten pieces and look for defects.	**Force** **Repetition** **Awkward Postures**	• The rotator cuff stabilises the shoulder joint when objects are manipulated. The heavier the object, the greater the load on the rotator cuff. • If the force placed on the rotator cuff exceeds the tissue tolerances, injury may occur. • 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. • 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.	• Position yourself as close to the lumber as possible. • Avoid sudden forceful movements of the arms. Use smooth motions while keeping the arms close to the body. • For exercises that can help prevent ***shoulder*** injuries, ***see the shoulder sections of the Body Manual***

CHECK IF THIS APPLIES	ACTIVITY OF RISK	ERGONOMIC RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Elbow/Wrist A Tilt Hoist Operator must grip boards in order to turn pieces to look for defects.	**Force** **Repetition** **Awkward Postures**	• Gripping an object requires activation of the forearm muscles, generating tension at the tendon/bone connection of the elbow. • Repeated stress to the elbow without adequate rest could fatigue tissues to the point of injury. • Gripping with a bent wrist requires increased muscle tension. • Extremely wide or narrow grip spans also require more muscle tension.	• Use only as much gripping force as is necessary. • Maintain a straight wrist position. • Whenever possible, try using both hands. • For exercises that can help prevent ***elbow*** injuries, ***see the elbow section of the Body Manual***.
	Wrist A Tilt Hoist Operator must grip pieces with the wrists bent in order to turn them.	**Force** **Repetition** **Awkward Postures**	• Gripping an object requires activation of the forearm muscles, generating tension in the tendons and sheaths running through the wrist. • Repeated gripping and bending of the wrist causes stress to the tendon sheaths. • 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.	• Whenever possible, try using both hands to grip and manoeuvre the lumber. • Use only as much force as is necessary to grip and manoeuvre the lumber. • Avoid fast jerking motions when handling lumber. Use smooth motions while maintaining the wrist in a neutral position. • Move the elbow and shoulder when handling lumber, not just the wrist. • For exercises that can help prevent ***wrist*** injuries, ***see the wrist section of the Body Manual***.

CHECK IF THIS APPLIES	ACTIVITY OF RISK	ERGONOMIC RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Low Back A Tilt Hoist Operator must bend forward in order to handle lumber.	**Force** **Repetition** **Awkward Postures**	• 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. • Repeated forward bending can gradually fatigue the structures of the low back. If the stress is excessive, and recovery is not adequate, the disc walls may fatigue to the point of injury. • 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 the pressure on the walls of the discs.	• Try to keep the back in a neutral position (ears, shoulders, and hips aligned). • When lifting, hold object close to the body and do not twist the torso. • For exercises that can help prevent ***back*** injuries, ***see the back section of the Body Manual***.

CHECK IF THIS APPLIES	ACTIVITY OF RISK	ERGONOMIC RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Ankle A Tilt Hoist Operator frequently activates foot pedals in order to operate the hoist and chains.	**Repetition** **Awkward Postures**	• Lifting the foot to activate a foot pedal puts the ankle into an awkward posture, increasing the load in the muscle on the front of the shin. The further away from the neutral posture the ankle is, the greater the loading to this muscle. Rigid and heavy shoes also increase this loading. • Repetitive use of foot pedals may gradually cause small tears in the muscle on the front of the shin. If the repetitive stress is excessive, and recovery is not adequate, the tears may progress to a more significant problem.	• Stretch the ankles before and during work to make sure the muscles and ligaments are loose. • For exercises that can help prevent ***ankle*** injuries, ***see the ankle section of the Body Manual***.
	Foot A Tilt Hoist Operator must continually press down on foot pedals in order to activate the hoist and chains.	**Awkward Postures** **Static Postures**	• Pressing down on a foot pedal while the ankle is bent leads to increased loading on the plantar fascia. • Continual standing on foot pedals can cause tissue in the foot to deform and breakdown over time. If the tissue deformation is excessive and recovery not adequate, an injury may occur.	• Alternate using the toe of the foot and the heel of the foot to activate the foot pedals. This will use more muscles of the leg, increasing circulation in this area. • Wear shoes with adequate support and cushioning. • Replace shoes before they wear out. • For exercises that can help prevent ***foot*** injuries, ***see the foot section of the Body Manual***.