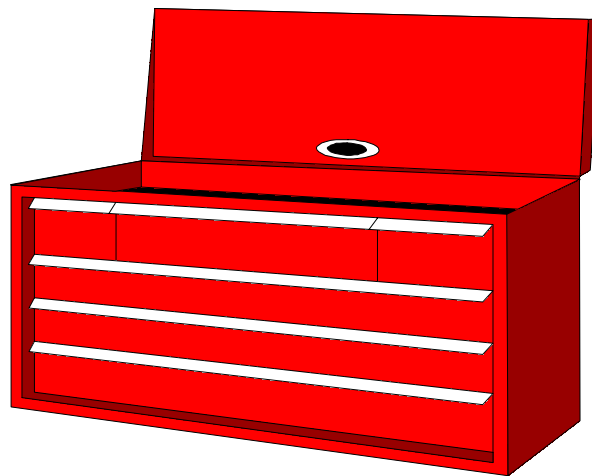


INDUSTRIAL MUSCULOSKELETAL INJURY REDUCTION PROGRAM

Common Industry Jobs (CIJs) Lumber Straightener 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

LUMBER STRAIGHTENER TOOL KIT

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Overview

Lumber Straightener

Job Summary

A Lumber Straightener is responsible for maintaining the flow of lumber between lumber processing equipment. A Lumber Straightener will monitor decks/chains, straighten/turn boards, clear cross-ups, remove waste lumber, and clean up the work area. Refer to the Physical Demands Analysis for more detail.

Physical Demands

The physical demands of the Lumber Straightener may include:

- a) Forceful exertions of the shoulder, elbow/wrist, and back
- b) Repetitive movements of the neck, shoulder, elbow/wrist, and ankle
- c) Awkward postures of the neck, shoulder, elbow/wrist, back, and ankle
- d) Standing
- e) Climbing
- f) Walking
- g) Balancing on foot pedals

Mental Demands

A Lumber Straightener may monitor one or more decks for cross-ups, or potential cross-ups. The Lumber Straightener has to respond quickly to dynamic work situations.

Major Variations

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

- 1) A Lumber Straightener may monitor:
 - a) One transfer deck/chain
 - b) Multiple transfer decks/chains

- 2) A Lumber Straightener may control decks/chains using:
 - a) Foot pedals
 - b) Push/pull buttons

Minor Variations

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

- 1) A Lumber Straightener may clear cross-ups using one or more of the following:
 - a) Pike pole
 - b) Picaroon
 - c) Chainsaw
 - d) Circular saw
 - e) Axe

- 2) A Lumber Straightener may clean up using:
 - a) A broom
 - b) A scraper

Physical Demands Analysis Lumber Straightener

PDA General Instructions: Lumber Straightener

The purpose of this PDA is to familiarise healthcare professionals with the physical demands of a Lumber Straightener. This PDA can be used to gather information about an individual's job and to assist in developing a rehabilitation and return-to-work plan. It is not intended for use in claims adjudication.

Where applicable, common industry job data (e.g., hand tools, tasks) have been included in the tables of this document. The information reported was collected from a sample of Lumber Straightener(s) in the BC Sawmill Industry. However, the PDA requires completion by the healthcare professional, with input from the injured worker to highlight tasks that aggravate the injury or prevent the worker from returning to their job. The worker's supervisor may be contacted for further information or verification of tasks.

A PDA should be filled out for each individual worker following an injury. Subsequent changes in the work process may reduce the accuracy of any pre-existing physical demands assessments. The IMIRP Society accepts no responsibility for the use or misuse of this Physical Demands Analysis, or for the accuracy of the PDA as it applies to any specific workplace.

Disclaimer

*The IMIRP Society accepts no responsibility for the use or misuse of the PDA,
or the accuracy of the PDA as it applies to any specific workplace.*

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Physical Demands Analysis Lumber Straightener

Task List

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

Monitor decks

A Lumber Straightener monitors and controls transfer decks/chains to make sure wood is flowing properly.

Does this task occur at your mill?

Yes No



Straighten and turn lumber

A Lumber Straightener may straighten and turn lumber to ensure the proper flow of wood on transfer decks/chains.

Does this task occur at your mill?

Yes No



Clear jam-ups

A Lumber Straightener manually clears any cross-ups or jam-ups that may occur on the transfer deck.

Does this task occur at your mill?

- Yes No



Remove waste lumber

A Lumber Straightener may have to remove waste lumber from the transfer deck/chain.

Does this task occur at your mill?

- Yes No



Clean up

A Lumber Straightener may have to clean up the work area and/or the transfer decks/chains.

Does this task occur at your mill?

- Yes No



Mark lumber

A Lumber Straightener may have to mark some lumber pieces for special use, such as value added processing.

Does this task occur at your mill?

Yes No



Clear chipper

A Lumber Straightener may have to clear jam-ups in the chipper.

Does this task occur at your mill?

Yes No



Job Profile

Date: _____

Company Name: _____

Division: _____

Employee Name: _____

Supervisor: _____

Phone: _____

Fax: _____

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

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

Describe:

Length of shift _____ hours

Formal breaks

- Two 10 minute breaks
- One 30 minute lunch break
- Other: _____

Informal breaks

- Yes, length of break varies
- Yes, _____ minutes/shift

Work pace control

- Self-paced
- Time pressure (e.g., completing a task during the 30 minute lunch break)
- Other: _____

Job rotation

Describe:

Yes No

Work Organisation

Task Description

The table below contains a list of tasks performed by a Lumber Straightener. Use the left column to check off tasks that are present. Estimate the *Percent of Shift* each task is performed and place a check mark in the appropriate column. The *Comments* section may be used to include information related to duration, frequency, and cycle times. Additional tasks can also be included under *Other*.

Task	Percent of Shift				Comments
	Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
<i>Monitor decks</i>					<ul style="list-style-type: none"> • <i>Frequency varies depending on flow of lumber</i>
<i>Straighten and turn lumber</i>					<ul style="list-style-type: none"> • <i>Frequency varies depending on flow of lumber</i>
<i>Clear cross-ups</i>					<ul style="list-style-type: none"> • <i>Frequency varies depending on number of cross-ups that occur during shift</i> • <i>Increases occur with runs of wood that break or catch easily</i>
<i>Remove waste lumber</i>					<ul style="list-style-type: none"> • <i>Frequency varies depending on quality of lumber</i>
<i>Clean up</i>					<ul style="list-style-type: none"> • <i>Frequency depends on downtime and/or quantity of debris on deck</i> • <i>Sub-tasks include placing scrap wood in waste conveyors and sweeping the area</i>
<i>Mark lumber</i>					<ul style="list-style-type: none"> • <i>See Grader Tool Kit</i>
<i>Clear chipper</i>					<ul style="list-style-type: none"> • <i>See Chipper Operator Tool Kit</i>
<i>Other:</i>					

Workstation Characteristics

Dimensions & Layout

Sketch workstation(s) and indicate relevant measurements, such as working heights and reaches.

Flooring, Displays and Seating

The table below lists several components of a workstation. For *Flooring* and *Displays* there are several options provided. Please indicate all of the options that apply to the workstation. For the *Seating* section, describe and identify the features of the seat, if applicable. The *Comments* section may be used to include additional information, especially any workstation characteristics of concern.

Workstation Characteristics	Comments
<p>Flooring (<i>Check all that apply</i>)</p> <p><input type="checkbox"/> Cement</p> <p><input type="checkbox"/> Wood</p> <p><input type="checkbox"/> Rubber matting</p> <p><input type="checkbox"/> Metal</p> <p><input type="checkbox"/> Other _____</p>	
<p>Displays (<i>Check all that apply</i>)</p> <p><input type="checkbox"/> Lights on console</p> <p><input type="checkbox"/> Mirrors</p> <p><input type="checkbox"/> Video monitors</p> <p><input type="checkbox"/> Computer monitors</p> <p><input type="checkbox"/> Scrolling display</p> <p><input type="checkbox"/> Signal lights</p> <p><input type="checkbox"/> Other: _____</p>	
<p>Seating (<i>Check all that apply</i>)</p> <p><input type="checkbox"/> Armrests</p> <p><input type="checkbox"/> Backrest</p> <p><input type="checkbox"/> Swivel seat</p> <p><input type="checkbox"/> Slide track</p> <p><input type="checkbox"/> Lumbar support</p> <p><input type="checkbox"/> Foot rest</p> <p><input type="checkbox"/> Casters # _____</p> <p><i>Indicate if adjustable:</i></p> <p><input type="checkbox"/> Height</p> <p><input type="checkbox"/> Armrests</p> <p><input type="checkbox"/> Backrest</p> <p><input type="checkbox"/> Forward tilt</p>	<p>Height of seat: _____ cm</p> <p>Depth of seat: _____ cm</p> <p>Width of seat: _____ cm</p> <p>Covering type: _____</p>

Equipment & Machinery Controls

The table below contains a list of the types of controls used by a Lumber Straightener. Use the left column to check off controls that are present at the work site. Highlight controls that may aggravate the injury, or which the worker finds difficult to use. The *Comments* section may be used to include any additional information. Additional controls can be included under *Other*.

Type of Control	Function	Comments	
	<i>Foot pedal</i>	<ul style="list-style-type: none"> • <i>Operate chains</i> • <i>Operate rollers</i> 	<ul style="list-style-type: none"> • <i>Frequency depends on flow of wood and number of cross-ups</i>
	<i>Push buttons</i>	<ul style="list-style-type: none"> • <i>Operate chains</i> 	<ul style="list-style-type: none"> • <i>Frequency depends on flow of wood and number of cross-ups</i>
	<i>Rotary selector switches</i>	<ul style="list-style-type: none"> • <i>Activate light to indicate when operator is in area or cross-up is present</i> • <i>Operate chains</i> 	<ul style="list-style-type: none"> • <i>Frequency depends on flow of wood and number of cross-ups</i>
	<i>Switches</i>	<ul style="list-style-type: none"> • <i>Activate light to indicate when operator is in area or cross-up is present</i> • <i>Operate chains</i> 	<ul style="list-style-type: none"> • <i>Frequency depends on flow of wood and number of cross-ups</i>
	<i>Other:</i>		

Physical Demands

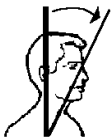
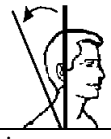
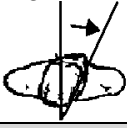

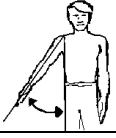
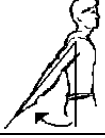
Whole Body Physical Demands

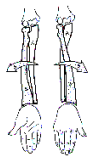

Identify each of the physical demands required by a Lumber Straightener and list the corresponding tasks in the second column. Check off (✓) the estimated *Percent of Shift*, and use the *Comments* section to include information related to duration, frequency, and cycle times.

Physical Demands	Tasks or Activity	Percent of Shift				Comments
		Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
<i>Example: Walking</i>	• <i>Clear cross-ups</i>		✓			• <i>Frequency depends on number of cross-ups</i>
<i>Walking</i>						
<i>Sitting</i>						
<i>Standing</i>						
<i>Climbing</i>						
<i>Balancing</i>						
<i>Kneeling/ Crouching</i>						
<i>Other:</i>						





Body Postures





The table below outlines the body postures that may be adopted throughout the shift by a Lumber Straightener, related to tasks. Check off (✓) the estimated *Percent of Shift*, and use the *Comments* section to include information describing posture duration, frequency, cycle times, and hand used.

Body Posture	Task(s)	Percent of Shift				Comments
		Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
<i>Example: Shoulder Extension</i>	<ul style="list-style-type: none"> Monitor decks 		✓			<ul style="list-style-type: none"> 5 to 9 times per minute Pulls lumber backward to trim for defects
Neck						
<i>Flexion</i> 						
<i>Extension</i> 						
<i>Twisting</i> 						
Shoulder						
<i>Flexion</i> 						
<i>Abduction/adduction</i> 						
<i>Extension</i> 						

Body Posture	Task(s)	Percent of Shift				Comments
		Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
Forearm						
<i>Rotation</i> 						
Wrist						
<i>Wrist Movements</i> 						
Hand/Fingers						
<i>*Handling</i>						
<i>*Fingering</i>						
<i>*Gripping</i>						

Legend for Hand/Fingers

<i>Handling</i>	<i>grasping, turning, holding, etc.</i>			
<i>Fingering</i>	<i>picking, pinching, etc.</i>			
<i>Gripping</i>	<i>Power</i> 	<i>Pinch</i> 	<i>Hook</i> 	<i>Precision</i> 

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						
<i>Flexion</i> 						
<i>Lateral Flexion</i> 						
<i>Twisting</i> 						
<i>Extension</i> 						

Manual Material Handling

The table below contains a list of general manual material handling activities performed by a Lumber Straightener. Indicate tasks that require one or more of these activities, and fill in the weight of the objects, or the force required, for each action. Check off (✓) the estimated *Percent of Shift*, and use the *Comments* section to include information related to duration, frequency, cycle times, and characteristics of objects handled. If necessary, please refer to Appendix A to calculate the weight of the wood being handled.

Activity	Task Description	Weight (kg)	Percent of Shift				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
<i>Pushing</i>							<ul style="list-style-type: none"> Frequency is higher when trimming for length
<i>Pulling</i>							<ul style="list-style-type: none"> Frequency depends on quality of lumber and lug speed
<i>Lifting</i>							<ul style="list-style-type: none"> Occurs mostly when uncrossing lumber on the deck
<i>Lowering</i>							
<i>Carrying</i>							

Hand Tools

Indicate the hand tools used by a Lumber Straightener by placing a check mark (✓) in the far left column. Determine the weight of the hand tool and enter it in the appropriate column. Check off (✓) the estimated *Percent of Shift*, and use the *Comments* section to include information related to duration, frequency, cycle times, and characteristics of objects handled.

Type of Tool	Task(s)	Weight (kg)	Percent of Shift				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
✓ <i>Picaroon</i>		<i>1.5 to 1.7</i>					
✓ <i>Pike Pole</i>		<i>2.0 to 3.9</i>					

Environmental Conditions

Work Environment

The table below contains a list of environmental conditions that may be of concern. If any of these factors aggravate the injury, describe in the *Comments* section.

Factor	Comments
Vibration (Indicate source) <input type="checkbox"/> Seat <input type="checkbox"/> Floor <input type="checkbox"/> Tool <input type="checkbox"/> Other: _____	
Noise level	
Lighting level	
Other:	

Location of Workstation

The table below contains a list of potential work environments. Indicate with a check mark (✓) in the left column which of the work environments apply to the specific workstation. For example, the workstation may be inside a building with both a local fan and heater, exposed to the outside by a doorway that is always open. In this situation, 'Inside exposed', 'Heater present', and 'Fan present' would all be checked.

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. Indicate the appropriate region with a check mark (✓) in the left column. Refer to the regional map in Appendix B of the PDA.

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

Personal Protective Equipment

The table below contains a list of the personal protective equipment (PPE). For the Lumber Straightener job at your mill, indicate with a check mark (✓) which of the PPE items are required.

<input type="checkbox"/>	Gloves Type:	<input type="checkbox"/>	Hard Hat	<input type="checkbox"/>	Leather Apron
<input type="checkbox"/>	Glove Liners	<input type="checkbox"/>	Steel-toed Boots	<input type="checkbox"/>	Dust Mask
<input type="checkbox"/>	Eye Protection	<input type="checkbox"/>	Hearing Protection	<input type="checkbox"/>	Seat Belt
<input type="checkbox"/>	Face Shield/Helmet	<input type="checkbox"/>	Life Jacket	<input type="checkbox"/>	Harness
<input type="checkbox"/>	Knee Pads	<input type="checkbox"/>	Other:	<input type="checkbox"/>	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.

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

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

2. Size of Wood*

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

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

* Conservative estimates of actual wood dimensions

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

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

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

3. Length of Wood

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

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

4. Weight of Wood Equation*

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

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

$$2.95 \text{ (wet lb./ board foot)} \times 0.67 \text{ (size of wood multiple for 2" x 4")} \times 16 \text{ (length of board in feet)} = 32 \text{ lbs.}$$

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

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

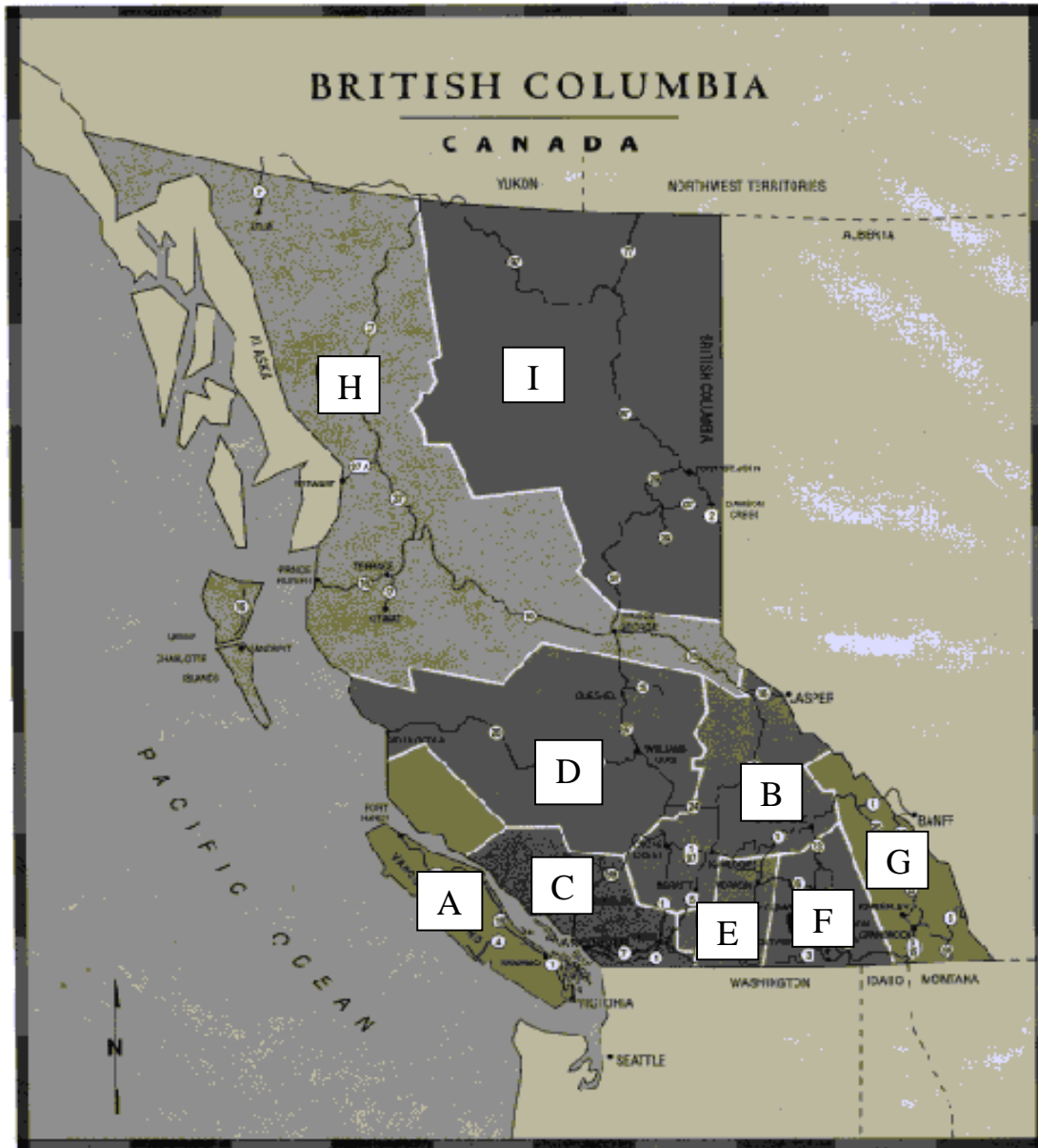
For the lightest species handled, enter the lb./board foot value, the multiple for the smallest size of wood, and the shortest length of this wood. Multiply these values together to determine the weight of the board in pounds.

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

Type of Wood Handled (lb./ board foot) <i>From Section 1</i>	x	Multiple (size of wood) <i>From Section 2</i>	x	Length of Wood <i>From Section 3</i>	=	Weight of the Board in pounds	Divide by 2.2 to calculate value in kilograms
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

Lumber Straightener

Purpose

The Risk Factor Identification Checklist for a Lumber Straightener 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 – Lumber Straightener

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.

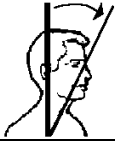
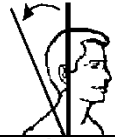
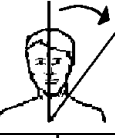

Static Postures: Static loading (sustained exertions) is physical effort (body postures) that is held, requiring muscle contraction for more than a short time.

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.

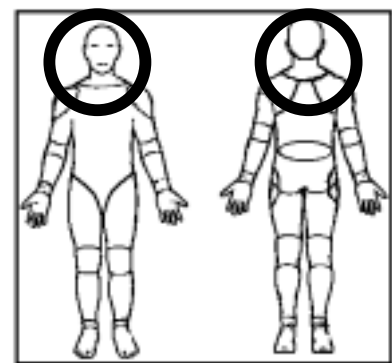
Awkward Postures: Awkward postures occur when there is a deviation from a power working posture. Some examples of awkward postures typically include reaching behind, twisting, working overhead, and forward or backward bending.

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 up or down frequently)			S O	
Ask the worker: Do you spend a large percentage of the day performing one action or task?			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 transfer decks/chains)			S O	
Awkward Posture				
Flexion			S O	
Extension			S O	
Lateral Bending			S O	
Rotation			S O	



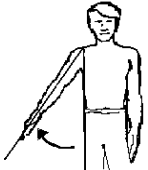
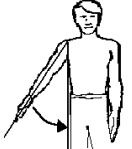
Please indicate whether the following direct risk factors were identified at the NECK .		
Direct Risk Factors	Repetition	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Static Posture	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Awkward Posture	<input type="checkbox"/> Yes <input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



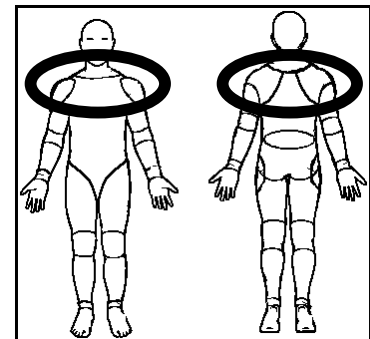
Body parts within the circled area will be classified as NECK issues.

SHOULDER

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., clearing cross-ups)		S O	
Ask the worker: Do you spend a large percentage of the day performing one action or task?		S O	
Static Posture			
Ask the worker: Do tasks require your shoulders to be maintained in a fixed or static posture? (e.g., using controls on control panel)		S O	
Ask the worker: Do you hold parts, tools, or objects for long periods?		S O	




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

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



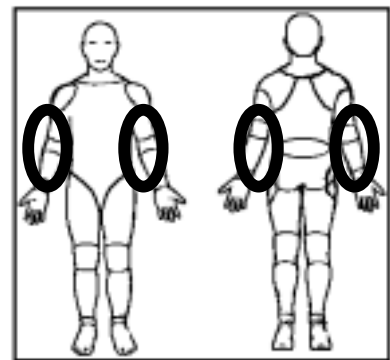
Body parts within the circled area will be classified as SHOULDER issues.

ELBOW

Force		N	Y	Comments:
Is forceful physical handling performed? Such as:				
Lifting			S	
			O	
Lowering			S	
			O	
Pushing			S	
			O	
Pulling			S	
			O	
Carrying			S	
			O	
Turning boards			S	
			O	
Are objects handled in a power grip? (e.g., pike pole, picaroon)			S	
			O	
Are objects handled in a pinch grip? (e.g., lumber)			S	
			O	
Are objects handled in a hook grip? (e.g., lumber)			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., turning lumber)				S
				O
Ask the worker: Do you spend a large percentage of the day performing one action or task?				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?			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., workstation digging into elbow)			S O	
Vibration				
Ask the worker: Is vibration transmitted to your hand through a tool or piece of equipment? (e.g., chainsaw)			S O	





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



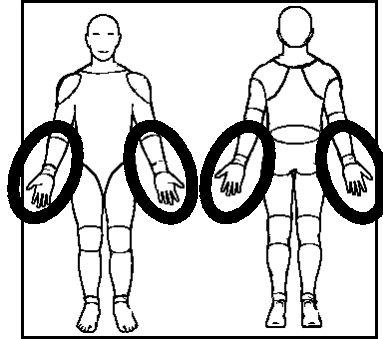
Body parts within the circled area will be classified as ELBOW issues.

WRIST/HAND

Force		N	Y	Comments:
Is forceful physical handling performed? Such as:			S	
Lifting			O	
Lowering			S	
			O	
Pushing			S	
			O	
Pulling			S	
			O	
Carrying			S	
			O	
Turning materials			S	
			O	
Are objects handled in a power grip? (e.g., pike pole, picaroon)			S	
			O	
Are objects handled in a pinch grip? (e.g., lumber)			S	
			O	
Are objects handled in a hook grip? (e.g., lumber)			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., turning lumber)				S
				O
Ask the worker: Do you spend a large percentage of the day performing one action or task?				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? (e.g., holding a chainsaw)			S O	
Ask the worker: Do you apply constant pressure on controls/objects with your hand? (e.g., advancing chains manually)			S O	
Ask the worker: Do you hold parts, tools, or objects for long periods?			S O	
Contact Stress				
Ask the worker: Do any objects, tools or parts of the workstation put pressure on any parts of your hand or arm, such as the backs or sides of fingers, palm or base of the hand, forearm? (e.g., hand tools that dig into the palm of the hand)			S O	
Ask the worker: Do you use your hand like a hammer for striking? (e.g., loosening lumber in cross-ups)			S O	
Awkward Posture				
Flexion			S O	
Extension			S O	
Ulnar Deviation			S O	
Radial Deviation			S O	
Vibration				
Ask the worker: Is vibration transmitted to your hand through a tool or piece of equipment? (e.g., chainsaw, circular saw)			S O	





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



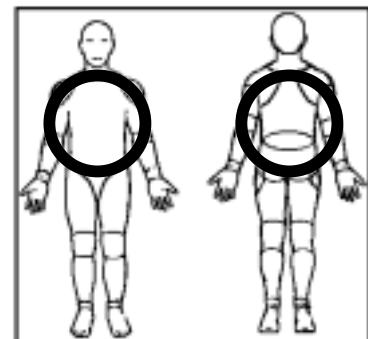
Body parts within the circled area will be classified as WRIST issues.

LOW BACK OR HIP/THIGH

Force		N	Y	Comments:
Is forceful physical handling performed? Such as:			S	
Lifting			O	
Lowering			S	
			O	
Pushing			S	
			O	
Pulling			S	
			O	
Carrying			S	
			O	
Repetition				
Are identical or similar motions performed over and over again? (e.g., bending over to clear cross-ups)			S	
			O	
Ask the worker: Do you spend a large percentage of the day performing one action or task?			S	
			O	
Static Posture				
Ask the worker: Do tasks require your trunk and upper body to be maintained in a fixed or static posture?			S	
			O	
Are workers required to sit or stand in a stationary position for long periods of time during the shift? (e.g., standing to monitor the transfer decks/chains)			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., railings that dig into the thigh or hip)			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 catwalks)			S O	

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

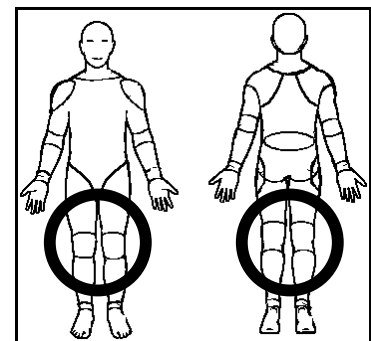


Body parts within the circled area will be classified as LOW BACK issues.

KNEE


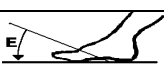
Repetition		N	Y	Comments:
Are identical or similar motions performed over and over again? (e.g., climbing stairs, crouching)			S O	
Static Posture				
Ask the worker: Do tasks require you to maintain your knee(s) in a fixed or static posture?			S O	
Are workers required to sit or stand in a stationary position for long periods of time during the shift? (e.g., standing while turning lumber)			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)? (e.g., kneeling on a transfer deck)			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	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Static Posture	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Contact Stress	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Awkward Posture	<input type="checkbox"/> Yes <input type="checkbox"/> No
In the Injury Statistics investigation, were there injury reports for the Knee or Hip/Thigh? (see Worksheet 1 in the Implementation Guide)		<input type="checkbox"/> Yes <input type="checkbox"/> No
In the Discomfort Survey investigation, were there reports of discomfort for the Knee or Hip/Thigh? (see Worksheet 2 in the Implementation Guide)		<input type="checkbox"/> Yes <input type="checkbox"/> No

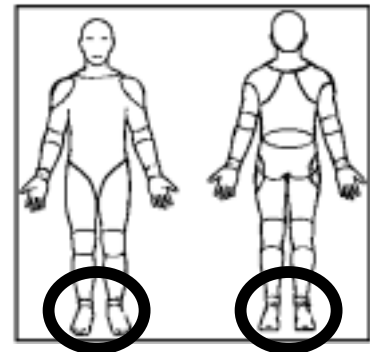


Body parts within the circled area will be classified as KNEE issues.

ANKLE/FOOT

Repetition		N	Y	Comments:
Are identical or similar motions performed over and over again? (e.g., walking on uneven surfaces)			S O	
Static Posture				
Are workers required to stand in a stationary position for long periods of time during the shift? (e.g., standing to monitor decks/chains)			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 catwalks)			S O	

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



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

CHARACTERISTICS OF OBJECTS BEING HANDLED

	N	Y	Comments:
Are there problems handling a load due to its size or shape? (e.g., lumber)			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., clearing cross-ups)			S O
Are handles for tools and equipment inappropriate in terms of size or shape? (e.g., chainsaw, circular saw)			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 question 1 in 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	N	Y	Comments:
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]

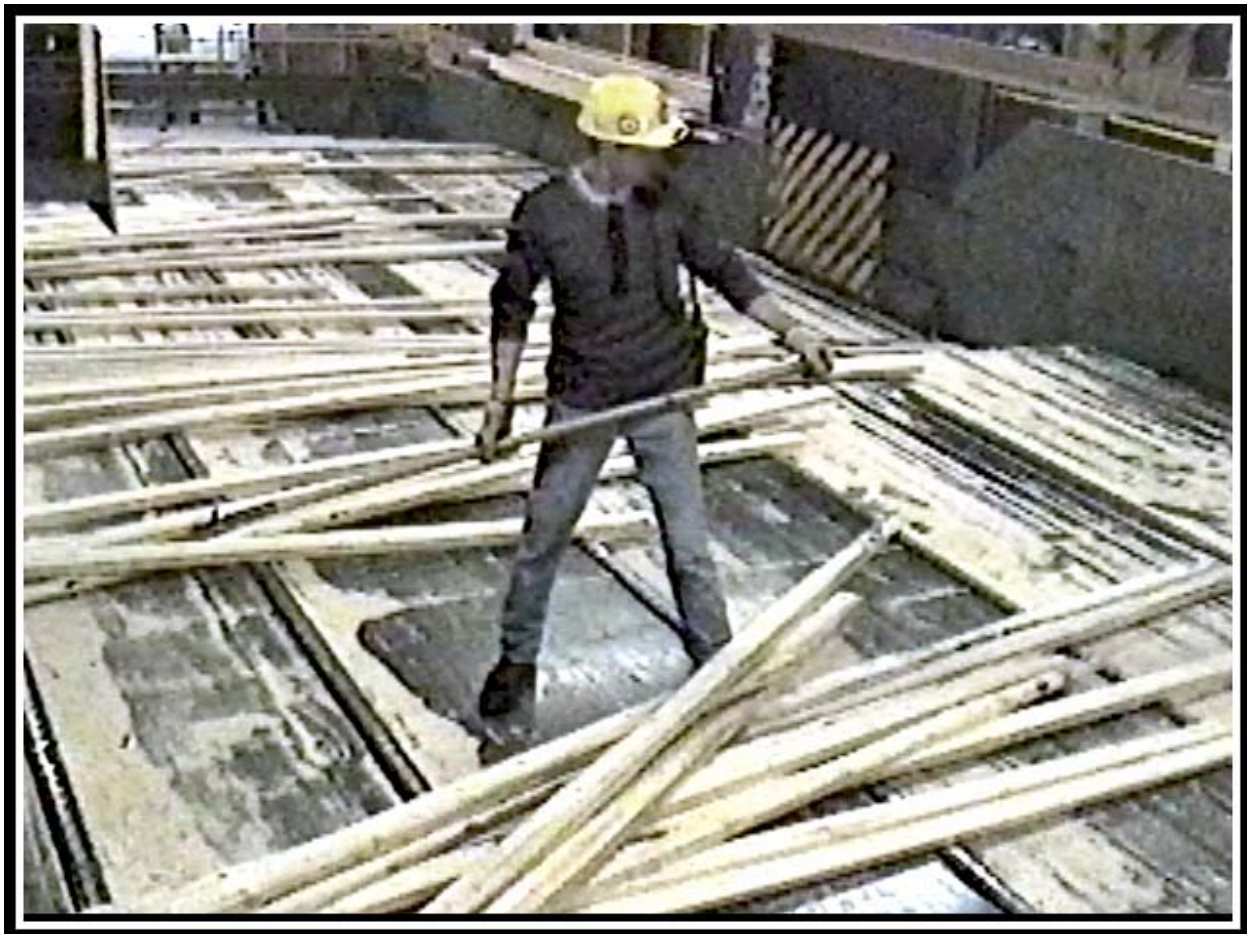
Noise	N	Y	Comments:
Have there been complaints on the level of noise in the work area?		S O	
Ask the worker: Are there any distracting or annoying noises at the workstation? (e.g., high-pitched sounds from machinery)		S O	

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? (e.g., cross-ups on more than one deck at once)		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**



Lumber Straightener

This Work Manual contains information about the body parts found to be at risk of musculoskeletal injury (MSI) for the Lumber Straightener (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

Lumber Straightener

Disclaimer

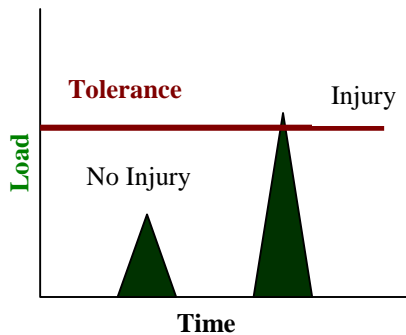
The BC sawmill IMIRP documents were developed by Advanced Ergonomics Inc. (AEI) based on analyses conducted in a number of voluntary, participating sawmills in British Columbia and should be considered applicable only to the BC sawmill industry. Modification to these documents may reduce their usefulness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

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Injury Education

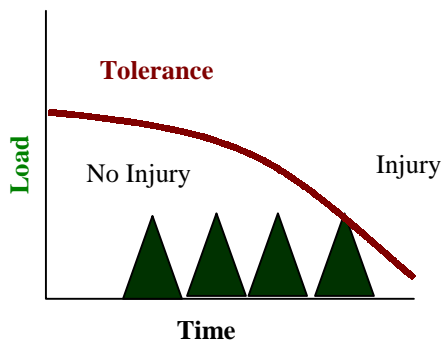
*Injuries occur when ...
Loads exceed tissue tolerances*



Excessive Force

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

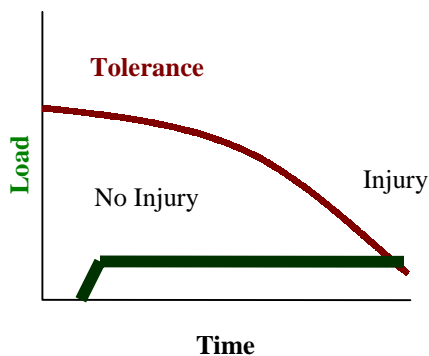
Example – a worker going over on their ankle and spraining it.



Excessive Repetition

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

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



Excessive Duration

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

Example – a Grader developing neck tension.

Body Parts at Risk

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

After all of the appropriate information is collected during the investigation of the Lumber Straightener 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 Lumber Straightener. 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.

Major Risk Identification

IMIRP ergonomists have assessed the Lumber Straightener position and found that the shoulder and low back are the body parts of major concern while performing the duties. Focussing on solutions that target the areas of major concern will likely reduce the greatest risks associated with this job.

Shoulder: Major risks include repetitive and awkward postures of the shoulder while clearing cross-ups, removing waste lumber, and straightening and turning lumber. The amount of force required to manipulate the lumber can also contribute to the risk of discomfort or injury.

The following solutions are targeted at reducing the risk of injury to the shoulder:

1. Mechanical aids (page 73)
2. Accessible lock-out systems (page 78)
3. Manual material handling (page 79)

Low Back: Major risks include straightening and turning lumber, clearing cross-ups and removing waste lumber.

The following solutions are targeted at reducing the risk of injury to the low back:

1. Mechanical aids (page 73)
2. Braced postures (page 74)
3. Manual material handling (page 79)

For additional stretching and strengthening exercises that would benefit a Lumber Straightener, refer to the Shoulder and Low Back sections of the Body Manual.

NECK

Direct Risk Factors:
Awkward Postures
Repetition



A Lumber Straightener may look down and/or to the side in order to monitor the transfer decks/chain.

BACKGROUND INFORMATION

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

DIRECT RISK FACTORS

Awkward Postures

- Neck muscles are required to turn the head to the side. The farther 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/backward/side bent position. The more the neck bends, the greater the load on the muscles and tendons.

Repetition

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

INDIRECT RISK FACTORS

Workstation Design

Additional Workstation Design Options

- Loading on the neck muscles is increased because the orientation of the worker, with respect to the infeed and outfeed decks/chains, requires the operator to repeatedly bend and/or twist the neck in order to monitor the work area.

CONSEQUENCES

- When the head is in a forward bent or twisted posture repetitively, 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 83 to 85.
- For exercises that can help to prevent *neck* injuries, see the *Neck section of the Body Manual*.

NECK/SHOULDER

Direct Risk Factors:
Awkward Postures
Repetition



A Lumber Straightener frequently works with the arms away from the body in order to straighten 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) elevate the shoulders, and the larger muscles of the shoulders (e.g., deltoids) raise the arms.

DIRECT RISK FACTORS

Awkward Postures

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

Repetition

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

INDIRECT RISK FACTORS

Workstation Design

Working Heights

- Loading on the muscles of the neck/shoulder increases when the height of the transfer deck causes the worker to work in an awkward posture, with the arms away from the body.

Working Reaches

- Loading on the neck/shoulder muscles increases for Lumber Straighteners who have to reach forward to turn lumber due to an obstructed access to the transfer chain.

CONSEQUENCES

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

SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Neck/Shoulder, please see the column labelled “Neck/Shoulder” in the Summary of Solutions on pages 83 to 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 Awkward Postures
--



A Lumber Straightener may push/pull and/or manipulate the lumber in order to clear cross-ups, remove waste lumber, and straighten lumber.

BACKGROUND INFORMATION

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

DIRECT RISK FACTORS

Force

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

Awkward Postures

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

INDIRECT RISK FACTORS

Workstation Design

Working Heights

- Loading on the shoulder muscles increases when the working heights are below waist height. Frequently, the Lumber Straightener will have to clear cross-ups on decks that can only be accessed by standing on them, or by reaching over a railing with a pike pole to access decks below them. The farther the object is away from the body, the greater the load on the shoulder when trying to lift, lower, push, or pull.

Working Reaches

- Loading on the shoulder muscles increases when working reaches are excessive. Pike poles are often used to reach waste lumber and clear cross-ups. When the load is farther away from the body, greater strain is placed on the shoulder muscles.

Characteristics of Objects Being Handled

Load Condition and Weight Distribution

- Loading on the shoulder muscles increases when the centre of gravity of the object is further away from the body. When straightening lumber, only the end of the piece is handled by the worker, increasing the load on the shoulder.

CONSEQUENCES

- When using the arms to push and/or pull and/or 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 83 to 85.
- For exercises that can help to prevent *shoulder* injuries, see the *Shoulder section of the Body Manual*.

ELBOW/WRIST

Direct Risk Factors:

Force
Awkward Postures
Repetition



A Lumber Straightener may grip lumber in order to turn, straighten, or remove it.

BACKGROUND INFORMATION

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

DIRECT RISK FACTORS

Force

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

Awkward Postures

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

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

Repetition

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

INDIRECT RISK FACTORS

Characteristics of Objects Being Handled

Size and Shape

- Loading on the elbow/wrist increases because the Lumber Straightener handles lumber of varying size and shape, which affects how the operator handles the lumber. The larger the pieces, the greater the force that is needed to manipulate the lumber.

Container, Tool, and Equipment Handles

- Loading on the elbow/wrist increases with the use of pike poles and picaroons. Pike poles and picaroons with slippery handles require more grip force to control, leading to increased tension and fatigue in the forearm muscles.

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 83 to 85.
- For exercises that can help to prevent *elbow* injuries, see the *Elbow section of the Body Manual*.

LOW BACK

Direct Risk Factors:
Force
Awkward Postures

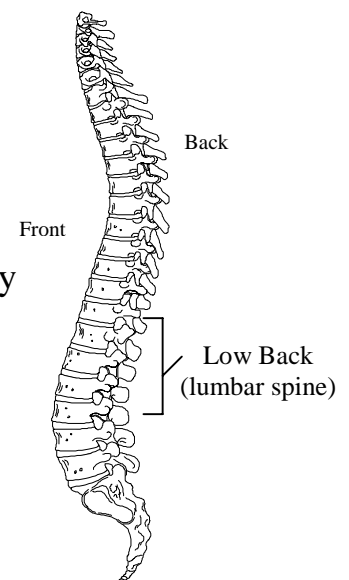


A Lumber Straightener may bend forward in order to clear cross-ups, straighten and remove lumber.

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.

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 Heights

- Loading on back muscles increases when working heights are below waist level. Frequently, a Lumber Straightener will have to bend over to clear cross-ups on decks that can only be accessed by standing on the deck, or by reaching over a railing with a pike pole to access lower decks. The further the object is away from the body the greater the load on the back when trying to lift, lower, push, or pull.

Working Reaches

- Loading on the back muscles increases when working reaches are excessive. Pike poles are used to reach waste lumber and clear cross-ups that are not within reach distance. The farther the load is away from the body, the greater the strain on the back muscles when supporting the forward-flexed upper body.

Characteristics of Objects Being Handled

Load Condition and Weight Distribution

- Loading on the back muscles increases when the centre of gravity of an object is away from the body and no mechanical advantage is available. When straightening lumber the majority of the weight of the lumber is away from the worker, thus increasing the load on the back.

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

ANKLE

Direct Risk Factors:
Awkward Postures
Repetition



A Lumber Straightener frequently activates foot pedals in order to operate chains and rollers.

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

- Loading on the ankle is increased when the height or angle of the foot pedal demands that the ankle be positioned in an awkward posture.

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 83 to 85.

FOOT

Direct Risk Factors:
Vibration



A Lumber Straightener may stand on a hard, vibrating surface in order to monitor the transfer decks/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 is responsible for producing the arch in our feet.

DIRECT RISK FACTORS

Vibration (whole body)

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

INDIRECT RISK FACTORS

Workstation Design

Floor Surfaces

- Floors that are too hard can increase the vibration transmission to the feet. Uneven flooring can also cause discomfort in the feet with static standing.

CONSEQUENCES

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

SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Foot, please see the column labelled “Ankle/Foot” in the Summary of Solutions on pages 83 to 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 Lumber Straightener may look down and/or to the side in order to monitor the transfer decks/chain.



NECK/SHOULDER

- A Lumber Straightener frequently works with the arms away from the body in order to straighten lumber.



SHOULDER

- A Lumber Straightener may push/pull and/or manipulate the lumber in order to clear cross-ups, remove waste lumber, and straighten lumber.



ELBOW/WRIST

- A Lumber Straightener may grip lumber in order to turn, straighten, or remove it.



LOW BACK

- A Lumber Straightener may bend forward in order to clear cross-ups, straighten and remove lumber.



ANKLE

- A Lumber Straightener frequently activates foot pedals in order to operate chains and rollers.



FOOT

- A Lumber Straightener may stand on a hard, vibrating surface in order to monitor the transfer decks/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	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆

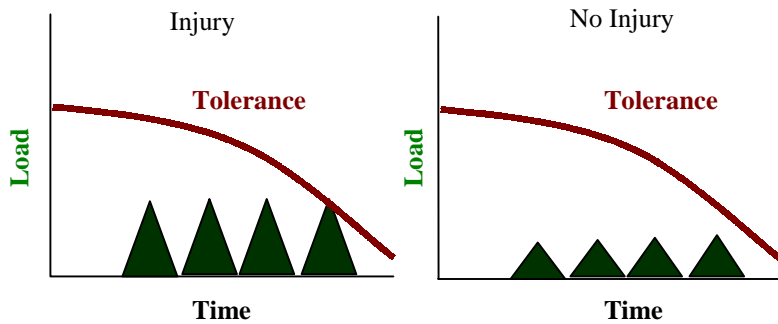
* Extended exposure to any risk factor can increase the likelihood of injury. For solutions designed to decrease the duration of exposure to any risk factor please refer to the Work Organisation section of the General Risk Factor Solutions Manual

** 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.

- = 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 83 to 85 for specific problem/solution information. Additional information on some risk factors can be found in the General Risk Factor Solutions Manual.

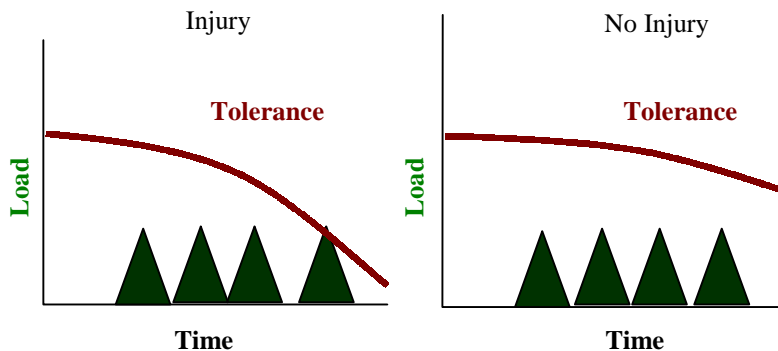
Injury Prevention

*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 Lumber Straightener 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

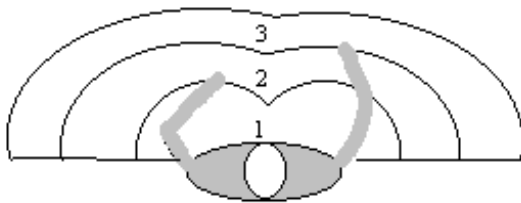
These are devices worn by a worker to reduce the risk of injury, including gloves, kneepads, hearing protection, and leather aprons.

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.

Stretch and strengthen upper body

WP

In order to increase the tissues' tolerance to deal with the stress of handling crossed boards, stretch and strengthen the upper body. See the Body Manuals for the Neck, Shoulder, Elbow, Wrist, and Back for strengthening exercises.

Reduce reaching

E
WP

In order to decrease awkward postures from reaching, use a lightweight long pike pole or picaroon to straighten lumber and remove waste pieces. Provide various lengths of pike poles for different tasks or situations.

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.

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

Lock-out

WP In order to decrease awkward shoulder postures due to working heights, a Lumber Straightener should lock out transfer decks to get closer to the load. By locking out, a Lumber Straightener will be able to get into safe positions where they are able to adopt a stronger position to use tools to clear cross-ups.

Adjust working heights

E Clearing cross-ups on transfer decks that are elbow height and above can force workers to place themselves in awkward postures of the neck, shoulder, and low back while using handtools. The work areas should be modified by adding raised work platforms or decreasing table heights to allow workers to remain in stronger positions.

Look down with eyes

WP To reduce neck bending, look down with the eyes.

Good postural alignment

WP To maintain good postural alignment and decrease uneven loading on neck tissues from bending forward, perform the wall exercise in the Body Manual for the Neck.

Mechanical aids

E To reduce or minimise awkward postures of the shoulders, neck, and back while performing repetitive forceful movements, mechanical aids such as a hoist or a grapple should be provided while clearing cross-ups.

Braced postures

WP

To reduce the load on the low back, a Lumber Straightener should use the safety rail or guard to brace the lower body. When reaching forward, bracing the lower body against the safety rail or guard reduces the amount of muscle activity in the low back. The safety rail or guard should be padded to avoid contact stress. The Lumber Straightener should try to use a free arm to support the upper body when possible.

FLOOR SURFACES

Anti-fatigue matting

E

In order to minimise fatigue in the lower extremities, anti-fatigue matting can be installed in areas where workers stand for long periods of time. 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. In addition, anti-fatigue matting may also aid in damping vibration levels. Anti-fatigue matting is a practical solution when a worker spends a majority of their time in one area, and the matting does not hinder the safety of the worker or the performance of the task.

Anti-fatigue insoles

WP
PPE

If however a worker must stand in several different areas for long periods of time, in order to minimise fatigue in the lower extremities, it may be more practical to use anti-fatigue insoles in work boots. The cushioned surface of the insole can absorb repeated impact from walking on metal catwalks, and may aid in damping vibration while standing in one spot.

Anti-slip material on deck

E

To In some situations, high traffic areas of a transfer deck may be covered with an anti-slip material. The anti-slip material may help to prevent strains and sprains of the knee and ankle whenever Lumber Straighteners perform tasks.

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

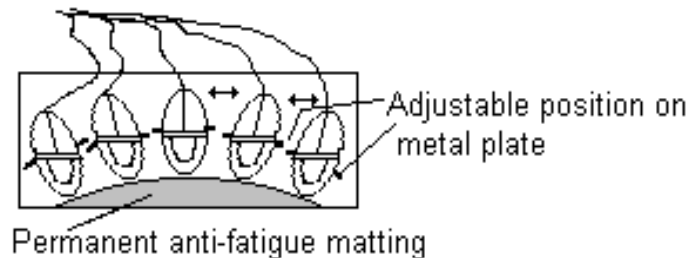
In order to reduce awkward postures of the lower extremities, allow operators to choose the most appropriate position for the pedals, based on their body dimensions and the workstation design.

Secured foot pedals

E

Securing the foot pedals may be required or desirable whenever practical. 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.

Appropriate footwear

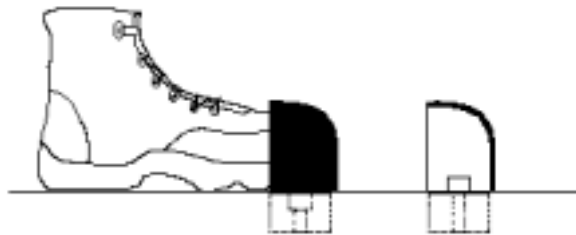
PPE

In order to ensure healthy foot alignment, purchase appropriate footwear. Some additional features to consider include a good tread on the sole to prevent slipping on the deck. See the guidelines for footwear in the Body Manual for the Foot.

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.



Alternate toe-heel activation

WP

In order to decrease repetitive and awkward postures, 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.

Stretch lower leg muscles

WP

In order to decrease risk of injury at the ankle, stretch the muscles of the lower leg before and during work to make sure the muscles are loose. For instructions and illustrations, see the calf stretch in the Back section of the Body Manual and the heel cord stretch in the Foot section of the Body Manual.

ADDITIONAL WORKSTATION DESIGN OPTIONS

Convex mirror

E

The Lumber Straightener has to monitor the lumber coming into and going out of the workstation. To do this, repetitive neck twisting is required, placing strain on the neck muscles and putting the worker at risk for an injury. To decrease this motion, install a convex mirror to give an overall view of the transfer decks. Only when a problem occurs does the operator have to turn their head to assess the corrective action necessary.



Mirrors increase the range of view for the worker, reducing awkward postures and decreasing the risk of injury.

Turn body

WP

In order to decrease repetitive and awkward postures of the neck, turn the trunk and the eyes, not just the neck, to watch lumber flow.

Accessible lock-out systems

E

To encourage the use of the electrical lock-out system it should be in an accessible location. Locking out will allow a Lumber Straightener to get closer to a load and potentially minimise awkward body postures and high forces while clearing cross-ups. The more difficult it is to access the lock-out system, the less likely it will be used.

Catwalks and stairs

E

To increase accessibility, modify catwalks by providing an extended balcony over areas where cross-ups occur frequently. Provide stairs in areas of frequent deck access to promote the use of stairs instead of jumping.

Characteristics of Objects Being Handled

Power positions

WP

Use power positions when handling loads or exerting force on objects. Using larger and stronger muscles when doing heavy or forceful work reduces the risk of muscle strain. For lifting, a power position is adopted when a worker remembers to ‘lift with the legs, not the back’. This phrase is based on the fact that the muscles of the thighs are larger and more powerful than the muscles of the low back. Other examples of using power positions include, using leverage to help move heavy objects and lumber when possible, and using the hips and legs to push debris on the floor when sweeping.

Manual material handling

WP

The following work practices refer specifically to manual material handling tasks. These tasks include lifting, lowering, pushing, pulling, carrying, and holding objects.

- Use the entire body, especially the large muscle groups of the lower body, to perform a movement.
- To reduce loading on the soft tissues of the back, lift heavy objects with a neutral back posture while maintaining the 3-point curve (the natural “S”- shaped curve of our back. See diagram on page 11). Do not use a pelvic tilt.
- Do not twist while holding or moving a load. This places the back in a weaker posture that can lead to injury.
- When possible, balance loads being carried on each side of the body. This minimises loading on the soft tissues of the back and hips.
- When lifting, carrying, or holding objects, keep them as close to the body as possible. The farther the load is away from the body, the more stress it puts on the back.

SIZE AND SHAPE

Two hands at once

WP

In order to reduce loading on elbow/wrist when handling lumber, use both hands to push, pull, lift, or lower larger pieces of lumber. This coupling will significantly decrease the load on one hand when doing the same task.

LOAD CONDITION AND WEIGHT DISTRIBUTION

Pike pole use

WP

In order to reduce loading on the shoulder and back when handling lumber on the end of pike poles, pick the appropriate pike pole for the job. The pike pole should be longer than the distance from the operator to the object to be retrieved. This extra distance will prevent the pike pole from striking the operator if the pike pole detaches from the object, and will also give the operator some extra grip length if the pike pole pulls away from the operator. Two hands should be used when handling the pike pole. Once the sharp end of the pike pole is stuck in the lumber, only pull on it twice before removing it from the wood. Repeat this process until the lumber is uncrossed or the jam is cleared. Also, keep the body in a strong posture by keeping arms close to the body, with elbows bent and wrists straight.

Lightweight, sharp tools

A
WP

In order to decrease the force required by a Lumber Straightener to straighten boards, ensure that the tools used to manipulate the wood (e.g., pike poles, picaroons) are lightweight and sharp.

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 Lumber Straightener 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. If slipping occurs this may be a good indicator that additional help may be required or a mechanical aid should be used. 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 Lumber Straightener's glove, and thus decrease the grip forces required.

Gloves

PPE

In order to reduce grip forces required by the Lumber Straightener, the worker should wear thin, close fitting gloves with a "sticky" palm surface to increase the friction between the gloves and the tool handles. Gloves should also prevent slivers.

Environmental Conditions

Please refer to the General Risk Factor Solutions Manual for solutions regarding environmental condition 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
Stretch and strengthen upper body	72		F	F	F			F				
Reduce reaching	72		A	A				A				
Lock-out	73		A	A								
Adjust working heights	73	A	A	A				A				
Look down with eyes	73	A										
Good postural alignment	73	A										
Mechanical aids	73			F				F				
Braced postures	74							F				
Anti-fatigue matting	74											V
Anti-fatigue insoles	74											V
Anti-slip material on deck	74									F	F	
Recessed foot pedals	75										A	
Moveable foot pedals	75										A	

Direct Risk Factors

F = Force

S = Static Postures

R = Repetition

C = Contact Stress

A = Awkward Postures

V = Vibration

Summary of Solutions

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

		Injury Prevention Potential										
SOLUTIONS	Page	Neck	Neck/ Shoulder	Shoulder	Elbow/Wrist	Wrist	Wrist/ Hand	Low Back	Hip	Knee	Ankle	Foot
Secured foot pedals	76										A	
Appropriate footwear	76											V
Foot push buttons	77										A	
Alternate toe-heel activation	77										R A	
Stretch lower leg muscles	77										A	
Convex mirror	78	A R										
Turn body	78	A R										
Accessible lock-out systems	78	A	A	A				A				
Catwalks and stairs	78	A	A	A				A				
Power positions	79			F	F			F				
Manual material handling	79			F	F			F				
Two hands at once	80				F							
Pike pole use	80							F				

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Summary of Solutions

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		Injury Prevention Potential										
SOLUTIONS	Page	Neck	Neck/ Shoulder	Shoulder	Elbow/Wrist	Wrist	Wrist/ Hand	Low Back	Hip	Knee	Ankle	Foot
Lightweight, sharp tools	80			F	F			F				
Tool handles	81				F A							
Gloves	81				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

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♦ = See General Risk Factor Solutions Manual

CHECK IF THIS APPLIES	ACTIVITY OF RISK	DIRECT RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	<p>Shoulder</p> <p>A Lumber Straightener may push/pull and/or manipulate lumber in order to clear cross-ups, remove waste lumber and straighten lumber.</p>	<p>Force</p> <p>Awkward Posture</p> <p>Repetition</p>	<ul style="list-style-type: none"> • The rotator cuff stabilises the shoulder joint when objects are pushed/pulled/manipulated. The heavier the object, or the larger the force required, the greater the load on the rotator cuff. • If the force placed on the rotator cuff exceeds the tissue tolerances, injury may occur. • 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. • 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. 	<ul style="list-style-type: none"> • When handling large boards, use the whole body, including the legs. • Turn and pull boards using both hands. • Keep tools sharpened and well maintained. • Pike poles should be lightweight and the right length for the job. The pike pole should be longer than the reach from the operator to the object. • For exercises that can help prevent <i>Shoulder</i> injuries, <i>see the Shoulder section of the Body Manual</i>.

CHECK IF THIS APPLIES	ACTIVITY OF RISK	DIRECT RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	<p>Low Back</p> <p>A Lumber Straightener may bend forward in order to clear cross ups, straighten and remove lumber.</p>	<p>Force</p> <p>Awkward Posture</p>	<ul style="list-style-type: none"> • Lifting increases the loading on the spine. Weight held in the hands is transmitted to the low back. The greater the weight, the greater the loading on the structures of the low back. • Back muscles must support the weight of the upper body when leaning forward/to the side. Increased bending of the back increases the loading on the spine and increases the pressure on the walls of the discs. 	<ul style="list-style-type: none"> • Keep the body in a strong posture, by keeping arms close to the body, with elbows bent and wrists straight. • Brace the lower body against the safety rail or guard. • Keep tools sharpened and well maintained. • Use a pike pole or picaroon to aid in handling crossed boards. • Exercise (e.g., walking) to warm up low back muscles • Drink fluids and stay in cooler locations. • For exercises that can help prevent Back injuries, <i>see the Back section of the Body Manual.</i>

CHECK IF THIS APPLIES	ACTIVITY OF RISK	DIRECT RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	<p>Ankle</p> <p>A Lumber Straightener frequently activates foot pedals in order to operate chains and rollers.</p>	<p>Awkward Postures</p> <p>Repetition</p>	<ul style="list-style-type: none"> • 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. • 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. 	<ul style="list-style-type: none"> • Stretch the ankles before and during work. • Alternate using the toe of the foot and the heel of the foot to activate the foot pedals. • For exercises that can help prevent <i>Ankle</i> injuries, <i>see the Ankle section of the Body Manual</i>.
	<p>Foot</p> <p>A Lumber Straightener may stand on a hard, vibrating surface in order to monitor the transfer decks/chains.</p>	<p>Vibration</p>	<ul style="list-style-type: none"> • Vibrating floors can increase the loading on the foot. Factors like vibration level and vibration frequency increase the amount of loading on the foot, and could lead to irritation. The longer the Lumber Straightener is exposed to vibration, the greater the risk of injury. 	<ul style="list-style-type: none"> • Use anti-fatigue insoles in shoes. • For exercises that can help prevent <i>Foot</i> injuries, <i>see the Foot section of the Body Manual</i>.