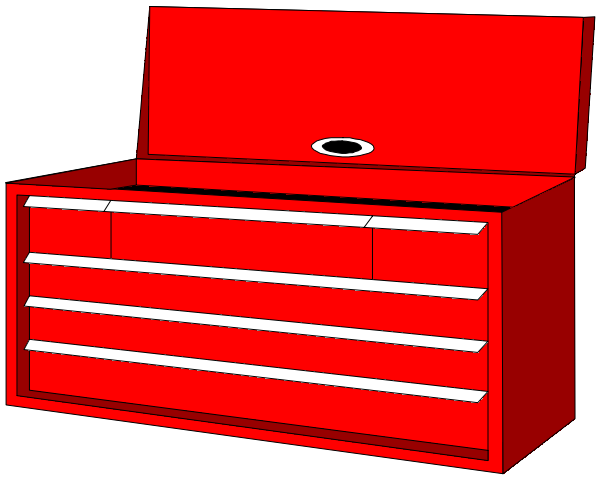
Industrial Musculoskeletal Injury Reduction Program

Common Industry Jobs (CIJs)

Edger Operator (Manual) 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

EDGER OPERATOR (MANUAL) TOOL KIT
Table of Contents

Overview
Edger Operator (Manual)

Job Summary

Edger Operators are responsible for the breakdown of lumber into suitable sizes for further manufacture. Ripping the lumber lengthwise into narrower widths does this. In the process, wane edges are removed, wide widths are reduced, and the lumber grade is raised, either by removing gross defects, or isolating them for removal further downstream. The manual operator produces the highest yield by singulating and sorting the lumber based on quality. Refer to the Physical Demands Analysis for more detail.

Physical Demands

The physical demands of the Edger Operator may include:

a) Repetitive motions of the neck, shoulders, arms, wrists, and eyes (must view several monitors at once)
b) Awkward postures of the neck, shoulders, wrists, and back
c) Pushing/pulling lumber to uncross jam-ups
d) Lifting/lowering lumber to uncross jam-ups
e) Continual standing/sitting

Mental Demands

The Edger Operator has to determine the maximum yield from a piece of lumber. To do this, the operator must observe the lumber, decide how to get the best possible yield, and then use the necessary controls accordingly. Co-ordination of these decisions and actions must be made in a relatively short period of time. Because of these requirements, the Edger Operator position can be very visually and mentally demanding.

Major Variations

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

1) The Edger Operator may have to:
   a) Feed the edger manually
   b) Unjam any crossed lumber
   c) Clean photo eyes/scanners

2) The Edger Operator may operate:
   a) An edger
   b) An unscrambler
   c) A conveyor
   d) A drop gate

3) Hand tools used may include:
   a) A picaroon
   b) A chain saw
   c) A pike pole
   d) An air hose

4) Postures adopted while edging may include:
   a) Sitting
   b) Standing
   c) Sit/standing

Minor Variations

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

1) The pace that the operator works depends upon the mill. The work pace range is 2-15 pieces/minute. This pace may be:
   a) Machine-paced
   b) Self-paced

2) Equipment operated may include:
   a) An edger machine
   b) A conveyor
   c) Transfer chains

3) Control types used may include:
   a) Joysticks
   b) Push buttons
   c) Foot pedals
   d) Switches

Physical Demands Analysis
Edger Operator (Manual)

PDA General Instructions: Edger Operator (Manual)

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

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

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

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

This PDA was generated from information collected in 1997.

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.

PDA Table of Contents

Physical Demands Analysis
Edger Operator (Manual)

Task List

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

Singulate lumber

An Edger Operator singulates incoming lumber while seated.

Does this occur at your mill?

☐ Yes ☐ No

An Edger Operator singulates incoming lumber while standing.

Does this occur at your mill?

☐ Yes ☐ No

Sort lumber

An Edger Operator sorts lumber based on quality. The Edger scans the lumber and edges it to produce the optimum yield.

Does this task occur at your mill?

☐ Yes ☐ No

Unjam lumber

An Edger Operator unscrambles cross-ups and jam-ups at the workstation.

Does this task occur at your mill?

☐ Yes ☐ No

Clean photo eyes

An Edger Operator cleans the photo eyes that scan the lumber.

Does this task occur at your mill?

☐ Yes ☐ No

Company Profile

Company Name:_____ Division:_____

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

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

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

Work Organisation

Task Description

The table below contains a list of tasks performed on an everyday basis by an Edger Operator (Manual).

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

Note the corresponding values for the percentage of the shift spent performing the task (Percentage of Shift) as found during the ergonomic investigation. The Comments section may be used to elaborate on the task description (i.e., variations between mills, frequencies, cycle times, etc.)

	Task	Percent of Shift				Comments
		Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	Singulate lumber			✓		• *Cycle time = Approximately 5 seconds*
	Sort lumber			✓		• *Cycle time = Approximately 5 seconds* • *Decision is made as to where the lumber goes*
	Un-jam lumber	✓				• *Cycle time = Approximately 1 to 5 minutes*
	Clean photo eyes	✓				• *Cycle time = Approximately 5 minutes* • *Usually done 1-3 times per shift*
	Other:					

Organisational Factors

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

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

Length of shift	☐ *8 hours* ☐
Formal breaks	☐ *Two 10 minute breaks* ☐ *30 minute lunch* ☐
Informal breaks	☐ *5 to 30 minutes depending on flow of wood* ☐
Work pace	☐ *2 to 15 pieces per minute* ☐
Work pace control	☐ *Machine-paced*
Job rotation ☐ Yes *(Check one)* ☐ No	If **Yes:** Rotation with what job(s):_____ _____ How often: (e.g., every 2 hours)_____

Workstation Characteristics

Dimensions & Layout

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

Workstation Dimensions	
Chain height (A)	cm
Control panel height	cm

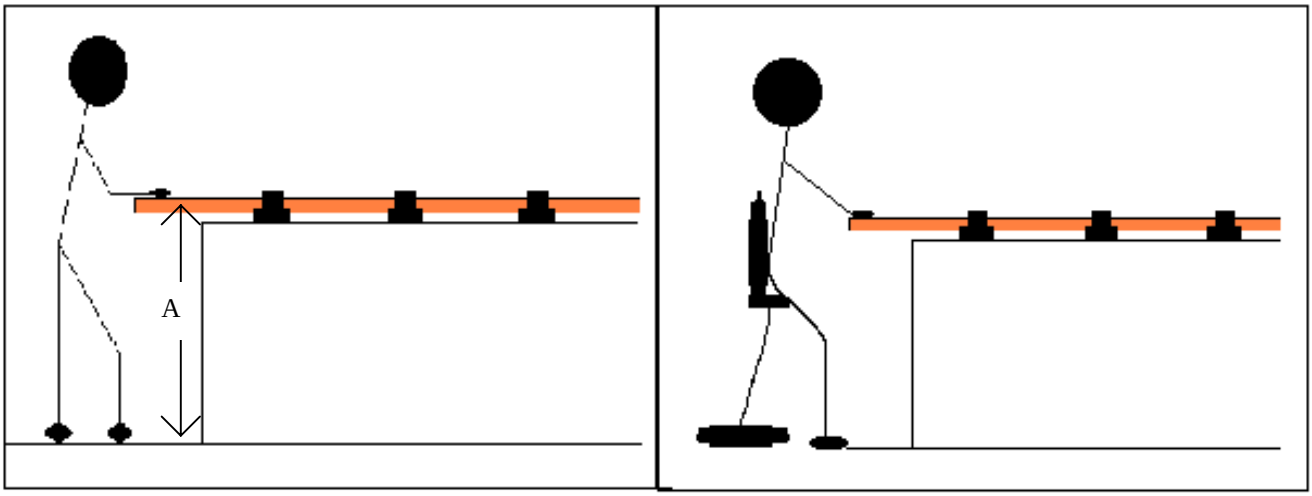


Figure 1: Edger Operator Workstation

Flooring, Displays and Seating

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

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

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

Equipment & Machinery Controls

The table below contains a list of the types of controls used by an Edger Operator (Manual).

Indicate the controls which are present at your mill by placing a check mark (✓) in the far left column. Indicate their corresponding functions by checking off the applicable box(es).

The Comments section may contain information, which describes variations between mills.

	Type of Control	Function	Frequency	Comments
	Foot pedal	☐ *Control chain* ☐ *Control drop gate*	*4 or more times per minute*	• *Functions of controls may vary from mill to mill*
	Joystick	☐ *Control chain* ☐ *Control drop gate*	*4 or more times per minute*	
	Push/pull button	☐ *Control conveyor* ☐ *Control edger* ☐ *Control unscrambler*	*2 or more times per minute*	
	Switch	☐ *Control chain*	*One time per minute*	
	Other:			

Physical Demands

Whole Body Physical Demands

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

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

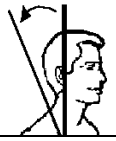
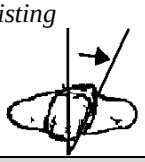
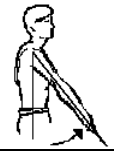
	Physical Demands	Tasks	Percent of Shift				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	Walking						*Not Applicable*
	Sitting	• *Singulating lumber* • *Sorting lumber*				✓	• *Operator either sit or stand at their workstations*
	Standing	• *Singulating lumber* • *Sorting lumber*				✓	• *Operator either sit or stand at their workstations*
	Climbing	• *Un-jamming* • *Cleaning photo eyes*	✓				• *Climbing onto conveyor* • *1-2 minutes at one time* • *every 2 hours*
	Balancing						*Not Applicable*
	Kneeling/ Crouching						*Not Applicable*
	Other:						

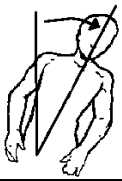
Body Postures

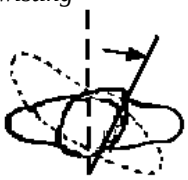
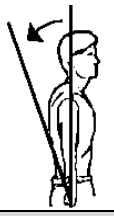
The table below outlines the body postures held or repeated throughout the shift by an Edger Operator (Manual).

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

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

	Body Posture	Task(s)	Percent of Shift				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
Neck							
	Flexion 						*Not Applicable*
	Extension 	• *Viewing monitors*		✓			• *Frequency = 10 to 15 times per minute* • *Depends on layout of workstation*
	Twisting 	• *Viewing monitors*		✓			• *Frequency = 10 to 15 times per minute* • *Depends on layout of workstation*
Shoulder							
	Flexion 	• *Singulating lumber* • *Sorting lumber*	✓				• *Reaching for lumber that is far away on chain* • *Frequency = 12 times per hour*
	Abduction 						*Not Applicable*
	Extension 						*Not Applicable*

Body Posture		Task(s)	Percent of Shift				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
Forearm							
	Rotation 						*Not Applicable*
Wrist							
	Flexion 	• *Singulating and sorting lumber*			✓		• *Frequency = 10 to 15 times per minute*
	Extension 	• *Singulating lumber* • *Sorting lumber*			✓		• *Frequency = 10 to 15 times per minute*
	Ulnar Deviation 	• *Singulating lumber* • *Sorting lumber*			✓		• *Frequency = 10 to 15 times per minute* • *Using pike pole for clearing jam-ups*
	Radial Deviation 						*Not Applicable*
Back							
	Flexion 	• *Singulating and sorting lumber*	✓				• *Frequency = 12 times per minute* • *Reaching for lumber that is far away on the chain*
	Lateral Flexion 						*Not Applicable*

Body Posture		Task(s)	Percent of Shift				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
Back							
	Twisting 						*Not Applicable*
	Extension 						*Not Applicable*
Other:							

Hand Grips

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

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

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

	Type	Task(s)	Percent of Shift				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	Power 	• *Sorting lumber* • *Un-jamming*		✓			• *Gripping joystick (varies with work technique)* • *Using pike pole*
	Pinch 	• *Singulating lumber*				✓	• *Handling lumber*
	Hook 						*Not Applicable*
	Precision 						*Not Applicable*
	Other:						

Manual Material Handling

The table below contains a list of manual material handling tasks (i.e. pushing, pulling, lifting, lowering, and carrying) performed by an Edger Operator (Manual).

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

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

	Task Description	Weight (kg)	Percent of Shift				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	Pulling on lumber to singulate	*Complete Appendix A to determine weights*			✓		
	Other:						

Hand Tools

Indicate the hand tools used by an Edger Operator (Manual) at your mill, by placing a check mark (✓) in the far left column. Determine the weight of the hand tool and place in appropriate column.

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

	Type of Tool	Task(s)	Weight of Tool (kg)	Percent of Shift				Comments
				Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	Picaroon	*Un-jamming*	*1.3*	✓				• *Frequency = 3 times per hour* • *Duration = 1 minute*
	Pike pole	*Un-jamming*	*3.5*	✓				• *Frequency = 4 times per shift* • *Duration = 1 minute*
	Air hose	*Cleaning photo eyes*		✓				• *Frequency = 4 times per shift* • *Duration = 1 to 3 minutes*
	Chain saw	*Un-jamming*	*6.8*	✓				• *Not daily* • *Duration = 5 minutes*
	Other:							

Environmental Conditions

Work Environment

The table below contains a list of environmental conditions that may be of concern at the Edger Operator (Manual) job.

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

If possible, please indicate the appropriate value for the noise and lighting levels at your mill for the Edger Operator (Manual). For the lighting level, please include the location of the measurements within the workstation.

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

Noise level	*93 to 95 dB*
Lighting level	*218 lux to 1.3 klux* Location: *workstation* Location:_____
Other	

Location of Workstation

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

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

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

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

Temperature

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

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

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

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

Personal Protective Equipment

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

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

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

Appendix A – Weight of Wood Equation

1. Type of Wood Handled

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

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

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

2. Size of Wood*

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

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

* Conservative estimates of actual wood dimensions

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

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

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

3. Length of Wood

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

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

4. Weight of Wood Equation*

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

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

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

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

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

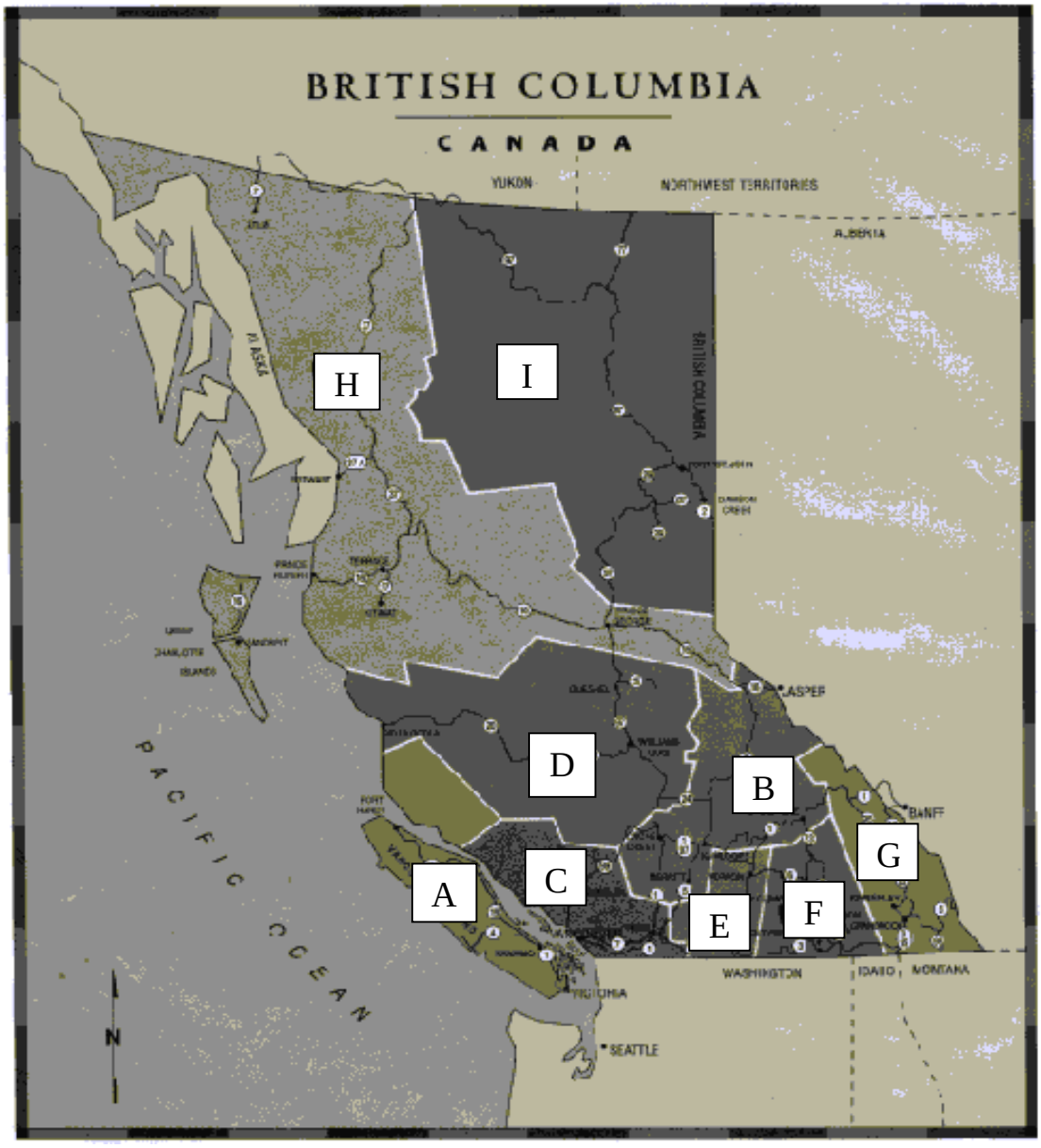
For the lightest species handled, enter the lb./board foot value, the multiple for the smallest size of wood, and the shortest length of this wood. Multiply these values together to determine the weight of the board in pounds.

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

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

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

Appendix B – Regional Map



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

Risk Factor Identification Checklist
Edger Operator - Manual

Purpose

The Risk Factor Identification Checklist for an Edger Operator - Manual 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 – Edger Operator - Manual

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.

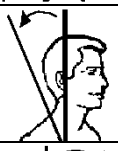
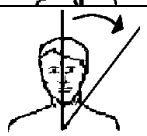
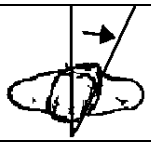
Static Postures: Static loading (sustained exertions) is physical effort (body postures) that is held, requiring muscle contraction for more than a short time.

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.

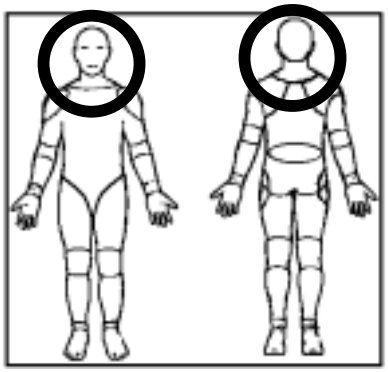
Awkward Postures: Awkward postures occur when there is a deviation from a power working posture. Some examples of awkward postures typically include reaching behind, twisting, working overhead, and forward or backward bending.

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? (e.g., handling lumber)				S O	
Static Posture					
Ask the worker: Do tasks require your neck or shoulders to be maintained in a fixed or static posture? (e.g., holding controls)				S O	
Awkward Posture					
Flexion				S O	
Extension				S O	
Lateral Bending				S O	
Rotation				S O	

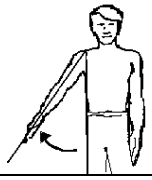
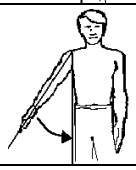
Please indicate whether the following direct risk factors were identified at the **NECK**.		
Direct Risk Factors	Repetition	☐Yes ☐No
	Static Posture	☐Yes ☐No
	Awkward Posture	☐Yes ☐No
In the **Injury Statistics** investigation, were there injury reports for the Neck or Head/Eye or Upper Back? (see Worksheet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



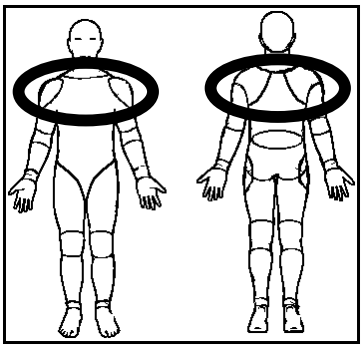
Body parts within the circled area will be classified as NECK issues.

SHOULDER

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

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

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



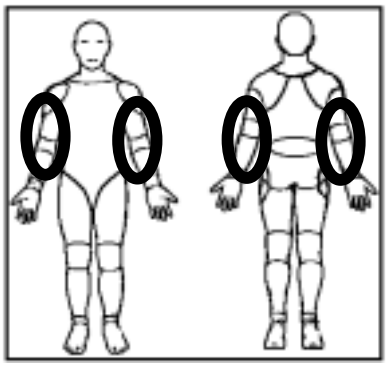
Body parts within the circled area will be classified as SHOULDER issues.

ELBOW

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

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

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



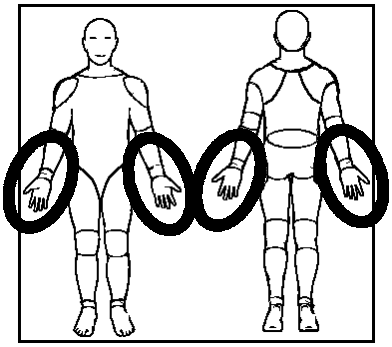
Body parts within the circled area will be classified as ELBOW issues.

WRIST/HAND

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

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

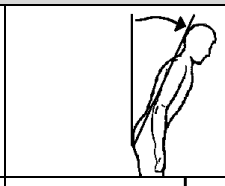
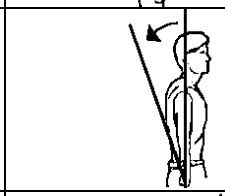
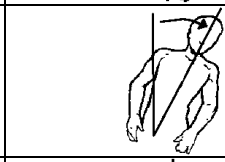
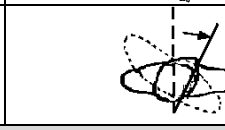
Please indicate whether the following direct risk factors were identified at the **WRIST/HAND**.		
Direct Risk Factors	Force	☐Yes ☐No
	Repetition	☐Yes ☐No
	Static Posture	☐Yes ☐No
	Contact Stress	☐Yes ☐No
	Awkward Posture	☐Yes ☐No
	Vibration	☐Yes ☐No
In the **Injury Statistics** investigation, were there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



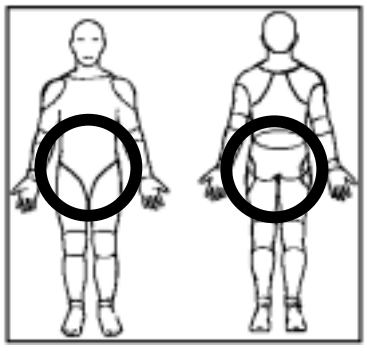
Body parts within the circled area will be classified as WRIST issues.

LOW BACK OR HIP/THIGH

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

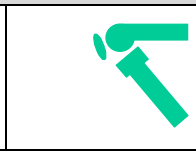
Awkward Posture		N	Y		Comments:
Flexion				S O	
Extension				S O	
Lateral Bending				S O	
Twisting				S O	
Vibration					
Ask the worker: Is your whole body exposed to vibration for significant portions of the work shift? (e.g., sitting on vibrating surface)				S O	

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

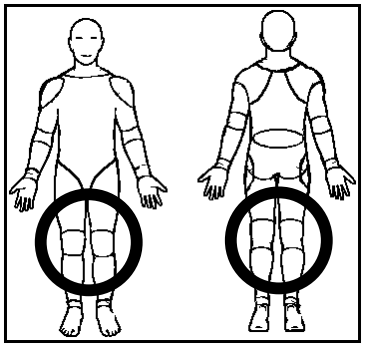


Body parts within the circled area will be classified as LOW BACK issues.

KNEE

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

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

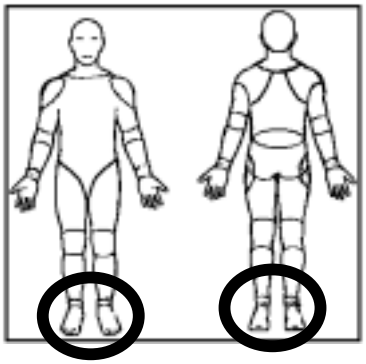


Body parts within the circled area will be classified as KNEE issues.

ANKLE/FOOT

Repetition	N	Y		Comments:
Are identical or similar motions performed over and over again? (e.g., 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?			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., sitting on vibrating surface)			S O	

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



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

CHARACTERISTICS OF OBJECTS BEING HANDLED

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

ENVIRONMENTAL CONDITIONS

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

ENVIRONMENTAL CONDITIONS [CONTINUED]

Noise	N	Y		Comments:
Have there been complaints on the level of noise in the work area?			S O	
Ask the worker: Are there any distracting or annoying noises at the workstation? (e.g., air hoses)			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., saw changes or repairs during lunch breaks)			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? (e.g., extended weekend maintenance)			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

Edger Operator

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

Edger Operator

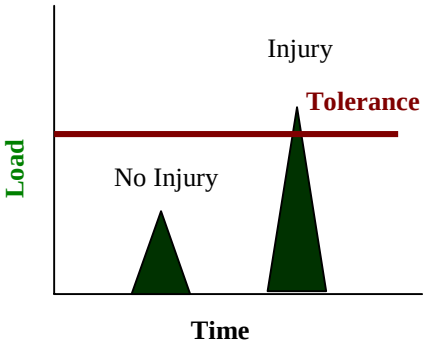
Disclaimer

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.

WM Table of Contents

Injury Education

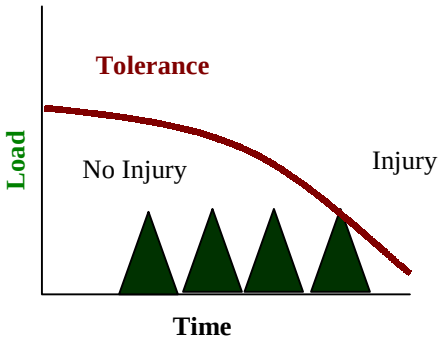
Injuries occur when …
Loads exceed tissue tolerances



Excessive Force

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

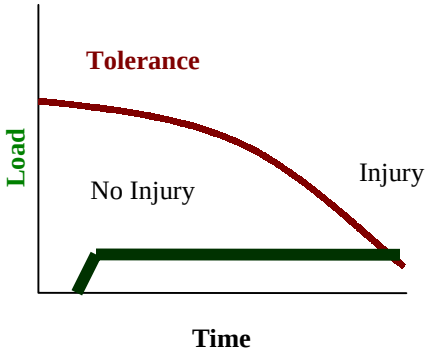
Example – a worker going over on their ankle and spraining it.



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 Edger Operator 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.

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

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

NECK

Direct Risk Factors:
Awkward Postures
Static Postures

An Edger Operator must hold the head forward in order to monitor lumber on the 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 generally occurs when the head is upright and the ears and shoulders are aligned.

DIRECT RISK FACTORS

Awkward Postures

- Neck muscles must support the weight of the head while in a forward position. The more the neck bends the greater the load on the muscles and tendons.

Static Postures

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

INDIRECT RISK FACTORS

Workstation Design

Working Heights

- Loading on the neck muscles is increased because the head is held in a forward bent position when viewing lumber on the chain.

CONSEQUENCES

- When the head is held in a forward posture, muscles and soft tissues of the neck may fatigue. Fatigue leads to an accumulation of waste products and/or a decrease in the ability to tolerate additional stress.
- Signs and symptoms include pain, tenderness, and muscle spasm in the neck area and/or 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 78& 79.
- For exercises that can help to prevent ***neck*** injuries, see the ***Neck section of the Body Manual.***

NECK

Direct Risk Factors:
Awkward Postures
Repetition

An Edger Operator must look up and to the sides in order to observe displays or monitors.

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 generally occurs when the head is upright and the ears and shoulders are aligned.

DIRECT RISK FACTORS

Awkward Postures

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

Repetition

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

INDIRECT RISK FACTORS

Workstation Design

Additional Workstation Design Options

- Loading on the neck muscles is increased because the orientation of the worker requires the operator to repeatedly bend and twist the neck in order to observe monitors or displays.

CONSEQUENCES

- When the head is held in a forward bent and twisted posture, muscles and soft tissues of the neck may fatigue. Fatigue leads to an accumulation of waste products and/or a decrease in the ability to tolerate additional stress.
- Signs and symptoms include pain, tenderness, and muscle spasm in the neck area and/or 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 78 & 79.
- For exercises that can help to prevent ***neck*** injuries, see the ***Neck section of the Body Manual.***

SHOULDER

Direct Risk Factors:
Force
Awkward Postures
Static Postures

An Edger Operator must manipulate process controls while facing the lumber chain. This task leaves the arm away from the body and unsupported.

BACKGROUND INFORMATION

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

DIRECT RISK FACTORS

Force

- The rotator cuff stabilises the shoulder joint when objects are manipulated. The heavier the object, or the larger the force required, the greater the load on the rotator cuff.
- If the force placed on the rotator cuff is excessive, and 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.

Static Postures

- When the arms are continuously raised, the rotator cuff is subjected to extended stress with no time for recovery. If the stress is excessive, and recovery is not adequate, the tissues may fatigue to the point of injury.

INDIRECT RISK FACTORS

Workstation Design

Working Reaches

- When extreme reaches are required to perform job tasks, the possibility of injury to the upper body is increased.

Working Heights

- The height of controls and materials effects the degree and duration of awkward postures an operator uses.

Seating

- Handling lumber from a seated position can increase the risk of injuries to the upper body, by reducing any contribution to the lift from the leg muscles.

CONSEQUENCES

- When using the arms to manipulate controls, 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 a 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 78 & 79.
- For exercises that can help to prevent ***shoulder*** injuries, see the ***Shoulder section of the Body Manual.***

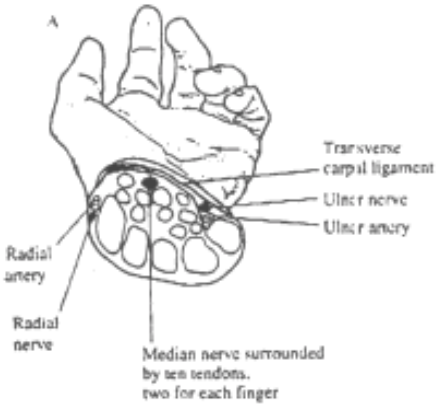
WRIST

Direct Risk Factors:
Force
Awkward Postures
Repetition

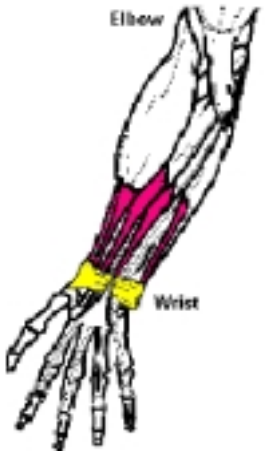
An Edger Operator must repeatedly grip boards with the wrists bent in order to turn and singulate lumber. This task occurs with force.

BACKGROUND INFORMATION

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



The Carpal Tunnel



DIRECT RISK FACTORS

Force

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

Awkward Postures

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

Repetition

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

INDIRECT RISK FACTORS

Characteristics of Objects Being Handled

Size and Shape

- Turning large pieces of lumber requires more force. More force is also required when the hand is in a widely spread grip with larger pieces of lumber.

Environmental Conditions

Cold Temperatures

- Exposure to cold temperatures, in combination with the above noted direct risk factors, can increase the likelihood of injury to the wrist.

CONSEQUENCES

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

SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Wrist, please see the column labelled “Wrist” in the Summary of Solutions on pages 78 & 79.
- For exercises that can help to prevent ***wrist*** injuries, see the ***Wrist section of the Body Manual.***

LOW BACK

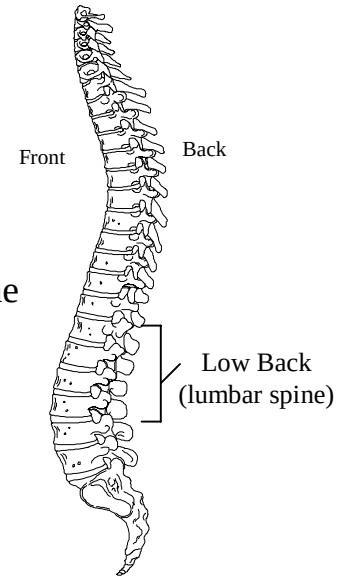
Direct Risk Factors:
Force
Awkward Postures
Static Postures
Repetition

An Edger Operator must bend forward in order to pull lumber. This activity requires force.

BACKGROUND INFORMATION

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

Neutral Spine



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.

Static Postures

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

Repetition

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

INDIRECT RISK FACTORS

Workstation Design

Working Reaches

- Extreme work reaches (e.g., cleaning photo eyes) in the Edger Operator job often require forward bending, increasing the risk of back injury.

Working Heights

- If controls or lumber are below proper working heights, operators must bend forward to reach them.

Seating

- A seated posture, while manually handling objects, can increase the strain on the back and upper body.

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 78 & 79.
- For exercises that can help to prevent ***back*** injuries, see the ***Back section of the Body Manual.***

Summary of Body Parts at Risk

NECK

- An Edger Operator must hold the head forward in order to monitor lumber on the chain.

- An Edger Operator must look up and to the sides in order to observe displays or monitors.

SHOULDER

- An Edger Operator must manipulate process controls while facing the lumber chain. This task leaves the arm away from the body and unsupported.

WRIST

- An Edger Operator must repeatedly grip boards with the wrists bent in order to turn and singulate lumber. This task occurs with force.

LOW BACK

- An Edger Operator must bend forward in order to pull lumber. This activity requires force.

Risk Factors by Body Part

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

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

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

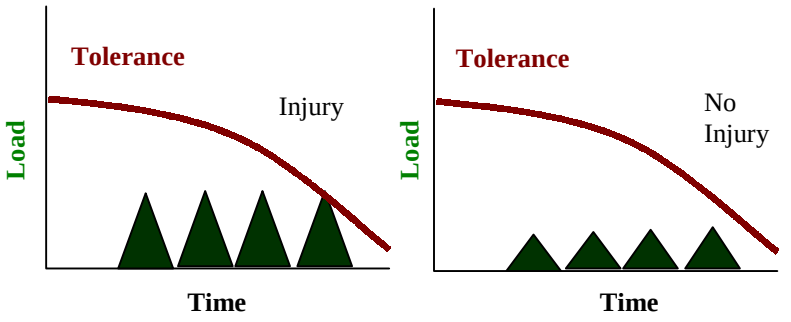
= Indicates that the risk factor was assessed and was not found to be a contributor to the body part problem.

♦ = Indicates that the risk factor assessed is a risk factor that is commonly found in sawmill 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 78 & 79 for specific problem/solution information. Additional information on some risk factors can be found in the General Risk Factor Solutions Manual.

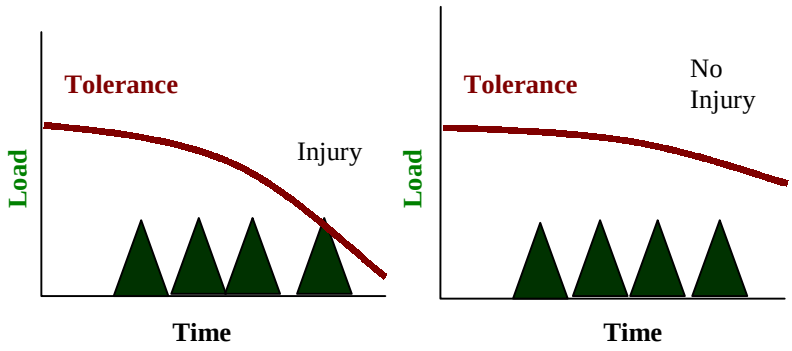
Injury Prevention

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 on injury prevention 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 solution options that can be implemented to decrease the size of the loads on the tissues.

Each of the solution options 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. Information is provided on what is considered an engineering control, an administrative control, or a work practice control, and personal protective equipment. 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 found during the ergonomic investigation of the Edger Operator job. The solution options 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 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: engineering, administrative, work practice, and personal protective equipment. The risk control categories are defined as follows:

E

ENGINEERING CONTROLS:
These include physical changes to workstations, equipment, materials, production facilities, or any other relevant aspect of the work environment that reduces or prevents 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 controls 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

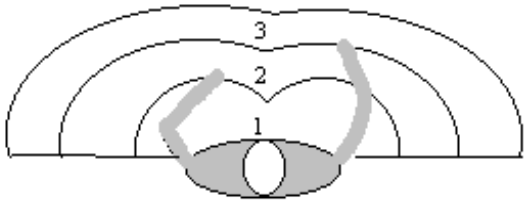
PERSONAL PROTECTIVE EQUIPMENT:
These are devices worn by a worker to reduce the risk of injury, including gloves, kneepads, hearing protection, and leather aprons.

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 and arm 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 that are used 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 occur otherwise.



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.

Location of controls

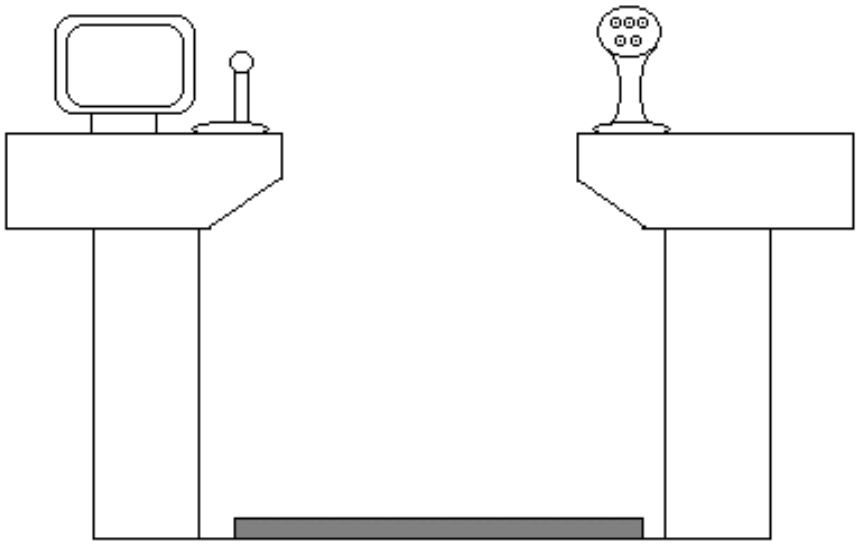
E

To prevent awkward reaches, process controls should not be behind the operator. However, controls in front of the operator would fall between the lumber chain and the worker, which would result in extended reaches over the panel to handle boards. A compromise location would be beside the operator. Control consoles with adjustable location (e.g., swivel arm), or a split console (see following discussion) would be ideal.

Split console

E

Using a split console allows for better visibility of the lumber at and around the work area. The split console also allows for clearance for the knees and legs to work the foot pedals.



Arrangements of controls

E

Controls should be arranged on the console so that the most commonly used ones are the most convenient for the operator to reach.

WORKING HEIGHTS

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

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

To determine the appropriate height specific for the Edger Operator, identify the body part of most concern (i.e., neck, shoulders, and/or back). If the main concern is the:

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

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

Proper working heights

E In order to decrease awkward and static shoulder postures, controls should be located between shoulder and waist height.

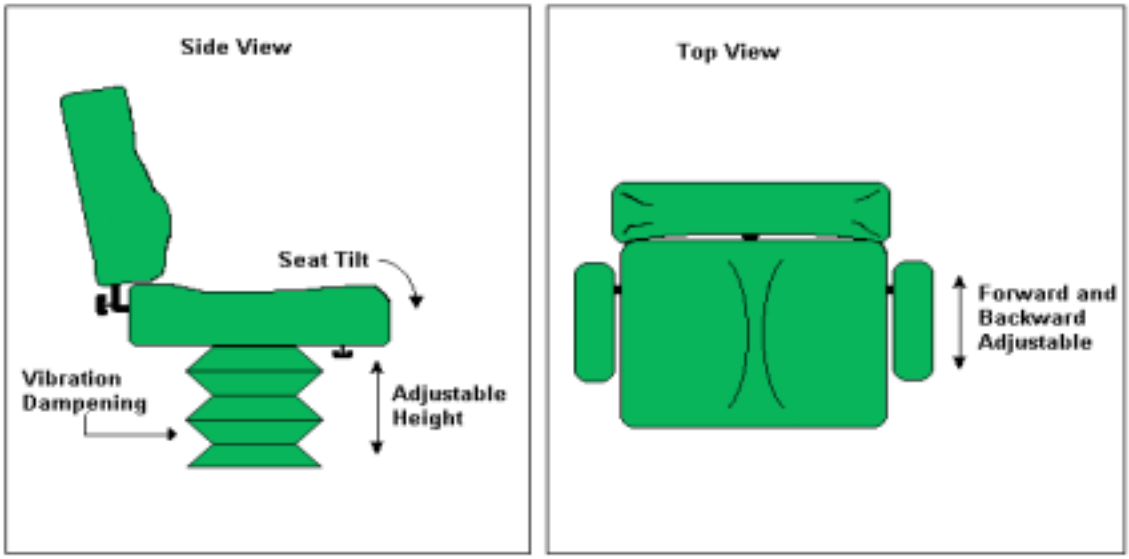
E The height of the lumber chain should be between hip and elbow height to minimise awkward back postures while handling boards.

SEATING

Many Edger Operators are required to sit when working. Sitting for long periods of time increases the load on the spine, which stresses the ligaments and discs of the low back. The load is increased when the operator does not maintain a neutral spine (see Injury Education for the Low Back on page 11).

E

In order to minimise awkward and static postures of the low back, seating should have several adjustable features (see list below) to accommodate various operators and allow for continual postural adjustments.



- ★ Seating should have adjustable lumbar support
- ★ Seats should be adjustable forwards/backwards and up/down
- ★ Seats should have seat pans which tilt forward and backward
- ★ Seats should be air-ride, or have vibration dampening cushions
- ★ Seats should be covered with a breathable, non-slip material

WP

In order to reduce awkward postures in the low back, the lumbar support in the chair should be adjusted to maintain the curve in the low back while sitting.

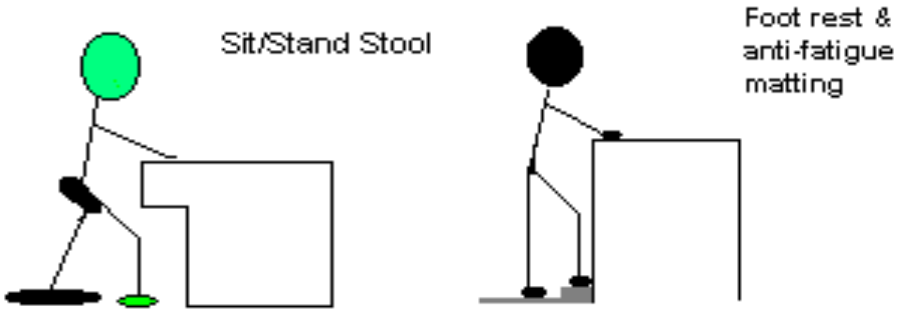
WP

In order to reduce awkward and static postures in the low back, encourage the Edger Operator to get up from the seated posture throughout the day. This change of position will alleviate the load on the spine, allow the discs to equalise, and allow ligaments to regain their stiffness after being stretched out during sitting.

Sit–stand stool

E
WP

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



FLOOR SURFACES

Anti-fatigue matting

E

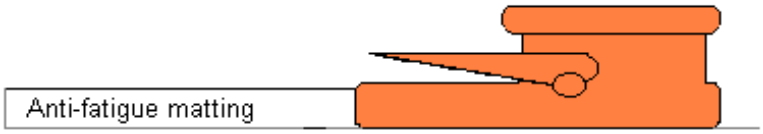
In order to minimise fatigue in the lower extremities; anti-fatigue matting can be installed. The use of anti-fatigue matting in the work area will help to increase comfort and reduce muscle fatigue. The cushioned surface encourages continuous micro-movements of the feet, which minimises blood pooling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

FOOT PEDALS

Recessed foot pedals

E

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



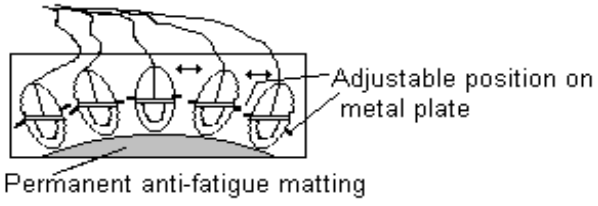
Moveable foot pedals

E

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

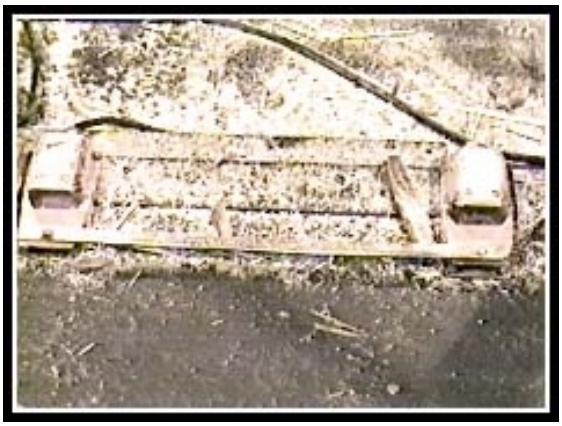
Securing the foot pedals may be required or desirable. Three solutions include:

1) Providing moveable foot pedals on a metal plate. The foot pedals are positioned in slide tracks cut into the metal, which allow pedals to move into the desired positions. The pedals are then tightened 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 in ideal positions. If there are a large variety of desired positions, a potential tripping hazard may exist. If this option is considered, make sure each possible position is highly visible to all operators, to prevent tripping or injuries.

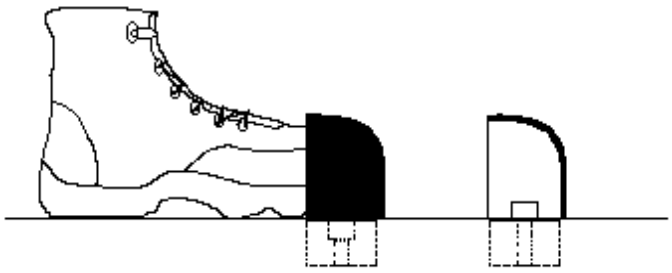
3) Providing a physical link (e.g., a metal bar) between two foot pedals with the same function. Depending on the distance between the pedals, an operator may move within the work area and still have access to the appropriate control. This solution is most appropriate where a worker may move to manipulate lumber but still needs to operate the foot pedals while doing so.



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 allow the upper body 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, and 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.

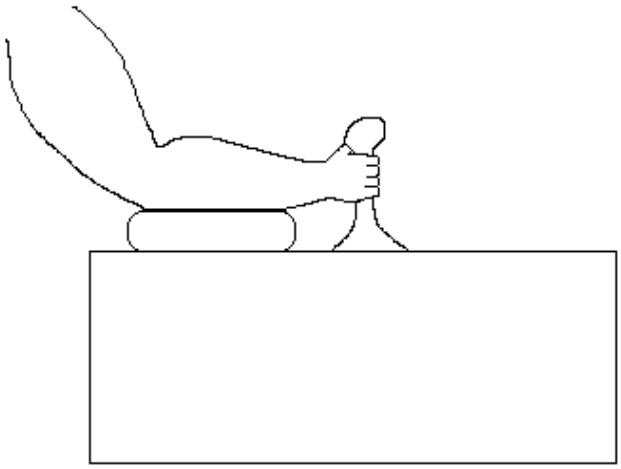


Characteristics of Objects Being Handled

Joystick control

E

When using a joystick control, there should be a cushion to support the arm to relieve strain on the shoulder. An arm pad located at the appropriate height can also promote a more neutral wrist position. This will help prevent wrist injuries.



Environmental Conditions

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

Work Organisation

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

Summary of Solutions

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

		Injury Prevention Potential										
SOLUTIONS	**Page**	Neck	Neck/ Shoulders	Shoulders	Elbow/Wrist	Wrist	Wrist/Hand	Low Back	Hip	Knee	Ankle	Foot
Location of controls	**69**			**A S R**				**A S R**				
Split console	**70**	**A**		**A**		**A**		**A**		**C**		
Arrangements of controls	**70**			**A S R**				**A S R**				
Proper working heights	**71**	**A S**		**R A**				**R A S**				
Seating	**72**	**A S**						**S**				**S**
Sit–stand stool	**73**			**A**				**S**				**S**
Anti-fatigue matting	**73**							**S**				**S**
Foot pedals	**74**										**A S**	**A S**
Joystick control	**76**		**R A**			**A**						

Direct Risk Factors

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

Summary of Solutions

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

		Injury Prevention Potential										
SOLUTIONS	**Page**	Neck	Neck/ Shoulders	Shoulders	Elbow/Wrist	Wrist	Wrist/Hand	Low Back	Hip	Knee	Ankle	Foot
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

◆ = *See General Risk Factor Solutions Manual*

EDGER OPERATOR (MANUAL) MSI SAFETY GUIDE

OBJECTIVE: To identify ergonomic risks involved in edging and to reduce the potential for musculoskeletal injuries.
More detailed information about risk reducing recommendations can be found in the Work Manual for the Edger Operator (Manual).

CHECK IF THIS APPLIES	ACTIVITY OF RISK	ERGONOMIC RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Neck An Edger Operator must hold the head forward in order to monitor lumber on the chain.	**Awkward Postures** **Static Postures**	• Neck muscles are required to turn the head to the side. The further the head is turned to the side, the greater the load on the muscles and tendons. • Neck muscles must support the weight of the head while in a forward or side bent position. The more the neck bends, the greater the load on the muscles and tendons. • When the neck is held still in a forward bent or twisted position, the muscles of the neck must remain tense to support the weight of the head. If the constant stress is sufficient, and recovery is not adequate, the tissues may fatigue to the point of injury.	• Try to keep the head in an upright position while viewing the lumber. • Use the eyes and the neck (not just the neck) to view the lumber. • When the head is bent, try to keep the chin tucked in. • For exercises that can help prevent ***neck*** injuries, ***see the neck section of the Body Manual***.
	An Edger Operator must look up and to the sides in order to observe displays or monitors.	**Repetition** **Awkward Postures**	• When the head is repeatedly turned to the side, the muscles of the neck are subjected to repeated stress, which can lead to injury. • Neck muscles are required to turn the head to the side. The further the head is turned, the greater the load on the muscles and tendons. • Neck muscles must support the weight of the head while in a twisted position. Increased twist puts more load on muscles and tendons.	• If twisting cannot be avoided, try to turn the head in both directions. • When twisting the head, keep the chin tucked in and the ears in alignment with the shoulders. • For exercises that can help prevent ***neck*** injuries, ***see the neck section of the Body Manual***.

CHECK IF THIS APPLIES	ACTIVITY OF RISK	ERGONOMIC RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Shoulder An Edger Operator must manipulate process controls while facing the lumber chain. This task leaves the arm away from the body and unsupported.	**Force** **Awkward Postures** **Static Postures**	• The rotator cuff stabilises the shoulder joint when objects are 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 is excessive, 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 continuously raised, the rotator cuff is subjected to extended stress with no time for recovery. If the stress is excessive, and recovery is not adequate, the tissues may fatigue to the point of injury.	• Keep overhead work to a minimum. • When reaching overhead, try to alternate arms. • Avoid sudden forceful movements of the arms. Use smooth motions while keeping the arms close to the body. • For exercises that can help prevent ***shoulder*** injuries, ***see the shoulder section of the Body Manual***

CHECK IF THIS APPLIES	ACTIVITY OF RISK	ERGONOMIC RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Wrist An Edger Operator must repeatedly grip boards with the wrists bent in order to turn and singulate lumber. This task occurs with force.	**Force** **Repetition** **Awkward Postures**	• Gripping an object requires activation of the forearm muscles, which generates tension in the tendons and tendon sheaths running through the wrist. The harder an object is gripped the greater the tension in the tendons. As tension increases, the pressure within the carpal tunnel may also increase. • Repeated gripping with the hands and bending of the wrists causes stress to the tendon sheaths. If the repetitive stress is excessive, and recovery is not adequate, the tendon sheaths may fatigue to the point of injury. • As the wrist is bent, the tendon sheaths will rub up against the walls of the carpal tunnel. The further the wrist is bent, the more friction experienced in the tendon sheaths.	• Try to keep the arm as close to the body as possible. • Whenever possible, try using both hands to grip and manoeuvre the lumber. • Use only as much force as is necessary to grip and manoeuvre the lumber. • Avoid sudden forceful movements of the hands. Use smooth motions and keep the wrists straight. • When handling lumber, move the elbow and the shoulder, not just the wrist. • For exercises that can help prevent ***wrist*** injuries***, see the wrist section of the Body Manual***.

CHECK IF THIS APPLIES	ACTIVITY OF RISK	ERGONOMIC RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Low Back An Edger Operator must bend forward in order to pull lumber. This activity requires force.	**Force** **Repetition** **Awkward Postures** **Static Postures**	• Lifting increases the loading on the spine. Weight held in the hands is transmitted to the low back. The greater the weight, the greater the loading on the structures of the low back. • Repeated forward bending and lifting can gradually fatigue the structures of the low back. If the repetitive stress is excessive, and recovery is not adequate, the disc walls may fatigue to the point of injury. • Back muscles must support the weight of the upper body when leaning forward. Increased bending of the back increases the loading on the spine and the pressure on the walls of the discs. • Sitting increases the loading on the walls of the discs. If the duration of sitting is excessive, and the recovery is not adequate (e.g., spine not returned to neutral posture), the tissues may deform to the point of injury.	• Handle lumber while in a standing position. • When turning lumber, centre the lumber in front of the body, to achieve better leverage. • Avoid handling lumber with the torso bent or twisted. • Use a longer pike pole to avoid leaning forward when pulling lumber. • For exercises that can help prevent ***back*** injuries, ***see the back section of the Body Manual***.