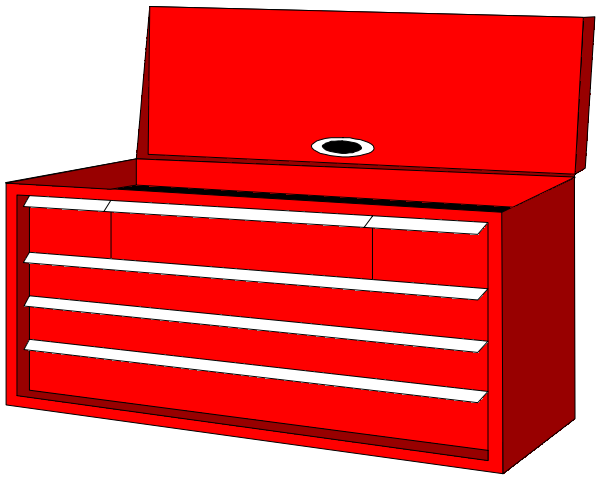
Industrial Musculoskeletal Injury Reduction Program

Common Industry Jobs (CIJs)

Benchman 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

BENCHMAN TOOL KIT
Table of Contents

Overview
Benchman

Job Summary

The Benchman is required to maintain bandsaws by tensioning (straightening) and levelling the saw back to its functional capacity. Bandsaws are sharpened with the help of a machine that grinds the saw edges. The Benchman levels the saws and removes ridges and dents by hammering with a cross-face hammer. The Benchman is also in charge of re-tipping the saws and repairing cracked saws. A machine is used to help perform these tasks. Refer to the Physical Demands Analysis for more detail.

Physical Demands

The physical demands of the Benchman may include:

a) Repetitive motions of the neck, shoulders, arms, and wrists
b) Awkward postures of the neck, shoulders, wrists, and back
c) Lifting/lowering saws and guides
d) Pushing/pulling saws around the filing room
e) Carrying saws
f) Continual standing/sitting

Mental Demands

The Benchman is required to make choices on how to refurbish saws into the best possible condition. This is a highly visual task that requires the worker to find large and small defects in the saw and correct them accordingly. A long training period is required for this job.

Major Variations

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

1) Machinery used to maintain the bandsaws may include:
   a) Grinders
   b) Tippers
   c) Levellers/Tensioners

2) Loading bandsaws onto the machinery may be done:
   a) Manually - worker loads the machine unaided
   b) Using lifting aids - worker uses a lifting aid such as a hoist to lift the band saw onto the machinery
   c) Aided by a co-worker - worker seeks aid to lift the saw

3) Grinding, tipping, levelling/tensioning the saw may be done:
   a) Manually
   b) Semi-automatically
   c) Automatically

4) General worker postures while benching the saws may include:
   a) Standing
   b) Sitting
   c) Sit/standing

Minor Variations

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

1) The pace that the operator works depends upon the mill and the size, shape, and scale of damage to the saws. The work pace range is 6-29 saws/shift. This pace is:
   a) Self-paced

2) Grip types used to handle saws and tools may include:
   a) Power/cylindrical
   b) Pinch
   c) Hook

3) Tools used to maintain the saws may include:
   a) Hammers
   b) Levels
   c) Weights
   d) Gauges
   e) Ratchets

Physical Demands Analysis
Benchman

PDA General Instructions: Benchman

This Physical Demands Analysis (PDA) identifies the physical demands of a Benchman as assessed by IMIRP ergonomists. The information reported was collected from a sample of Benchmen 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 Benchman 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 Supervisor Ergonomics Training Session. Modifications to a PDA must be within the scope of competence of those individuals making the changes and must be reported to any rehabilitation professional using the PDA. Neither AEI nor the IMIRP Society accepts any responsibility for the use or misuse of these documents.

PDA Table of Contents

Physical Demands Analysis
Benchman

Task List

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

Level and tension band saws

A Benchman levels and tensions damaged saws.

Does this task occur at your mill?

☐ Yes ☐ No

Grind saws

A Benchman manually loads, or uses a monorail system to load a saw onto a grinder. The grinder is set to grind the edges automatically.

Does this task occur at your mill?

☐ Yes ☐ No

A Benchman manually loads, or uses a monorail system to load a saw on to a grinder. The operator manually grinds the edges.

Does this task occur at your mill?

☐ Yes ☐ No

Re-tip saws

A Benchman loads a saw on to a tipper and manually re-tips the saw

Does this task occur at your mill?

☐ Yes ☐ No

A Benchman loads a saw on to a tipper and sets the machine to re-tip the saw.

Does this task occur at your mill?

☐ Yes ☐ No

Change saws

A Benchman changes saws.

Does this task occur at your mill?

☐ Yes ☐ No

Resurface guides

A Benchman resurfaces guides. Techniques for resurfacing differ.

Does this task occur at your mill?

☐ Yes ☐ No

Company Profile

Company Name: _____ Division: _____

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

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

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

Work Organisation

Task Description

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

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 (Percent 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%	
	Level and tension band saws			✓		• *Cycle time = Approximately 20 to 45 minutes* • *Depends on the amount of deviations in the saw*
	Grind saws		✓			• *Cycle time = Approximately 10 minutes*
	Re-tip saws		✓			• *Cycle time = Approximately 15 to 30 minutes*
	Change saws		✓			• *Cycle time = Approximately 10 to 20 minutes*
	Resurface guides		✓			• *Cycle time = Approximately 30 minutes (spent resurfacing guides at one time)*
	Other:					

Organisational Factors

The table below contains a list of organisational factors for a Benchman. 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	☐ *Taken as required* ☐
Work pace	☐ *6 to 29 saws per shift* ☐
Work pace control	☐ *Self-paced (time pressure deadline)* ☐
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	
Working height (A)	cm

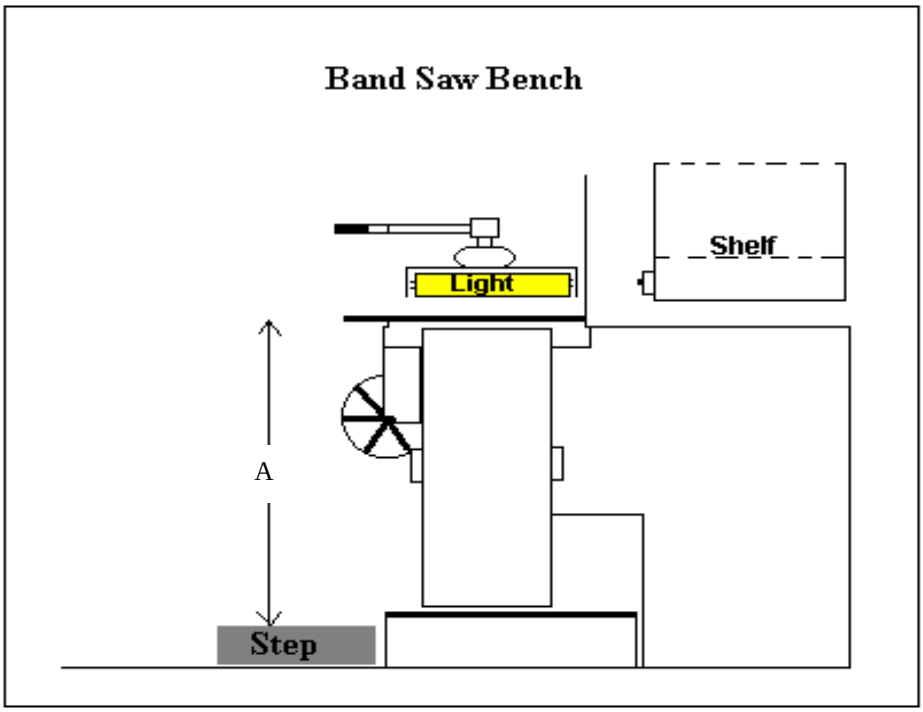


Figure 1: Bench Workstation

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 a Benchman.

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
	Toggle switch	☐ *Controls for lights on bench*	*3 to 60 times per hour*	
	Lever	☐ *Tighten rollers on bench*	*30 to 120 times per hour*	
	Push/pull button	☐ *Stop and start machine*	*3 to 60 times per hour*	
	Foot pedal	☐ *Controls tipper and grinder*	*Once per minute*	
	Wheel	☐ *Changes position of machine*	*3 times per hour*	
	Other:			

Physical Demands

Whole Body Physical Demands

Identify each of the physical demands required by a Benchman, 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.

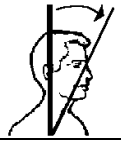
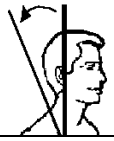
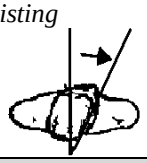
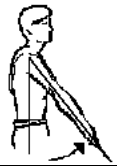
Physical Demands		Tasks	Percent of Shift				Comments
			Rarely 0 to 5%	Occasionally 6 to 33%	Frequently 34 to 66%	Constantly 67 to 100%	
	Walking	• *Moving to work areas around filing room*		✓			• *Frequency = 3 times per hour* • *Duration = 1 to 5 minutes* • *If changing saws is included in the tasks the % of shift will increase*
	Sitting						*Not Applicable*
	Standing	• *Performing bench work*			✓		• *Standing can occur for up to 2 hours at a time thus increasing the % of shift value*
	Climbing	• *Climbing stairs and into machinery when changing saws*	✓				• *Frequency = once every 2 hours* • *Duration = 1 minute*
	Balancing						*Not Applicable*
	Kneeling/ Crouching						*Not Applicable*
	Other:						

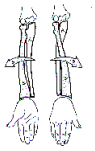
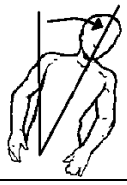
Body Postures

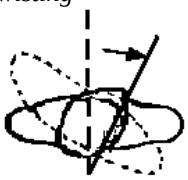
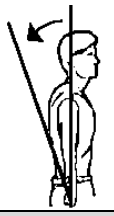
The table below outlines the body postures held or repeated throughout the shift by a Benchman.

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 	• *Level and tension*			✓		• *Flexion is a combination of lateral flexion and twisting* • *Looking down when benching*
	Extension 						*Not Applicable*
	Twisting 	• *Level and tension*			✓		• *Combination of lateral flexion and twisting* • *Looking to the side when benching*
Shoulder							
	Flexion 						*Not Applicable*
	Abduction 	• *Level and tension*			✓		• *Arm is held out to the side when using a level during benching tasks*
	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 	• *Level and tension*			✓		• *Using tools when benching*
Extension 						*Not Applicable*
Ulnar Deviation 	• *Level and tension*			✓		• *Using a hammer when benching*
Radial Deviation 						*Not Applicable*
Back						
Flexion 	• *Level and tension*			✓		• *Leaning forward while benching* • *Depends on work height and height of worker*
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 	• *Level and tension*		✓			• *Twisting to one side to view saw during benching*
	Extension 						*Not Applicable*
Other:							

Hand Grips

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

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 	• *Level and tension* • *Resurface guides* • *Re-tip saws*			✓		• *Hammering while levelling and tensioning* • *Duration depends on how much work the saws need*
	Pinch 	• *Level and tension* • *Change saws*		✓			• *Holding a level or a saw*
	Hook 	• *Change saws*	✓				• *Placing saws into machinery*
	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 a Benchman.

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%	
	Pushing saws around filing room	*18+*	✓				• *Frequency = 3 times per hour*
	Lifting saws onto and off of bench and other machinery	*18+*	✓				• *Frequency = 2 to 3 times per hour*
	Lifting guides from bench to shelf	*5.6 (up to 35)*	✓				• *Frequency = once every minute, for 10 minutes*
	Carrying band saws	*18+*	✓				
	Carrying guides	*5.6 (up to 35)*	✓				
	Other:						

Hand Tools

Indicate the hand tools used by a Benchman 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%	
	Hammer	*Benching saws*	*1.1*		✓			• *Frequency = 1 to 2 times per minute* • *Duration = 10 seconds* • *Depends on repair level of saw*
	Level	*Benching saws*	*0.2*		✓			• *Frequency = 1 to 2 times per minute* • *Duration = 10 seconds*
	Weights	*Benching saws*	*2.3 to 4.5*		✓			• *Frequency = 2 times per minute* • *Duration = 5 seconds*
	Gauge	*Benching saws*	*0.7*	✓				• *Some individuals use the gauge as frequently as the level, usage varies with work technique*
	Other:							

Environmental Conditions

Work Environment

The table below contains a list of environmental conditions that may be of concern at the Benchman 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 Benchman. 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	*80 to 92 dB*	
Lighting level	*25 lux*	Location: *at bench*
	356 to 991 lux	Location: *in filing room*
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 personal protective equipment (PPE).

For the Benchman 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.

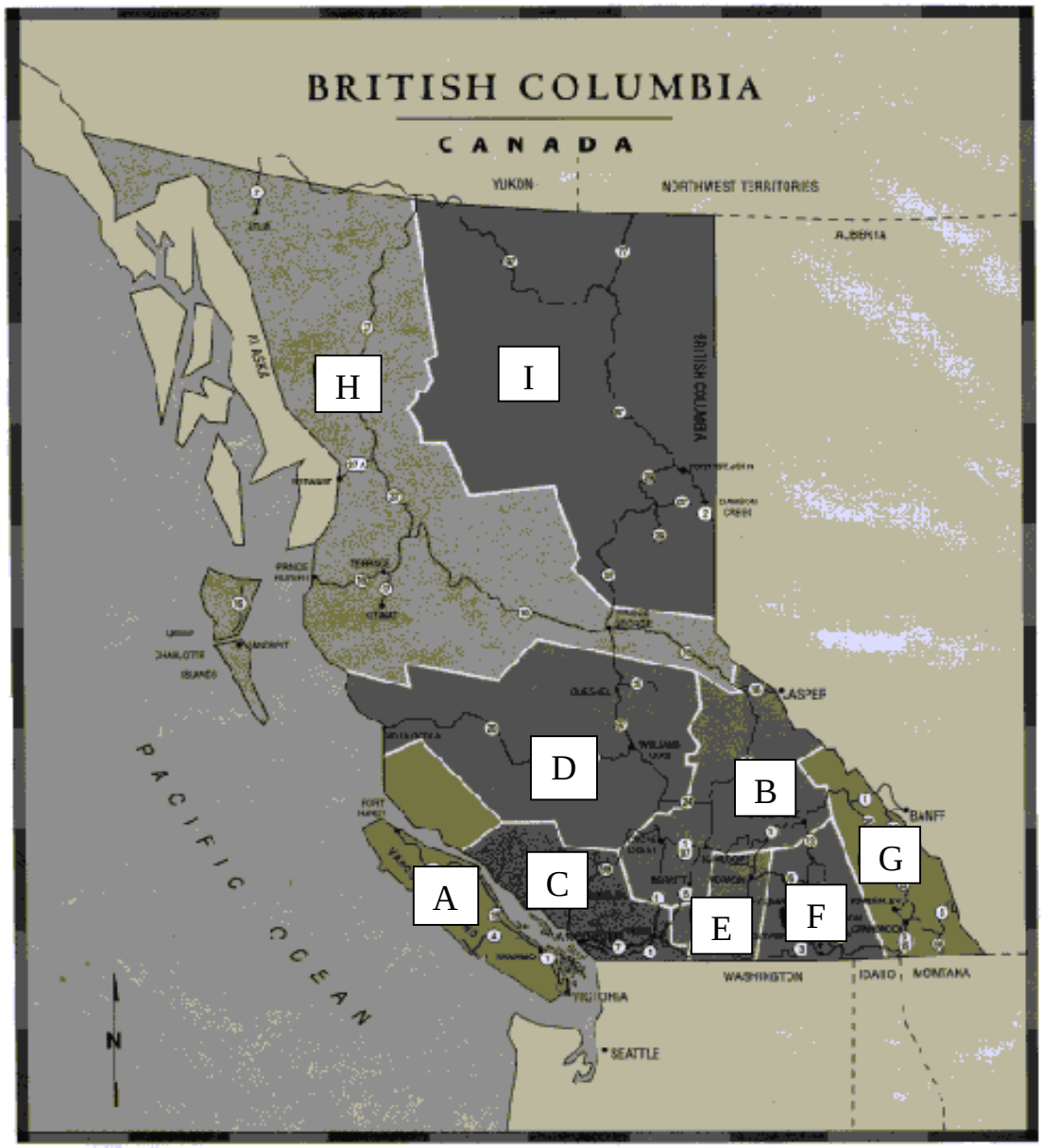
For the lightest species handled, enter the lb./board foot value, the multiple for the smallest size of wood, and the shortest length of this wood. Multiply these values together to determine the weight of the board in pounds.

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
Benchman

Purpose

The Risk Factor Identification Checklist for a Benchman 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 – Benchman

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.

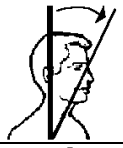
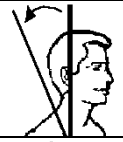
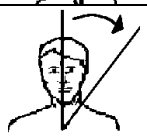
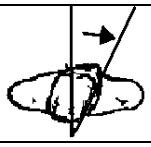
Static Postures: Static loading (sustained exertions) is physical effort (body postures) that is held, requiring muscle contraction for more than a short time.

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.

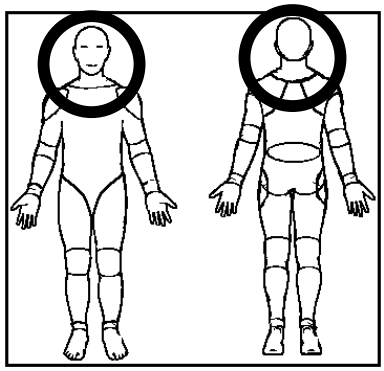
Awkward Postures: Awkward postures occur when there is a deviation from a power working posture. Some examples of awkward postures typically include reaching behind, twisting, working overhead, and forward or backward bending.

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., hammering)				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 a saw for a long period)				S O	
Awkward Posture					
Flexion				S O	
Extension				S O	
Lateral Bending				S O	
Rotation				S O	

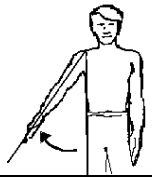
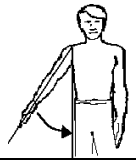
Please indicate whether the following direct risk factors were identified at the **NECK**.		
Direct Risk Factors	Repetition	☐Yes ☐No
	Static Posture	☐Yes ☐No
	Awkward Posture	☐Yes ☐No
In the **Injury Statistics** investigation, were there injury reports for the Neck or Head/Eye or Upper Back? (see Worksheet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



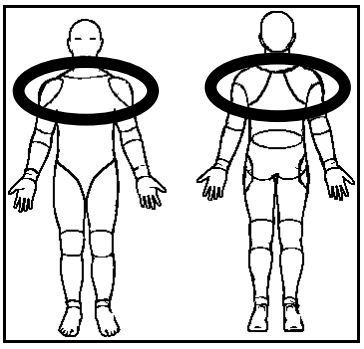
Body parts within the circled area will be classified as NECK issues.

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., hammering)			S O	
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., benching saws)			S O	
Static Posture				
Ask the worker: Do tasks require your shoulders to be maintained in a fixed or static posture? (e.g., brazing)			S O	
Ask the worker: Do you hold parts, tools, or objects for long periods? (e.g., hammer)			S O	

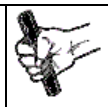
Awkward Posture		N	Y		Comments:
Flexion				S O	
Extension				S O	
Abduction				S O	
Adduction				S O	

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



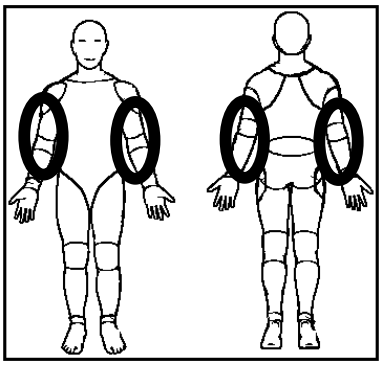
Body parts within the circled area will be classified as SHOULDER issues.

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., hammer) 			S O	
Are objects handled in a pinch grip? (e.g., holding saws) 			S O	
Are objects handled in a hook grip? (e.g., grip used to carry saws) 			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., hammering)			S O	
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., hammering)			S O	

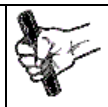
Static Posture	N	Y		Comments:
Ask the worker: Do tasks require your hand and arm to be maintained in a fixed or static posture?			S O	
Ask the worker: Do you apply constant pressure on controls/objects with your hand?			S O	
Ask the worker: Do you hold parts, tools, or objects for long periods? (e.g., hammer)			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., grinder)			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



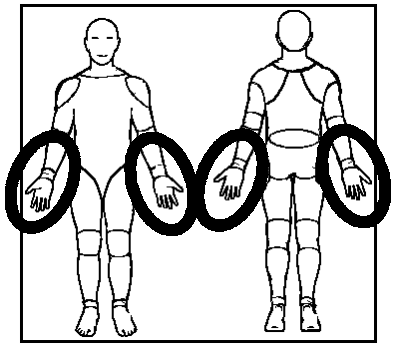
Body parts within the circled area will be classified as ELBOW issues.

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., hammer) 			S O	
Are objects handled in a pinch grip? (e.g., holding saws) 			S O	
Are objects handled in a hook grip? (e.g., carrying saws) 			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., hammering)			S O	
Ask the worker: Do you spend a large percentage of the day performing one action or task? (e.g., hammering)			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., hammer)				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., Pipefitter loosening valve)				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., grinder)				S O	

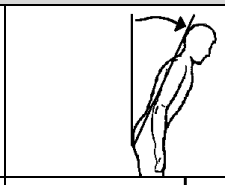
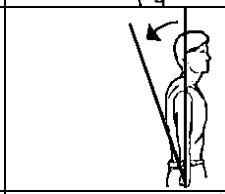
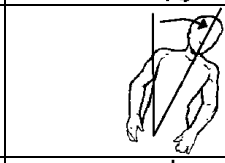
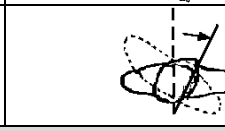
Please indicate whether the following direct risk factors were identified at the **WRIST/HAND**.		
Direct Risk Factors	Force	☐Yes ☐No
	Repetition	☐Yes ☐No
	Static Posture	☐Yes ☐No
	Contact Stress	☐Yes ☐No
	Awkward Posture	☐Yes ☐No
	Vibration	☐Yes ☐No
In the **Injury Statistics** investigation, were there 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



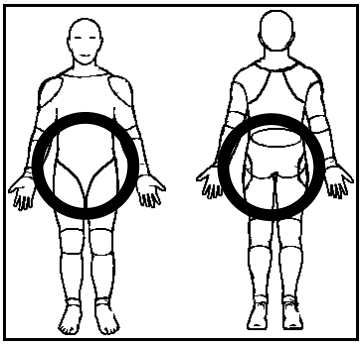
Body parts within the circled area will be classified as WRIST issues.

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., bending to bench saws)			S O	
Static Posture				
Ask the worker: Do tasks require your trunk and upper body to be maintained in a fixed or static posture? (e.g., bending the bench saws)			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 grind saws)			S O	
Contact Stress				
Ask the worker: Do **<u>any</u>** objects, tools or parts of the workstation put pressure on **<u>any</u>** 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., standing on vibrating surface)				S O	

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

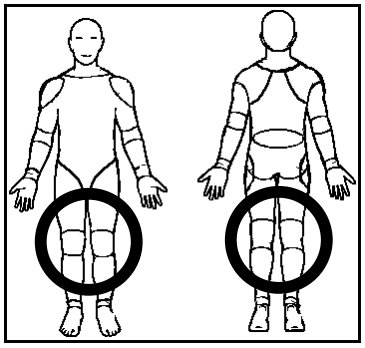


Body parts within the circled area will be classified as LOW BACK issues.

KNEE

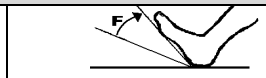
Repetition	N	Y		Comments:
Are identical or similar motions performed over and over again? (e.g., climbing stairs)			S O	
Static Posture				
Ask the worker: Do tasks require you to maintain your knee(s) in a fixed or static posture? (e.g., kneeling)			S O	
Are workers required to sit or stand in a stationary position for long periods of time during the shift? (e.g., sitting at brazing station)			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

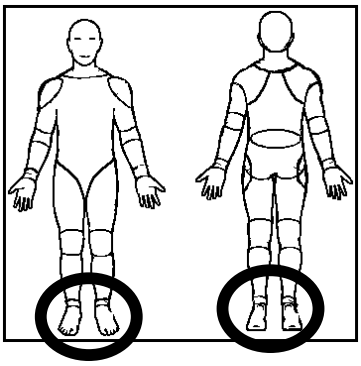


Body parts within the circled area will be classified as KNEE issues.

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? (e.g., standing at benching station)			S O	
Awkward Posture				
Flexion 			S O	
Extension 			S O	
Vibration				
Ask the worker: Is your whole body exposed to vibration for significant portions of the work shift? (e.g., standing on vibrating surface)			S O	

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



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

CHARACTERISTICS OF OBJECTS BEING HANDLED

	N	Y		Comments:
Are there problems handling a load due to its size or shape? (e.g., saws)			S O	
Are there problems handling a load due to its fragile, unbalanced, or non-rigid conditions? (e.g., chains)			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? (e.g., while benching a saw)			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

Benchman

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

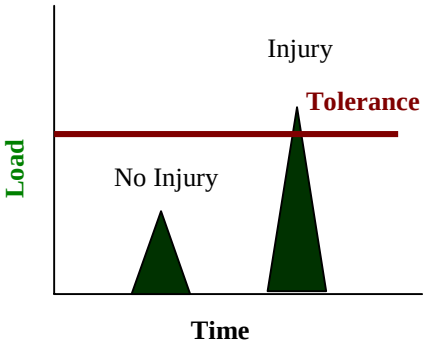
Disclaimer

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

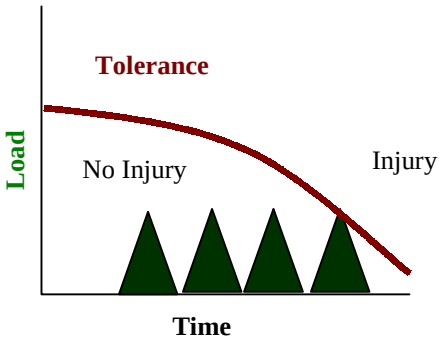
Injuries occur when …
Loads exceed tissue tolerances



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.

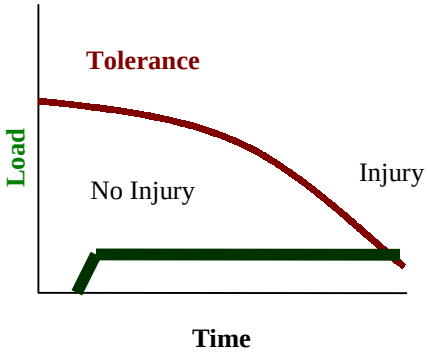
Example – a worker going over on their ankle and spraining it.



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 Benchman 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 Benchman. 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

A Benchman must hold the head in a twisted posture in order to inspect and maintain saws.

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.

Static Postures

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

CONSEQUENCES

- When the head is held in a forward 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 77 & 78.
- For exercises that can help to prevent ***neck*** injuries, see the ***Neck section of the Body Manual.***

NECK/SHOULDER

Direct Risk Factors:
Force
Awkward Postures

A Benchman must lift saws in order to load them on the grinder.

BACKGROUND INFORMATION

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

DIRECT RISK FACTORS

Force

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

Awkward Postures

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

CONSEQUENCES

- Forceful and repeated lifting of saws can lead to neck and/or shoulder strain.
- Signs and symptoms include pain, tenderness, and muscle spasm in the neck/shoulder area, and/or 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 77 & 78.
- To help prevent ***neck*** discomfort, see the upper trapezius stretch in the ***Neck section of the Body Manual.***

SHOULDER

Direct Risk Factors:
Force
Awkward Postures

A Benchman must push and pull saws and manipulate controls in order to bench and grind saws.

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, and 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.

INDIRECT RISK FACTORS

Workstation Design

Working Heights

- The working heights of the controls for the grinders and other machinery may be positioned such that workers must put their arms in an extreme position away from their body, occasionally above shoulder height, to operate machinery.

CONSEQUENCES

- When using the arms to push and pull saws and 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 77 & 78.
- For exercises that can help to prevent ***shoulde**r* injuries, see the ***Shoulder section of the Body Manual.***

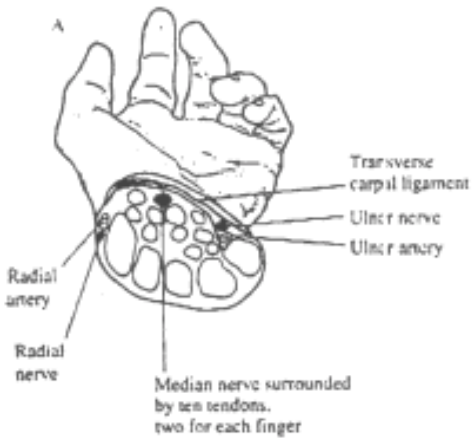
WRIST

Direct Risk Factors:
Force
Awkward Postures
Repetition

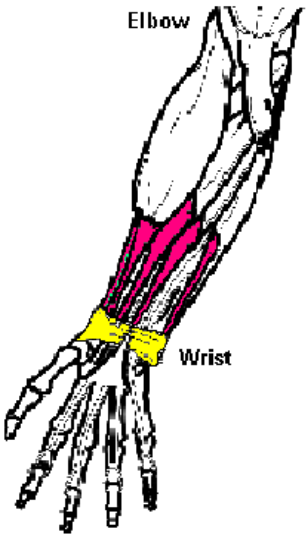
A Benchman must grip tools and controls with the wrists bent in order to set saws.

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

INDIRECT RISK FACTORS

Characteristics of Objects Being Handled

Size and Shape

- The size and position of machinery controls affects operator exposure to forceful and awkward wrist postures. Hand tool size and shape can also affect wrist posture, especially in confined spaces.

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 77 & 78.

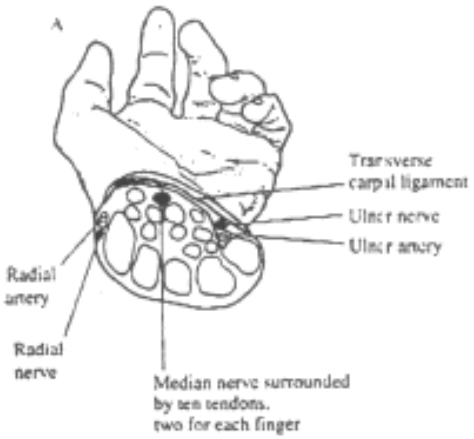
WRIST/HAND

Direct Risk Factors:
Contact Stress
Vibration

A Benchman may be exposed to contact stress and hand/arm vibration when maintaining saws.

BACKGROUND INFORMATION

- The carpal tunnel is located at the base of the palm; it contains the tendons of the muscles that bend the hand and wrist inwards and an important nerve (median nerve).



The Carpal Tunnel

DIRECT RISK FACTORS

Contact Stress

- Contact between hard or sharp surfaces and the base of the palm places stress on the tendons and nerves in the carpal tunnel.
- Continual contact with hard or sharp surfaces may damage the nerve and/or gradually weaken the tendons and cause injury.

Vibration

- Exposure to vibration, through the use of power tools or through contact with other vibrating objects places a unique form of mechanical stress on the tissues of the hand and wrist. Factors like vibration level and vibration frequency influence the amount of mechanical stress.
- Continual exposure to hand/arm vibration may gradually damage neurovascular tissue (nerves and blood vessels) in the hand, and may contribute to problems in the wrist.

INDIRECT RISK FACTORS

Characteristics of Objects Being Handled

Container, Tool, and Equipment Handles

- Vibration and contact stress can be damped (cushioned) with softer tool handle coverings. However, these handles need to be securely fastened to the tool and properly maintained to provide these benefits.

Environmental Conditions

Cold Exposure

- Exposure to cold temperatures can increase the risk of wrist problems associated with the previous direct risk factors.

CONSEQUENCES

- Continual exposure to hand/arm vibration and contact stress may lead to neurovascular damage.
- Signs and symptoms include pain, whitening of the fingers, and a loss of feeling and strength in the hand.

SUGGESTED SOLUTIONS

- For specific solutions that may prevent injuries to the Wrist/Hand, please see the column labelled “Wrist/Hand” in the Summary of Solutions on pages 77 & 78.

LOW BACK

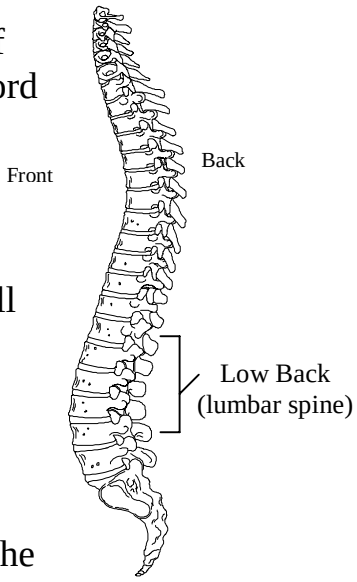
Direct Risk Factors:
Force
Awkward Postures
Static Postures

A Benchman must bend forward in order to inspect and maintain saws.

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

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

INDIRECT RISK FACTORS

Workstation Design

Working Heights

- Low working heights, especially for visual inspection tasks, can lead to extreme forward bending.

Floor Surfaces

- Hard floor surfaces can contribute to low back discomfort.

CONSEQUENCES

- Extreme forward bending may lead to damage in the disc walls, especially when the position is held for a long duration.
- 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 77 & 78.
- For exercises that can help to prevent ***back*** injuries, see the ***Back section of the Body Manual.***

Summary of Body Parts at Risk

NECK

- A Benchman must hold the head in a twisted posture in order to inspect and maintain saws.

NECK/SHOULDER

- A Benchman must lift saws in order to load them on the grinder.

SHOULDER

- A Benchman must push and pull saws and manipulate controls in order to bench and grind saws.

WRIST

- A Benchman must grip tools and controls with the wrists bent in order to set saws.

WRIST/HAND

- A Benchman may be exposed to contact stress and hand/arm vibration when maintaining saws.

LOW BACK

- A Benchman must bend forward in order to inspect and maintain saws.

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.*

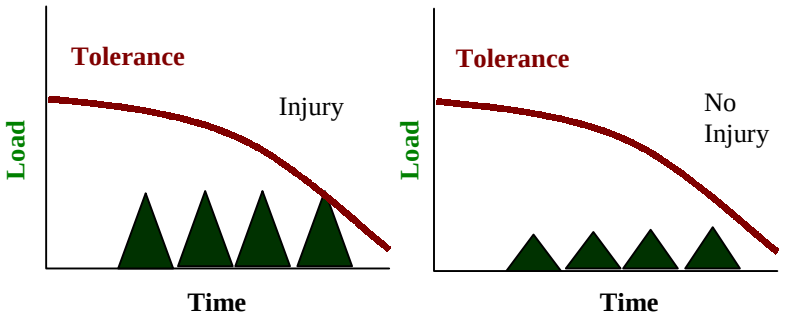
= Indicates that the risk factor was assessed and was not found to be a contributor to the body part problem.

♦ = 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 77 & 78 for specific problem/solution information. Additional information on some risk factors can be found in the General Risk Factor Solutions Manual.

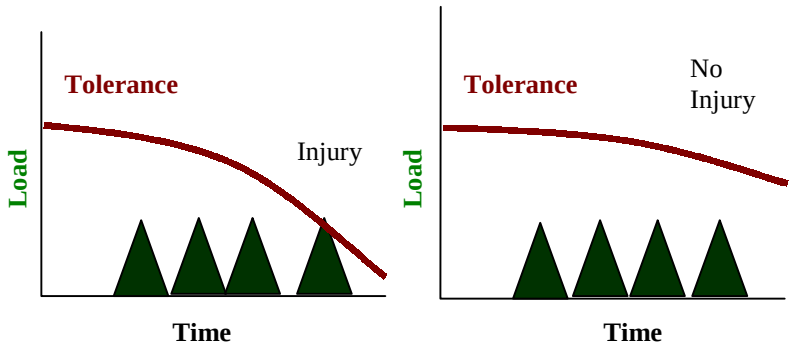
Injury Prevention

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 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 Benchman 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

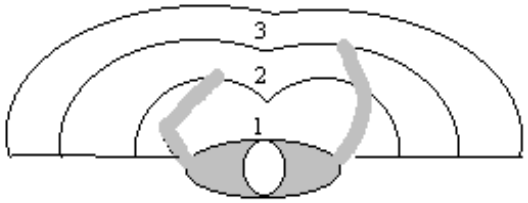
PERSONAL PROTECTIVE EQUIPMENT:
These are devices worn by a worker to reduce the risk of injury, including gloves, kneepads, hearing protection, and leather aprons.

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.

Minimise work reaches

E To reduce forward bending of the back during saw inspection and maintenance, make sure that the operator is not obstructed from reaching the saw. Where possible, reposition controls that come between the operator and the saw on the bench.

Provide space for Benchman to keep hand tools within comfortable reach envelope.

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 Benchman, 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 work heights

E

To reduce forward bending of the neck and trunk during saw inspection tasks, a bench height at or slightly above operator elbow height is suggested. However, for heavy work (e.g., hammering saws), a working height at or slightly below hip level is appropriate. Adjustable flooring (e.g., removable steps) would allow for these different work levels while accommodating various operator heights.

Control panel location

E

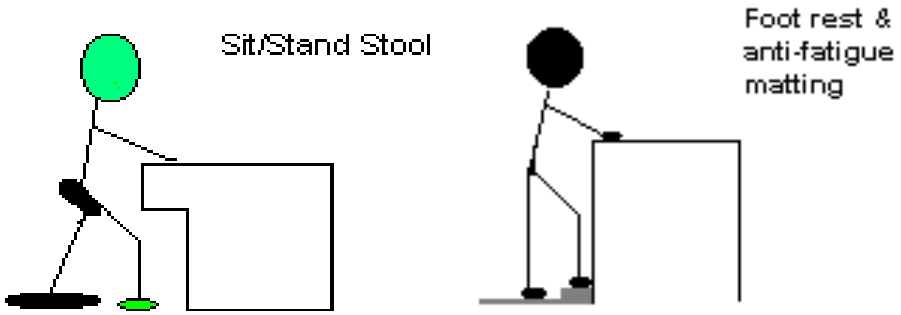
In order to decrease awkward and static shoulder postures, controls should be located between shoulder and waist height. If space permits, control panels can also be rotated to a horizontal position, as this would allow for more controls to be located at optimal working heights.

SEATING

Sit–stand stool

E
WP

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



FLOOR SURFACES

Anti-fatigue matting

E

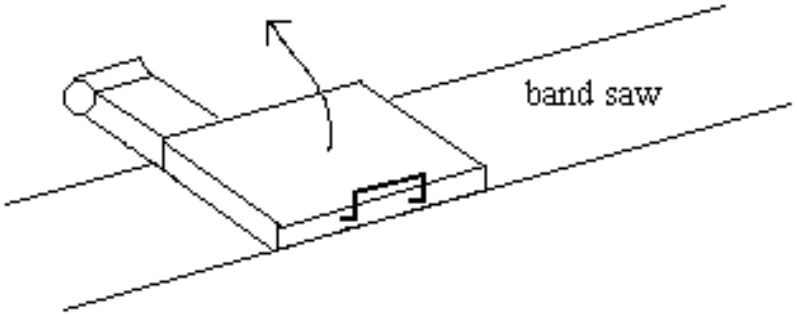
In order to minimise fatigue in the lower extremities; anti-fatigue matting can be installed. The use of anti-fatigue matting in the work area will help to increase comfort and reduce muscle fatigue. The cushioned surface encourages continuous micro-movements of the feet, which minimises blood pooling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

ADDITIONAL WORKSTATION DESIGN OPTIONS

Weights for bandsaw

E

Using a weight that is attached to a hinge will reduce stress on the shoulders.



Automatic leveller

E

Implementing the use of an automatic leveller to level and tension the band saws would decrease the repetitive motions of the wrists, neck, and shoulders. Stationary standing and back flexion would also be reduced.

Characteristics of Objects Being Handled

CONTAINER, TOOL AND EQUIPMENT HANDLES

Handle coverings

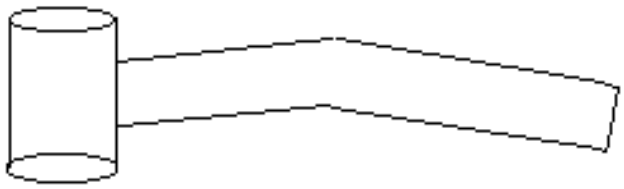
E

In order to reduce the grip force required to grip hand tools, increase the friction between the tool handles and the Attendants glove. Due to the smooth, slippery surface of metal or wooden tool handles (e.g., hammer) a Benchman must use a higher grip force in order to maintain control of the tool. This can put the elbow, and possibly the wrist and hand, at risk of injury. Wrapping the tool handles with foam, rubber, medical/athletic tape, or modifying the surface using other friction increasing material (e.g., gritty paint) would increase the friction between the handle and the Benchman's glove, decreasing the grip forces required.

Bent handled hammer

E
WP

The use of bent handled tools may help to reduce the awkward positions of the wrist. A bent handled hammer will attempt to keep the wrist in a neutral position while hammering which will reduce the risk of wrist injury.



Gloves

PPE

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

Environmental Conditions

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

Work Organisation

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

Work Techniques

The particular work technique used to perform a task can affect the amount and number of risk factors to which a worker may be exposed. Proper work techniques can minimise the influence of these risk factors and thus decrease the likelihood that a musculoskeletal injury may develop.
Please refer to the General Risk Factor Solutions Manual for more solutions regarding work technique risk factors.

Lift with load close to body

WP When lifting, hold the object close to the body. The farther the load is away from the body the more stress it puts on the back.

Neutral position

WP When changing saws in machines, try to keep the back in the neutral position. Do not twist while lifting.

Bend neck to both sides

WP Bend the neck to both sides when viewing saws for deviations.

Roll bandsaw

WP Roll the bandsaw whenever possible rather than lifting it over shoulder level.

Keep arm close to body

WP Keep the arms as close as possible to the torso when benching.

Summary of Solutions

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

		Injury Prevention Potential					
SOLUTIONS	**Page**	Neck	Neck/ Shoulders	Shoulders	Wrist	Wrist/ Hand	Low Back
Minimise work reaches	**71**		**F A**	**A**			**A**
Proper work heights	**72**	**A S**		**A**			**A S**
Control panel location	**72**	**A S**		**A**			**A S**
Sit–stand stool	**73**	**A**					**A S**
Anti-fatigue matting	**73**						**S**
Weights for bandsaw	**74**		**F**		**F**		**F**
Automatic leveller	**74**	**A S**	**F A**	**R A**	**F R A**		**A S**
Handle coverings	**75**					**C V**	
Bent handled hammer	**75**				**A**		
Gloves	**75**					**F**	

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	Wrist	Wrist/ Hand	Low Back
Lift with load close to body	**76**		**F A**	**A**			**F A**
Neutral position	**76**						**F A**
Bend neck to both sides	**76**	**R S**					
Roll bandsaw	**76**	**A**	**F A**				**F A**
Keep arm close to body	**76**		**F A**	**A**	**A**		
Heat Exposure	◆	◆	◆	◆	◆	◆	◆
Cold Exposure	◆	◆	◆	◆	◆	◆	◆
Lighting	◆	◆	◆	◆	◆	◆	◆
Noise	◆	◆	◆	◆	◆	◆	◆
Vibration	◆	◆	◆	◆	◆	◆	◆
Rest breaks	◆	◆	◆	◆	◆	◆	◆
Job Rotation	◆	◆	◆	◆	◆	◆	◆
Task Rotation	◆	◆	◆	◆	◆	◆	◆
Work Pace	◆	◆	◆	◆	◆	◆	◆
Scheduling	◆	◆	◆	◆	◆	◆	◆

Direct Risk Factors

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

BENCHMAN MSI SAFETY GUIDE

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

CHECK IF THIS APPLIES	ACTIVITY OF RISK	ERGONOMIC RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Neck A Benchman must hold the head in a twisted posture (neck) in order to inspect and maintain saws.	**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.	• Train yourself to look up from time to time and relax your neck muscles. • When the head is bent, try to keep the chin tucked in. • Bend the neck to alternate sides when performing visual tasks. • For exercises that can help prevent ***neck*** injuries, ***see the neck section of the Body Manual***.

CHECK IF THIS APPLIES	ACTIVITY OF RISK	ERGONOMIC RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Neck/Shoulder A Benchman must lift saws (neck/shoulder) in order to load them on the grinder.	**Force** **Awkward Postures**	• Neck and shoulder muscles support the weight of objects held in the hands. The heavier the object, the greater the load on muscles and tendons. • 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.	• Avoid sudden forceful movements of the arms. Use smooth motions while keeping the arms close to the body. • Roll the bandsaw whenever possible, rather than lifting it over shoulder level. • When lifting, use both arms. • For exercises that can help prevent ***neck*** and ***shoulder*** injuries, ***see the neck and shoulder sections of the Body Manual.***
	Shoulder A Benchman must push and pull saws and manipulate controls (shoulder) in order to bench and grind saws.	**Force** **Awkward Postures**	• The rotator cuff stabilises the shoulder joint when objects are pushed, pulled, and manipulated. The heavier the object, or the larger the force required, the greater the load on the rotator cuff. Excessive forces can cause injuries. • 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.	• Try to keep the arms supported while brazing saw tips, levelling saws, or operating machinery. • When reaching overhead, try to alternate arms. • For exercises that can help prevent ***shoulder*** injuries, ***see the shoulder sections of the Body Manual***

CHECK IF THIS APPLIES	ACTIVITY OF RISK	ERGONOMIC RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Wrist A Benchman must grip tools and controls with the wrists bent in order to set saws.	**Force** **Repetition** **Awkward Postures**	• Gripping requires activation of the forearm muscles, generating 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 and bending of the wrist causes stress to the tendon sheaths. Injuries can occur when this stress is excessive. • 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.	• Use only as much gripping force as is necessary. • Maintain a straight wrist position. • Whenever possible, try using both hands to distribute the workload evenly. • Avoid sudden forceful movement of the hands. Use smooth motions and keep the wrists straight. • 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
	A Benchman may be exposed to contact stress and hand/arm vibration when maintaining saws.	**Contact Stress** **Vibration**	• Contact between hard or sharp surfaces and the base of the palm places stress on the tendons and nerves in the carpal tunnel. • Continual contact may damage the nerve and/or gradually weaken the tendons and cause injury. • Exposure to vibration, through power tools or other vibrating objects places a unique form of mechanical stress on the tissues of the hand and wrist. Factors like vibration level and vibration frequency influence the amount of stress. • Continual exposure to hand/arm vibration may gradually damage neurovascular tissue (nerves and blood vessels) in the hand, and may contribute to problems in the wrist.	• Operate vibrating tools/equipment with the wrists in a neutral (straight) posture. • Minimise grip and push force used to operate the tools/equipment. • For exercises that can help prevent ***wrist*** injuries, ***see the wrist section of the Body Manual***

CHECK IF THIS APPLIES	ACTIVITY OF RISK	ERGONOMIC RISK FACTOR(S)	POTENTIAL HAZARDS	SUGGESTED SOLUTIONS
	Low Back A Benchman must bend forward (low back) in order to inspect and maintain saws.	**Force** **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. • Back muscles must support the weight of the upper body when leaning forward and to the side. Increased bending of the back increases the loading on the spine and increases the pressure on the walls of the discs. • Extended periods of forward or side bending can gradually fatigue the structures of the low back. If the stress is excessive, and recovery is not adequate, the disc walls may fatigue to the point of injury.	• When leaning forward to bench saws, or when handling objects, try to keep the back in a neutral posture (ears, shoulders, and hips in alignment). • When stooping down, bend with the hips and knees, not with the back. • When lifting, hold objects close to the body. • Do not stand with legs locked straight. • When using a footrest, alternate placing one foot and then the other onto the foot rest. • Wear shoes with adequate support and cushioning. • Replace shoes before they wear out. • For exercises that can help prevent ***back*** injuries, ***see the back section of the Body Manual***.