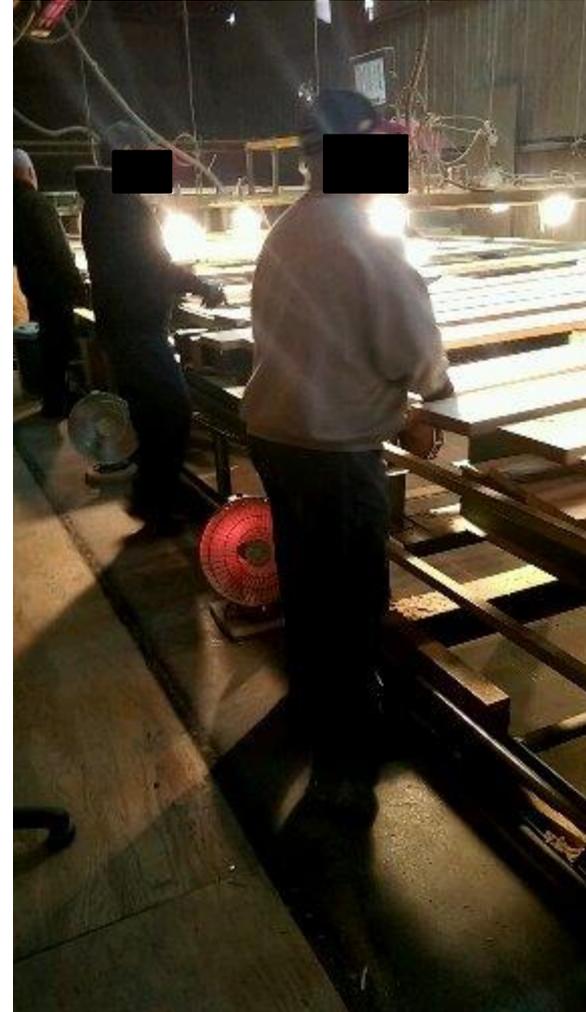




# Ergonomics

**“This material was produced under grant SH26336H4 from the Occupational Safety and Health Administration, U.S. Department of Labor. It does not necessarily reflect the views or policies of the U.S. Department of Labor, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government”**



# Ergonomics looks at:

- ▶ Work station
- ▶ Tools
- ▶ Motions
- ▶ Physical condition
- ▶ Physical limitations
- ▶ Environment



# Musculoskeletal disorders



# MSD symptoms

- ▶ Dull, aching sensation
- ▶ Discomfort with movements
- ▶ Tenderness to the touch
- ▶ Burning sensation
- ▶ Pain
- ▶ Tingling
- ▶ Cramping
- ▶ Stiffness



# Common MSDs

- ▶ Tendinitis
- ▶ Tenosynovitis
- ▶ Trigger finger
- ▶ Raynaud's syndrome
- ▶ De Quervain's disease
- ▶ Carpal tunnel syndrome



# Workplace risk factors

- ▶ Repetitive motions
- ▶ Fixed / awkward postures
- ▶ Vibration
- ▶ Force
- ▶ Twisting / bending
- ▶ Elevation of elbows
- ▶ Lifting



# Workplace risk factors

- ▶ Inappropriate tools
- ▶ Continuous contact
- ▶ Restricted clearance
- ▶ Improper seating/  
support
- ▶ Bad body mechanics
  - ▶ unadjustable equipment



# Identify risk factors

- ▶ Management/employee involvement
- ▶ Audit work stations
- ▶ Audit procedures



# Engineering controls

- ▶ Preferred method
- ▶ Work station design
- ▶ Tool design
- ▶ Equipment design



# Work station design

Provide adequate:

- ▶ Work space
- ▶ Work height
- ▶ Support
- ▶ Storage space
- ▶ Machine controls



# Work station design

- ▶ Reduce static loading
- ▶ Raise / lower working height
- ▶ Remove hard / sharp edges
- ▶ Provide mechanical advantages
- ▶ Insulate heat / cold



# Work station redesign

- ▶ Provide seating / support
- ▶ Improve material orientation
- ▶ Improve layout



# Tool selection should minimize:

- ▶ Awkward, bent grip
- ▶ Vibration
- ▶ Excessive grip strength
- ▶ Awkward positions to exert force
- ▶ Repetitive motions



# Administrative controls

- ▶ Job rotation
- ▶ Shift length
- ▶ Overtime management
- ▶ Rest breaks
- ▶ Production rates



# Work practice controls

- ▶ Use proper techniques
- ▶ Avoid unnecessary steps
- ▶ Job training
- ▶ Exercise/conditioning



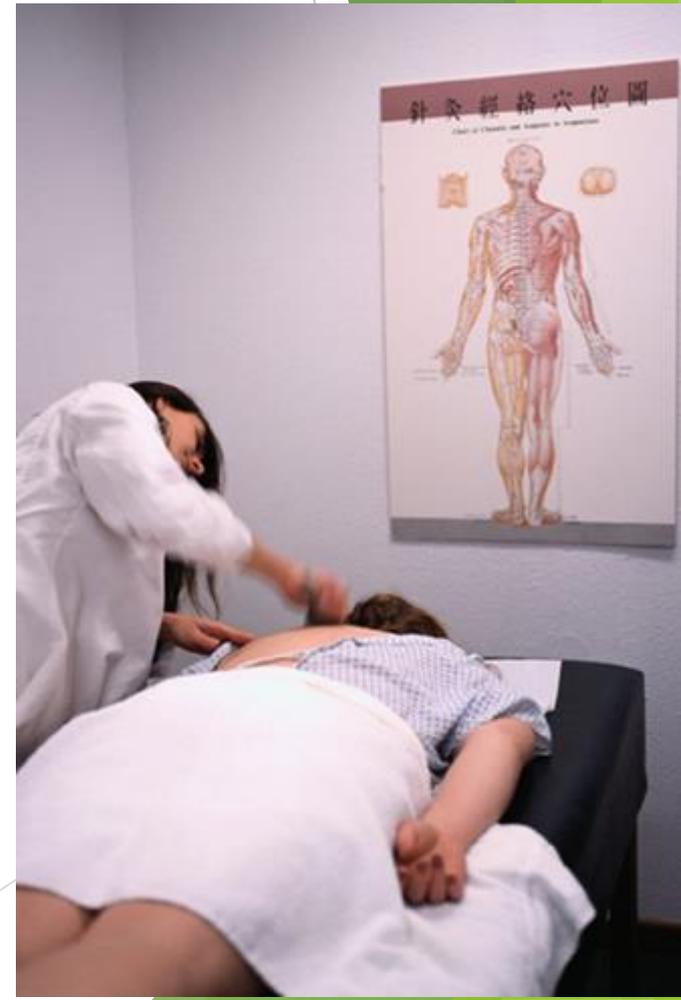
# Medical management

- ▶ Early reporting & treatment
- ▶ Symptoms survey
- ▶ Medical treatment
- ▶ Recordkeeping



# Back disorders

- ▶ Sprains
- ▶ Strains
- ▶ Ruptured/  
slipped disks
- ▶ Muscle spasms



# Back pain factors

- ▶ Improper posture
- ▶ Poor physical condition
- ▶ Improper lifting



# Proper lifting

- ▶ Size up the load
- ▶ Bend your knees
- ▶ Do not twist
- ▶ Clear path
- ▶ Lower
- ▶ Push carts/slowlydollies



# Summary

- ▶ Define ergonomics
- ▶ MSDs
- ▶ Risk factors
- ▶ Controls
- ▶ Medical management
- ▶ Proper lifting



# Lumber Handling in Sawmills



# Ergonomic Safety

Identify the  
Hazard

Control the Hazard



# Ergonomic Hazards

## Backs

- ▶ Back - bending more than 30 Degrees
  - ▶ 4 hour limit per day
- ▶ Back - bending more than 45 Degrees
  - ▶ 2 hour limit per day
- ▶ Lifting - varies depending on the hand placement, frequency of lift, and weight of the board



# Ergonomic Hazards

## Shoulders, Arms, & Hands

- ▶ Gripping - Every few seconds with a force of more than 10 pounds
  - ▶ 3 hour limit per day
  - ▶ Bent wrist = 2 hour limit per day
- ▶ Working with hands over head or reaching more than once per minute for a total of more than 4 hours



# Ergonomic Hazards

## Neck

- Neck - bent more than 45 Degrees
  - 4 hour per day limit
- Position monitors and control panels to improve neck postures



# Ergonomic Hazards Hips, Knees, Ankles, & Feet

- Standing for long periods of time
  - Anti-fatigue mats
  - Cushioned insoles
  - 6 inch foot rest bar
- Repetitively operating foot controls in awkward postures
  - Recess the foot control into floor to reduce upward flexion of the foot



# Lumber Handling Jobs in Sawmills

- ▶ Machine off bearers
- ▶ Edger operators
- ▶ Resaw operators
- ▶ Straighteners/drop sorters
- ▶ Trim saw operators

- Planer operators
- Graders
- Pullers
- Banders



# Machine Off Bearer

- ▶ Located between the headrig saw and the edger
- ▶ Ensures that the cants are straightened
- ▶ Ensures slab woods and slash are disposed of
- ▶ Cants can weigh up to 300 lbs



# Machine Off Bearer Ergonomic Hazards

- ▶ Bending and reaching to turn cants and remove trim and slash
- ▶ Lifting and turning cants
- ▶ Manually handling excessive slash and trim
- ▶ Gripping large and heavy cants to turn them
- ▶ Looking down at monitors or control panels



# Machine Off Bearer Hazard Controls

- ▶ Raise the chain to reduce the bending angle
- ▶ Use a tool like a pike pole to remove trim and slash
- ▶ Use mechanical board turners or reverse running chains with pneumatic driven pop-up pins or stops to flip boards



# Machine Off Bearer Hazard Controls

- ▶ Install a controlled gate stop on headrig outfeed together with jump chains to direct materials.
- ▶ Tilt head rig saw to make sure the wane of the cants is up.
- ▶ Ramp system to take cants up and allow trim to fall down
- ▶ Install a steep un-scrambler which will help straighten and separate boards



# Machine Off Bearer Hazard Controls

- ▶ Train the headrig worker to turn the log frequently and not cut past the center of the log before they flip it in order to ensure proper landing of the cants with the wane up.
- ▶ Use the momentum of the chain to assist with turning of the cants.



# Edger Operator

- ▶ Makes longitudinal cuts in cants
- ▶ After the headrig saw
- ▶ Cants are broken down into boards and straitened
- ▶ Manually feeds edger
- ▶ Control booth
- ▶ Computerized



# Edger Operator Ergonomic Hazards

- ▶ Gripping cants to straighten them
- ▶ Lifting cants to align them
- ▶ Gripping joysticks or other controls
- ▶ Looking down at a monitor or control panel as in some automated processes



# Edger Operator Ergonomic Hazard Controls

- ▶ Raise the end of the feed table to make it higher than the roller and add adequate line bars with reversible chains
- ▶ Use a system of pop-up pins to align cants
- ▶ Use alignment and jump chains
- ▶ Use a line bar to straighten cants
- ▶ Install an adjustable fence



# Edger Operator Ergonomic Hazard Controls

- ▶ Install a surge chain with manual position
- ▶ Unscrambler \* Various set ups
- ▶ Position Control panels so they are adjustable to properly position them to improve neck postures and account for variety of people



# Resaw Operator

- ▶ Further size boards as needed



# Resaw Operator Ergonomic Hazards

- ▶ Reaching above head for the control panel
- ▶ Gripping boards and feeding them into the saw
- ▶ Lifting heavy boards especially during upset conditions when boards pile up
- ▶ Bending to reach for boards
- ▶ Standing for long periods



# Resaw Operator Ergonomic Hazard Controls

- ▶ Relocate control panel to eliminate reaching up
- ▶ Make controls adjustable to improve working posture
- ▶ Automate the board feeding process with pin stops and the operator sitting in a booth
- ▶ Use speed up rollers to make sure boards are sent to the operator's position to help reduce reaching and grip force on boards



# Resaw Operator Ergonomic Hazard Controls

- ▶ Use speed up rollers to make sure boards are sent to the operator's position to help reduce reaching and grip force on boards
- ▶ Use unscrambler to straighten and pace boards
- ▶ Install a V-notch unscrambler in limited space situations



# Resaw Operator Ergonomic Hazard Controls

- ▶ Have an opening to allow the operator to get closer to the long reach while bending
- ▶ Train workers to wait to handle boards until they are closer to minimize reaching



# Straightener/Drop Sorter

- ▶ AKA - floaters or Tipplemen
- ▶ Clear jam-ups on conveyors
- ▶ Unstack and straighten boards
- ▶ Dispose of debris
- ▶ Sort boards and operate drop gates to send boards to appropriate chains



# Straightener/Drop Sorter Ergonomic Hazards

- ▶ Handling boards to straighten, sort, or unstack them
- ▶ Lifting large and heavy boards during sorting
- ▶ Bending and reaching for boards or slash
- ▶ Looking down at a monitor or control panel



# Straightener/Drop Sorter Ergonomic Hazard Controls

- ▶ Install a functional unscrambler with metal cross bars that can help reduce pile up of boards
- ▶ Unscrambler capacity needs to be compatible with the board flow
- ▶ Deeper unscrambler is needed with high product flow conditions



# Straightener/Drop Sorter Ergonomic Hazard Controls

- ▶ Adjust the angle of the slope of the unscrambler so the boards can be dropped down smoothly with out cross-ups
- ▶ Install a short “v” notch type unscrambler when space is a concern
- ▶ Install trim eliminator
- ▶ Position the 2<sup>nd</sup> conveyer belt before the unscrabler to avoid cross-ups



# Straightener/Drop Sorter Ergonomic Hazard Controls

- Place a picker on the edge out-feed to dispose of slash and trim
- Install a computerized trim eliminator to get rid of the trim at the edger
- Place a chipping head on edger
- Adjust the speeds of the conveyor chains to avoid pile ups



# Straightener/Drop Sorter Ergonomic Hazard Controls

- ▶ Install mirrors to spot pile ups
- ▶ Make sure the number of operators are compatible with the product flow
- ▶ Train operators to handle boards only when necessary
- ▶ Move operators closer to the gate to reduce bending



# Trip Saw Operator

- Trims ends of boards to length
- Load lugs that carry boards into the saws



# Trip Saw Operator Ergonomic Hazards

- ▶ Gripping boards to position them into lugs
- ▶ Gripping boards to position them for cuts
- ▶ Gripping boards to help straighten or separate them
- ▶ Gripping slash to manually dispose of it
- ▶ Bending to reach and align boards
- ▶ Lifting boards at jam ups



# Trip Saw Operator Ergonomic Hazard Controls

- Install a properly designed automatic lug feeder
- Add an extra powered belt for longer boards to assist with alignment
- Use a curved ramp after an unscrambler so boards coming off will be straight and separate



# Trip Saw Operator Ergonomic Hazard Controls

- Synchronize chains to prevent pile-ups
- Automate the process with electric eyes to know when to load more materials and to detect excess in order to prevent pile ups
- Install a drop sorter before the trim saw to dispose of slash
- Increase the space between the unscrambler and the operator to reduce jam-ups
  - Buffer area



# Trip Saw Operator Ergonomic Hazard Controls

- Use a person to monitor backups so that no more boards will be sent to the trimmer than can be handled
- Teach the operator not to handle boards unnecessarily
- Install functional even ending fences to align boards
- Chain control training



# Planer Operator

- ▶ Loads boards into planer machine
- ▶ Foot and hand controls are used to advance chains and control planer machine
- ▶ Remove boards from piles
- ▶ Manually remove stickers
- ▶ Turn boards for inspection before feeding them into the planer



# Planer Operator Ergonomic Hazards

- ▶ Reaching overhead to remove stickers
- ▶ Gripping boards to manually load them into planer
- ▶ Gripping boards to move them from stacks
- ▶ Looking down at monitor or control panel



# Planer Operator Ergonomic Hazard Controls

- ▶ Develop a system that removes stickers before they are sent to the planer station
- ▶ Install feed rollers at planer machine to send the boards into the pineapple
- ▶ An angle ramp after the unscrambler is an important consideration to ensure boards are dropped smoothly and not crossed up



# Planer Operator Ergonomic Hazard Controls

- ▶ “V” notch uncrambler may be appropriate for mills having limited space
- ▶ Adjust chain speed to ensure that boards do not pile up
- ▶ Make control panels and monitors adjustable and movable



# Grader

- ▶ Grade boards of various dimensions and weights according to their quality



# Grader Ergonomic Hazards

- ▶ Gripping boards to turn them or send them to the resaw



# Grader Ergonomic Hazard Controls

- ▶ Use a mechanical board turning device with a lug loader
- ▶ Install a functional unscrambler in to reduce board stacking
- ▶ Add another grader to reduce overall exposure to the risk



# Puller

- ▶ Boards are manually pulled off the conveyor chain and stacked by dimension for transport



# Puller Ergonomic Hazards

- ▶ Gripping and pulling boards to stack them
- ▶ Lifting boards to stack them
- ▶ Bending to lower boards onto a cart during stacking
- ▶ Looking down at control panel



# Puller Ergonomic Hazard Controls

- ▶ Install a mechanical sorter and auto stacker
- ▶ If boards are heavy train workers to pull only one board at a time
- ▶ Train workers to put on hand underneath the load when lifting and carrying boards to reduce hand grip force



# Puller Ergonomic Hazard Controls

- ▶ Train workers to use the leverage of the boards and momentum during stacking
- ▶ Use an adjustable height cart/bin
- ▶ Install a scissor lift to raise carts/bins to improve posture during lifting and stacking
- ▶ Make control panels adjustable and movable



# Bander Operator

- ▶ Bands loads for transportation
- ▶ End of production
- ▶ Staple gun use
- ▶ Wrapping loads



# Bander Operator Ergonomic Hazards

- ▶ Using your hand as a hammer to align boards
- ▶ Gripping tools during banding operation
- ▶ Bending to band/wrap the wood
- ▶ Using chain saw to trim ends of boards
- ▶ Reaching above shoulder height to load the magazine
- ▶ Repetitively firing staple gun



# Bander Operator Ergonomic Hazard Controls

- ▶ Use rubber mallet
- ▶ Use an even machine
- ▶ Automate the process
- ▶ Rotate worker jobs that don't include gripping
- ▶ Place load on an adjustable height stand



# Bander Operator Ergonomic Hazard Controls

- ▶ Wear anti-vibration gloves
- ▶ Raise the loading area stops feeding up
- ▶ Train the operator to load magazine at a lower level
- ▶ Elevate workers so they can fill the magazine from higher level, the battens must also be raised



# Bander Operator Ergonomic Hazard Controls

- ▶ Work with customers to develop a better labeling method to eliminate the repetitive firing of a staple gun
- ▶ Build or purchase an automatic labeling machine



# Job Rotation

- ▶ Limits employee exposure to risk factors
- ▶ Reduces potential for injury MSD
- ▶ Learning curve - Give adequate training and break-in periods
- ▶ Keep to a minimum 2 or 3 jobs
- ▶ Strengthens your teams average knowledge and flexibility



# Ergonomics Grant

- ▶ Please email me to get out to your site.
- ▶ Training
- ▶ Job ergonomic Risk Needs Assessment
- ▶ Grant requirements



# Workers' Rights Under OSHA Act

Workers are entitled to working conditions that do not pose a risk of serious harm. To help assure a safe and healthful workplace, OSHA also provides workers with the right to:

- ▶ Ask OSHA to inspect their workplace;
- ▶ Use their rights under the law without retaliation and discrimination;
- ▶ Receive information and training about hazards, methods to prevent harm, and the OSHA standards that apply to their workplace. The training must be in a language you can understand;
- ▶ Get copies of test results done to find hazards in the workplace;
- ▶ Review records of work-related injuries and illnesses;
- ▶ Get copies of their medical records.



# Employer Responsibilities

Under the OSH law, employers have a responsibility to provide a safe workplace. This is a short summary of key employer responsibilities:

- ▶ Provide a workplace free from serious recognized hazards and comply with standards, rules and regulations issued under the OSH Act.
- ▶ Examine workplace conditions to make sure they conform to applicable [OSHA standards](#).
- ▶ Make sure employees have and use safe tools and equipment and properly maintain this equipment.
- ▶ Use color codes, posters, labels or signs to warn employees of potential hazards.
- ▶ Establish or update operating procedures and communicate them so that employees follow safety and health requirements.
- ▶ Employers must provide safety training in a language and vocabulary workers can understand.
- ▶ Employers with hazardous chemicals in the workplace must develop and implement a written hazard communication program and train employees on the hazards they are exposed to and proper precautions (and a copy of safety data sheets must be readily available). See the OSHA page on [Hazard Communication](#).
- ▶ Provide medical examinations and training when required by [OSHA standards](#).
- ▶ Post, at a prominent location within the workplace, the [OSHA poster](#) (or the state-plan equivalent) informing employees of their rights and responsibilities.
- ▶ Report to the nearest OSHA office within 8 hours any fatal accident or one that results in the hospitalization of three or more employees. Call our toll-free number: 1-800-321-OSHA (6742); TTY 1-877-889-5627
- ▶ [Keep records](#) of work-related injuries and illnesses. (Note: Employers with 10 or fewer employees and employers in certain low-hazard industries are exempt from this requirement.)
- ▶ Provide employees, former employees and their representatives access to the Log of Work-Related Injuries and Illnesses ([OSHA Form 300](#)). On February 1, and for three months, covered employers must post the summary of the OSHA log of injuries and illnesses ([OSHA Form 300A](#)).
- ▶ [Provide access](#) to employee medical records and exposure records to employees or their authorized representatives.
- ▶ Provide to the OSHA compliance officer the names of authorized employee representatives who may be asked to accompany the compliance officer during an [inspection](#).
- ▶ Not discriminate against employees who exercise their rights under the Act. See our "[Whistleblower Protection](#)" webpage.
- ▶ Post OSHA citations at or near the work area involved. Each citation must remain posted until the violation has been corrected, or for three working days, whichever is longer. Post abatement verification documents or tags.



# Right to File a Complaint

- ▶ The Occupational Safety and Health Act of 1970 gives employees and their representatives the right to file a complaint and request an OSHA inspection of their workplace if they believe there is a serious hazard or their employer is not following OSHA standards. Further, the Act gives complainants the right to request that their names not be revealed to their employers.
- ▶ Complaints from employees and their representatives are taken seriously by OSHA. It is against the law for an employer to fire, demote, transfer, or discriminate in any way against a worker for filing a complaint or using other OSHA rights.
- ▶ OSHA will keep your information confidential.



# Whistleblower Protections

- ▶ OSHA's Whistleblower Protection Program enforces the whistleblower provisions of more than twenty whistleblower statutes protecting employees who report violations of various workplace safety laws.

Protection from discrimination means that an employer cannot retaliate by taking "adverse action" against workers, such as:

- ▶ Firing or laying off
- ▶ Blacklisting
- ▶ Demoting
- ▶ Denying overtime or promotion
- ▶ Disciplining
- ▶ Denial of benefits
- ▶ Failure to hire or rehire
- ▶ Intimidation
- ▶ Making threats
- ▶ Reassignment affecting prospects for promotion
- ▶ Reducing pay or hours

