Environmental Health and Safety

Construction Ergonomics

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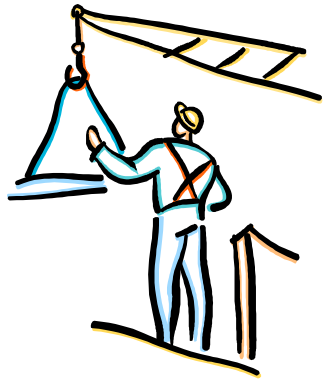
Outline

- Review Basic Ergonomics Principles
  - What is ergonomics?
  - Types of ergonomic injuries
  - Importance of early reporting
  - Stretching basics
- Ergonomic risk factors present in construction
- Ergonomics tips to minimize risk factor exposure
- Summary

What is Ergonomics?

- Ergonomics (er'gõ nom'iks):
  - The study of work and the relationship of work to the physical and cognitive capabilities of people
  - Fitting the job (tools, tasks, and environment) to the employee, instead of forcing the worker to fit the job

- Ergonomic principles derived from many areas, including:
  - Biomechanics
  - Physiology
  - Anthropometry
  - Industrial engineering
  - Safety



Ergonomic Injuries

- Two classifications of ergonomic injuries
  - Cumulative Trauma Disorders (CTD's) – exposure driven
  - Strains/Sprains – instantaneous (event driven)

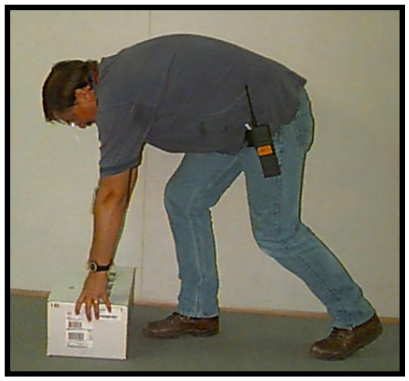
Ergonomic Injuries

- Cumulative Trauma Disorders (CTD's)
  - Injury to soft tissue caused by prolonged exposure to multiple ergonomic risk factors
  - Typically develop in small body segments (i.e. fingers, wrists, elbows, and neck)

- Examples of CTD's
  - Tendon disorders:
    - Inflammation of tendon and/or tendon sheathing caused by repeated rubbing against ligaments, bone, etc.
    - Lateral epicondylitis (tennis elbow)
  - Nerve disorders:
    - Compression of nerves from repeated or sustained exposure to sharp edges, bones, ligaments, and/or tendons
    - Carpal tunnel syndrome
  - Neurovascular disorders:
    - Compression of blood vessels and/or nerves from repeated exposure to vibration or cold temperatures
    - Raynaud's phenomenon (white finger syndrome)

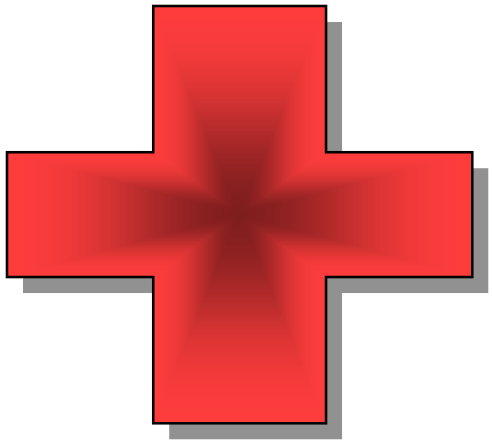
Ergonomic Injuries

- Strains & Sprains
  - Injury to connective tissue caused by single forceful event: lifting heavy objects in awkward position
  - Common to large body segments (i.e. back, legs, and shoulders)
  - Risk of injury increases with the presence of multiple risk factors



Early Reporting of Ergonomic Issues

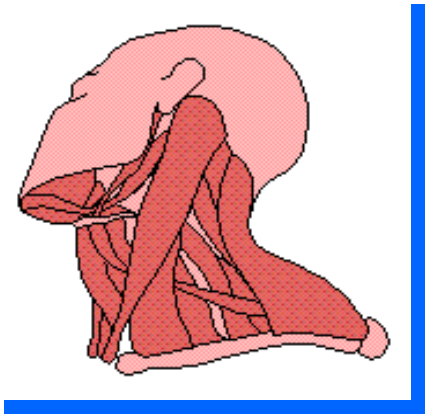
- Proactive Reporting:
  - Report suspected ergonomics risk factors to your supervisor and safety committee representative
- Early Reporting Process:
  - Report pain or discomfort associated with work to your supervisor and Occupational Health Services
- Benefits to Early Reporting:
  - Leads to early care and quicker healing, preventing chronic problems
  - Leads to quicker identification of the root cause of the injury
  - Will initiate an ergonomics evaluation by trained personnel



Stretching Basics

Benefits of stretching:

- Increases flexibility/elasticity of muscles
- Increases circulation to warm the muscles, improving mental alertness, reducing fatigue
- Decreases muscle tension and stress

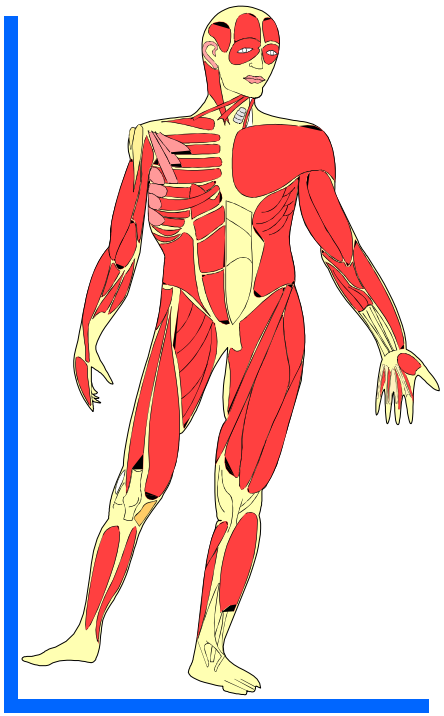


When to Stretch:

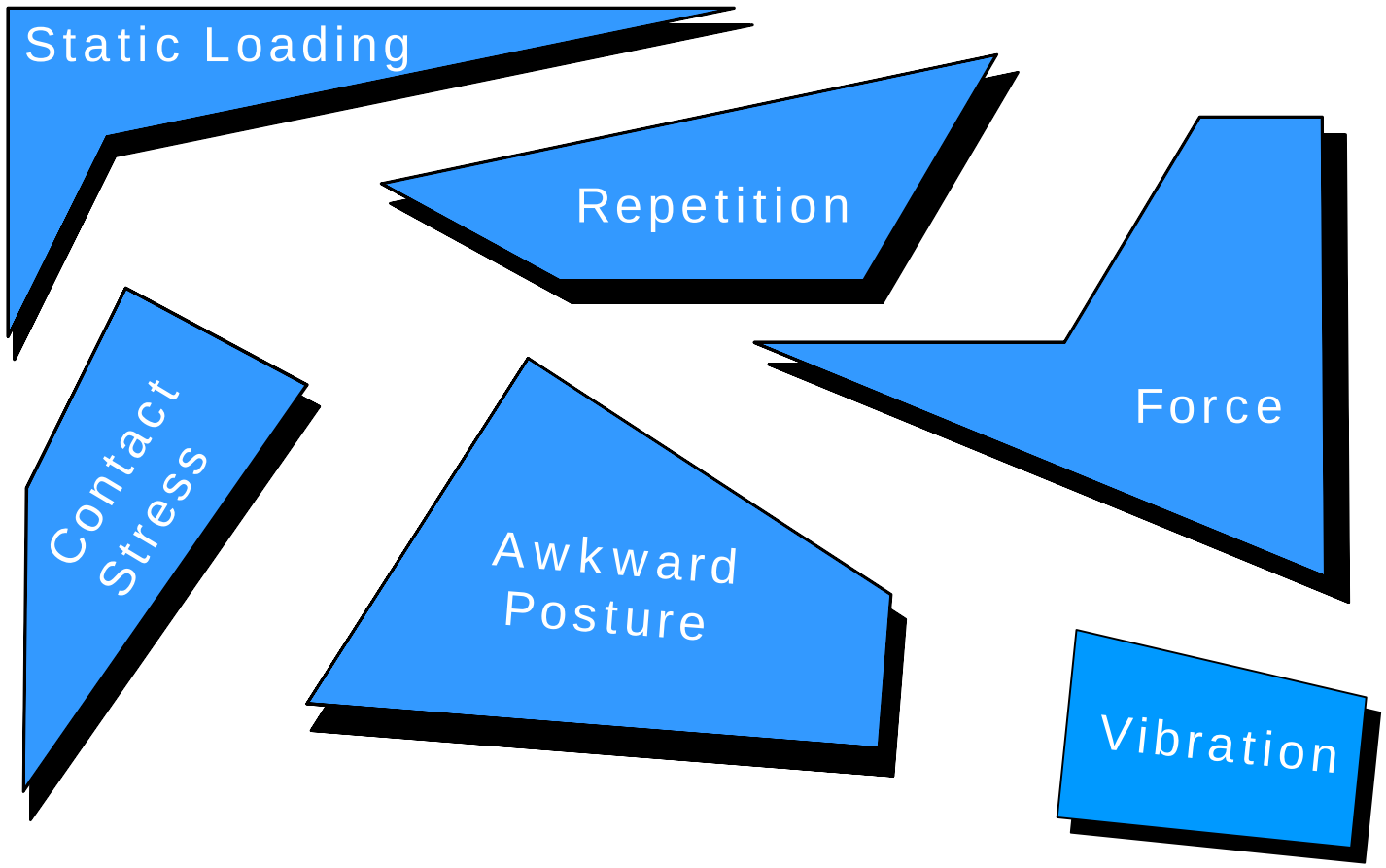
- Prior to starting your day
- During short breaks (at least once per hour)
- After breaks or lunch to prevent fatigue
- If tension or stress is apparent
- After a lengthy task duration or an extended awkward posture

Stretching Basics

- **Proper stretching techniques:**
  - Relax and breathe normally. Do not hold your breath.
  - Hold each stretch for a count of 15, or as long as comfort is maintained.
  - Use gentle, controlled motions. Do not bounce!
  - Keep the knees slightly bent for better balance.
  - Stretch until a mild tension is felt, then relax.
  - Stretch by how you feel and not by how far you can go.



Ergonomic Risk Factors



Risk of injury increases with:

- Prolonged exposure to any of these ergonomic risk factors
- Presence of multiple risk factors within a single job task

Ergonomic Tips to Minimize Awkward Postures

- Work near elbow height to avoid bending excessive bending

- Avoid overhead reaching and kneeling when possible

Ergonomic Tips to Minimize Awkward Postures

- Where awkward postures are unavoidable, change tasks, stretch, and take short breaks frequently

Ergonomic Tips to Minimize Awkward Postures

- Select the correct tool handle orientation based upon worksurface height/orientation (when possible)

Pistol grip

In-line grip

Primary Use	Surface Orientation	Select this tool type
Above shoulder height	vertical surface	in-line grip
	horizontal surface	pistol grip
Between elbow and shoulder height	vertical surface	pistol grip
	horizontal surface	in-line grip
Below elbow height	vertical surface	in-line grip
	horizontal surface	pistol grip

Ergonomic Tips to Minimize Force

- Use mechanical lift assists and carts when available
  - Avoid manually handling heavy objects (more than 35 pounds)
  - Avoid carrying objects more than 100 feet

- Practice Proper Cart Handling
  - Push instead of pulling
  - Use both hands when pushing
  - Stand directly behind the cart when pushing (avoid twisting your body)
  - Maintain good control and limit speed
  - Ensure cart is not overloaded

Ergonomic Tips to Minimize Force

- Use proper lifting techniques when lifting
  - Examine the load and the surrounding area
  - Bend knees when lifting a load
  - Look forward to keep back straight
  - Position the load close to the body
  - Maintain a firm grip on the load
  - Use smooth, controlled movements
  - Keep arms in front of body
  - Turn feet in direction of movement to avoid twisting
- **Get help before performing tasks requiring excessive force**

Ergonomic Tips to Minimize Force

A Two-Person Lift Is Appropriate When. . .

- A lift, hoist or other mechanical assistance is unavailable
- The object is heavier than you are capable of lifting alone (typically more than 35 pounds)
- The object is not heavier than what two people are capable of lifting (typically less than 60 pounds)
- The object is awkward or oversized.
- Any object that does not have its weight equally distributed within the load.
- **Remember some objects are too heavy or awkward to be handled with two people**

Ergonomic Tips to Minimize Force

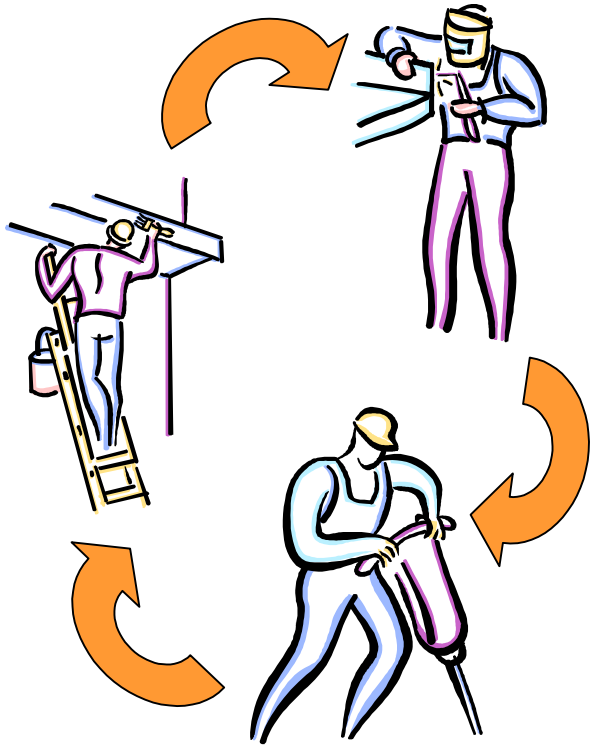
- Use the correct tools / powered tools for the task
  - Powered tools tend to require less exertion to perform a task
  - Ensure that the weight of a powered tool (and cording) does not create additional force issues

- Use only the amount of force necessary to complete the task

Ergonomic Tips to Minimize Repetition

- **Repetition:**
  - Use power tools when available

  - Change tasks, stretch, or take a break from repetitive tasks



  - Follow job rotation policies where applicable – effective job rotations work alternate muscle groups between successive job functions

Ergonomic Tips to Minimize Static Loading

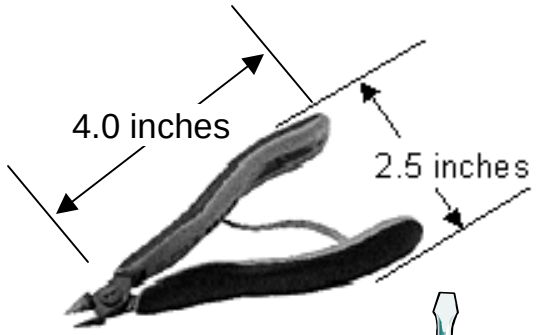
- **Static Loading:**
  - Avoid prolonged awkward postures
  - Change the position of the work or your body position to get as close as possible to the work area
  - If prolonged awkward postures are unavoidable, use a “supported” posture to compensate
  - A supported posture uses part of your body to support the weight of another body segment that is in an awkward position

Ergonomic Tips to Minimize Contact Stress

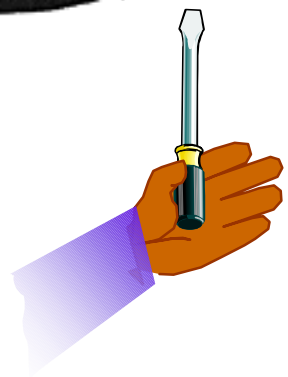
- Select hand tools that conforms to the geometry of the hands

- Pistol grip & in-line tools:
  - Recommended handle length: 5.0 inches
  - Recommended handle diameter: 1.0 to 1.5 inches

- Pliers & crimping action tools:
  - Recommended handle length: 4.0 inches (minimum)
  - Recommended handle span: 2.5 inches



- Avoid handles that end in the palm of the hand



Ergonomic Tips to Minimize Contact Stress

- **Avoid pressure on palms, wrists, and elbows:**
  - Use padding on hard or sharp surfaces
  - Change your position to eliminate the stress

- **Avoid pressure on knees:**
  - Avoid kneeling on hard surfaces for prolonged periods
  - Use knee pads when kneeling tasks are unavoidable

Ergonomic Tips to Minimize Vibration & Torque

❑ To lessen vibration:

- Pad tool handles with a soft compressible surface
- Use vibration damping (gel filled) gloves

- Select tools (hammers and chippers) with built in damping systems (springs/hydraulics)

❑ To lessen torque reaction:

- Use electric tools as opposed to air driven tools
- Use pulse tools or auto-shutoff tools

Summary

- Minimize ergonomic risk factors in your area
- Stretch throughout the shift especially before and after activities that require awkward positions or lifting
- Pay attention to your body and know your physical limitations
- Report ergonomics issues through appropriate channels.
- Ergonomic injuries are preventable, and you own your own safety