

**ERGONOMICS IN THE
WORKPLACE... A
NATURAL FIT**

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Presentation Objectives

- What exactly is ergonomics and why is it an important part of a comprehensive safety & wellness initiative?
- What are the similarities and differences between job descriptions, job physical demands, risk screening tools and ergonomic assessments?
- When assessing ergonomic risk, what are the important issues?
- Does ergonomics really work?

What is ERGONOMICS?

Ergonomics is the science that is concerned with the design of equipment, facilities, operations, and environments to match the capabilities and limitations of people.

Basically, Ergonomics is.....

Fitting The Job To The Person

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Workers Come in Different Sizes


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How much is too much?

- What is “safe work”?
- Ergonomics has certain design thresholds and parameters


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Ergonomic Job Design

$$\text{Strain} = \frac{\text{Job Physical Demands}}{\text{Worker Capacity}}$$



Goals of Ergonomics

- To decrease errors, accidents, injuries and illnesses
- To increase safety and comfort
- To increase efficiency, productivity and quality




This is what we know....

- Physical
- Psychosocial
- Personal
- Pro-active vs Reactive



Top 5 Excuses for Not Incorporating Ergonomics into Design of Machinery


- No Time...** "Never seem to have time to do it right the first time. However, we seem to find time to do it right the second or third time."
- Too Expensive...** "Pay a little now or a lot more later."
- Ugly Baby Syndrome** . . . Telling an engineer that his/her designs could be improved is much like saying "Your baby is ugly."
- Ergonomics Is Common Sense** . . . If true, common sense is not so common.
- Oops** . . . "I didn't think about it."



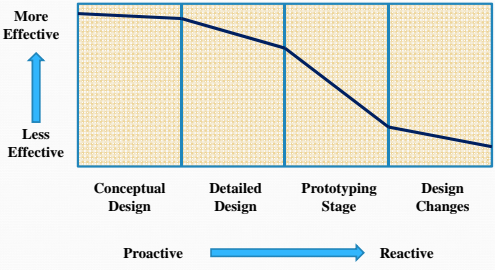
Why Ergonomics?

Cost of injuries (financial + personal)


- Ergonomic related injuries typically account for 40-60% of injuries and 50-75% of workers' compensations costs
- Productivity
- Quality
- OSHA compliance

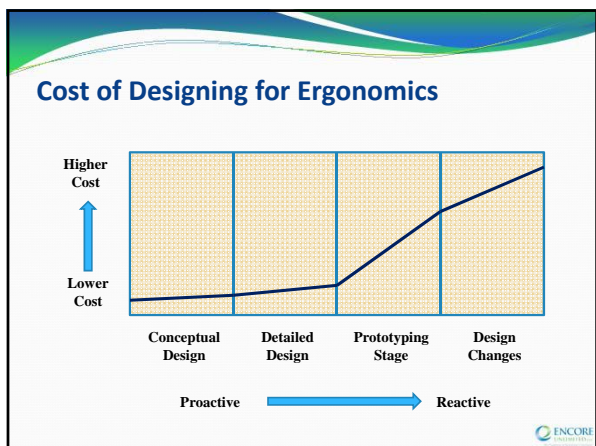


Effectiveness of Designing for Ergonomics



Design Stage	Effectiveness
Conceptual Design	High (Proactive)
Detailed Design	Medium-High
Prototyping Stage	Medium-Low
Design Changes	Low (Reactive)






- ### Tools in the Arsenal
- Job Descriptions
 - Job Physical Demands
 - Risk Screening Tools
 - Ergonomic Assessment
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- ### Nomenclature
- Don't get caught up in the titles
 - terms are confusing to most and used differently in different venues.
 - Concentrate on the purpose of the assessment.
 - There are similarities and differences between all 4 types of information gathering/reporting tools
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Comparison of Tools	Job Description	Physical Job Demands	Risk Screening Tool	Ergonomic Assessment
Communicate with employee	✓	✓	✓	✓
Communicate with Supervisor/Manager	✓	✓	✓	✓
Communicate with MD		✓		✓
Assist with RTW		✓		✓
Quantify Physical Demands		✓		✓
Identify the presence of risk factors			✓	✓
Prioritize areas of potential risk			✓	✓
Correctly identify ergonomic hazards >50% of the time				✓
Assess combination of factors to determine level of ergonomic risk				✓
Assist with redesign to mitigate risk				✓

Why is this information important?

- We need to use this information to design jobs.
- This is the way that ergonomics can effectively reduce the potential for workplace injuries.




Using Ergonomics to Assess Risk and Mechanism of Injury
Ergonomic Risk Factors & Mechanism of Injury



What are Cumulative Trauma Disorder (CTD) Risk Factors?


- Elements of a task that increase the likelihood of the development of work-related musculoskeletal disorders

Posture +
 Force +
 Rep =
 Injury




Mechanism of Injury vs. Causation

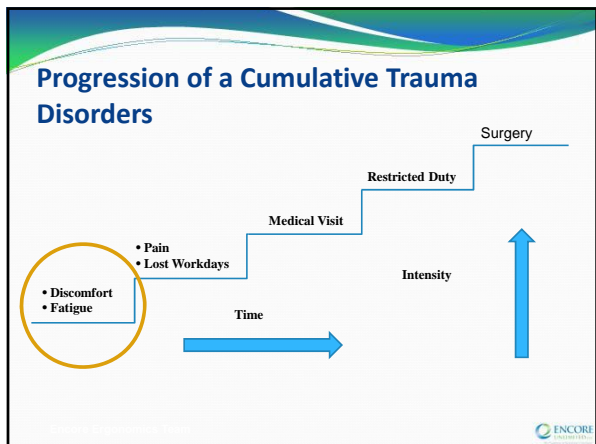
- Causation
Identifying the most likely cause of a workers condition or disability and demonstrating that it arose out of the workplace
- Mechanism of Injury
Circumstances under which an injury can occur



Primary Job Risk Factors Considered in Major Reviews

Risk Factor	Low Back	Distal Upper Extremities	Neck and Shoulders
Force	Strong	Strong	Strong
Awkward Posture	Strong	Strong	Strong
Static Posture	Good	Good	Good
Repetition	Good	Strong	Strong
Compression	Good	Good	Weak
Vibration	Strong	Strong	Weak
Combined	Good	Strong	Good





How Should We Control CTDs?

From three directions

- Prevention
- Detection
- Reaction

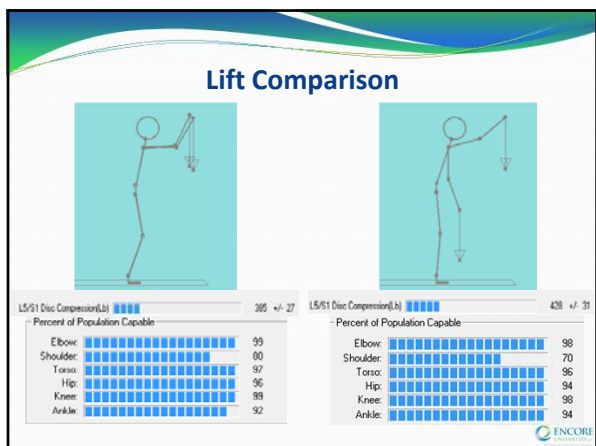
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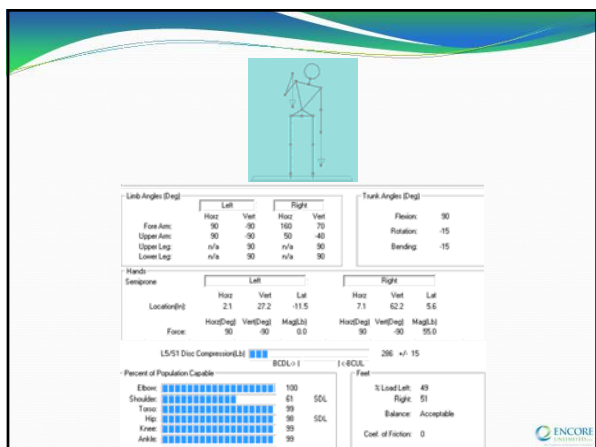
Question....

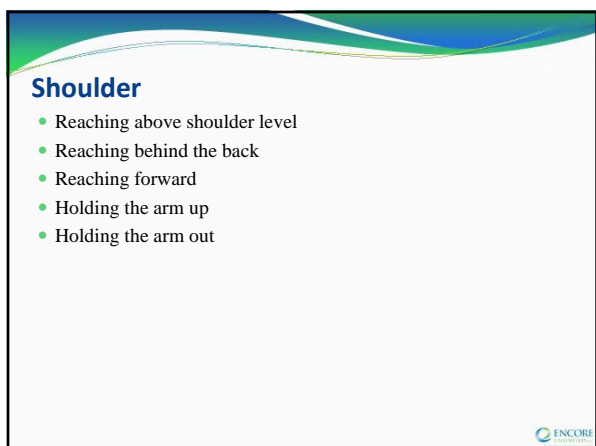
What is the most important factor in minimizing risk when lifting?

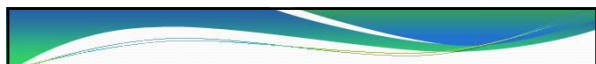
- The vertical height of the object
- The horizontal distance from the body
- The weight of the object

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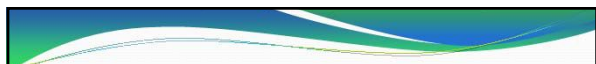







- Limit the amount of work performed at or above shoulder height
 - Workers are the weakest when the upper arm is raised between 90 and 120 degrees or out to the side greater than 60 degrees.
- Limit the amount of work performed while reaching out to the side
- Limit the amount of work performed while reaching in front of your body greater than 18 inches
- Limit use of large amounts of force generated from the shoulder repetitively throughout the workday

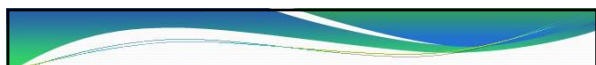





Elbow

- Elbow bending
- Wrist bending with force
- Working with elbows < 90°
- Working with palms up or down (supination and pronation)
- Gripping with arms extended
- Resting arms on hard surface





- Minimize forceful extension of the elbow
- Minimize repetitive forceful supination / pronation of the extended arm




Question...

Are you stronger

- Lifting with your palm facing up?
- Lifting with your palm facing down?


Workers are much stronger when lifting with the elbows bent and the palms supinated (facing up).

Minimize lifting with an extended elbow and a pronated forearm (palm facing down)




Wrist and Hand Risk Factors


- Twisting with wringing motion
- Hard or sharp object in the palm
- Flexion, extension, radial or ulnar deviation
- Pounding
- Cold tools
- Pinching with force
- Use of a small or large diameter tool
- Use of a single digit
- Torque reaction from tools
- Improper glove size
- Vibrating tools



Use a power grasp instead of a pinch grasp whenever possible



Effects of Grip Span on Grip Strength



Grip Span	Percent of Maximum Grip Strength Available
2.5"	85 %
2.0"	100 %
1.5"	75 %
1.25"	60 %
1.0"	30 %

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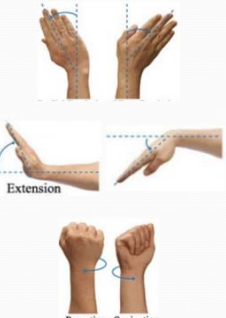
Question...

When you flex your wrist 45 degrees, how much grip strength capability do you lose?

- 20%
- 40%
- 60%

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Effects of Wrist Posture on Grip Strength




Wrist Posture	Percent of Maximum Grip Strength Available
Ulnar (40°)	75 %
Radial (25°)	80 %
Extension (45°)	75 %
Flexion (45°)	60 %
Flexion (65°)	45 %

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Use Power Tools and Smart Tools whenever possible

- Hand tools should never weigh >2.5 lbs
- Use overhead suspension systems to eliminate weight of tools




Limit use of Tools with Vibration

- Vibration tool use should not exceed 2 hours total out of every 8 hour shift

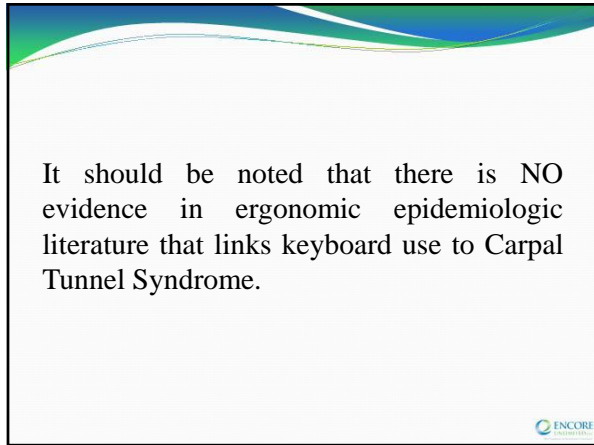


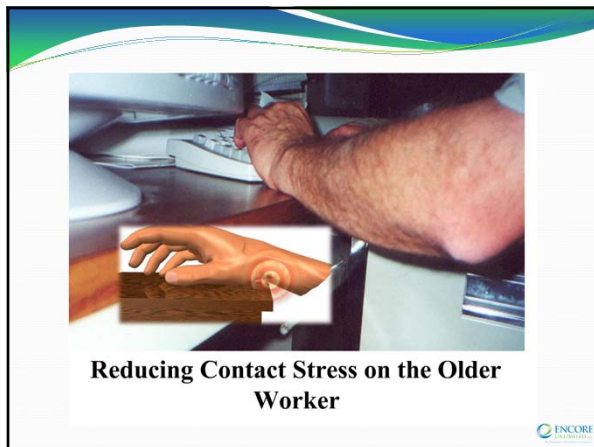
ALWAYS.....

Maintain tools in the best working condition for the job.









Questions?

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