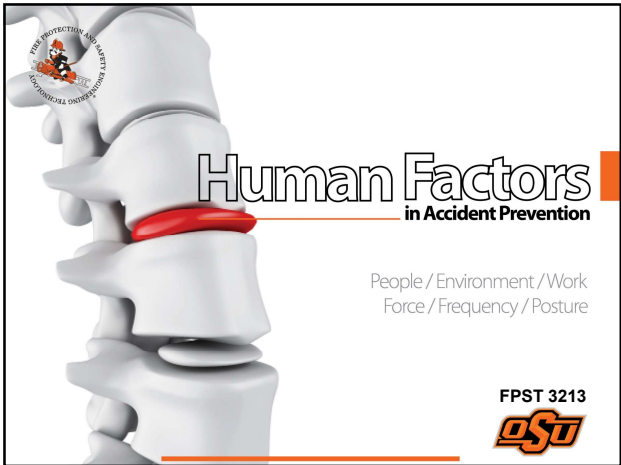
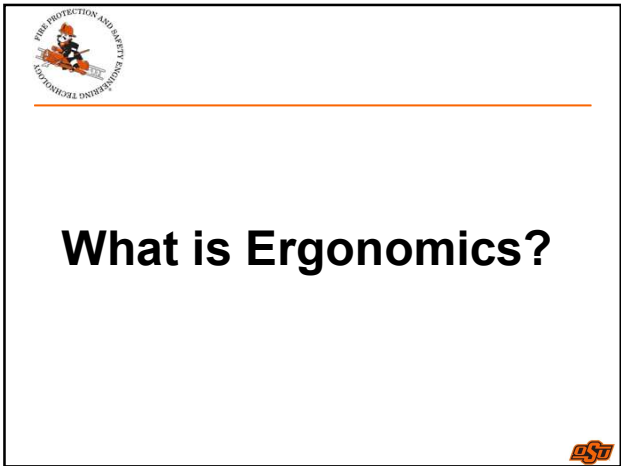


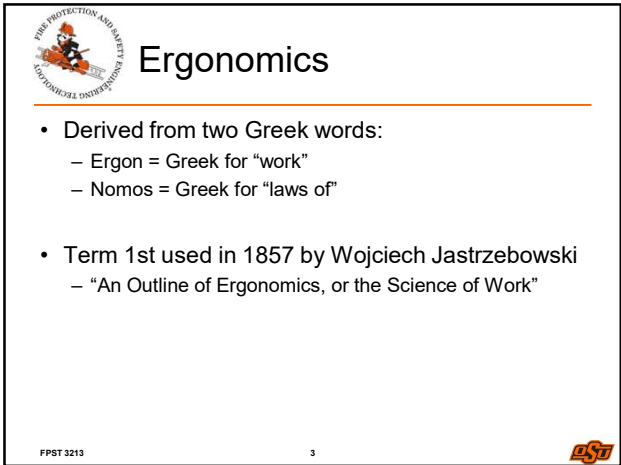
What is Ergonomics?



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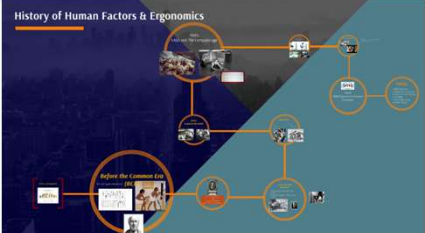
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What is Ergonomics?




History of Ergonomics

http://prezi.com/1mycy-rjd0gd/?utm_campaign=share&utm_medium=copy




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Ergonomics	Human Factors
<ul style="list-style-type: none">• How work affects people• Reduce fatigue	<ul style="list-style-type: none">• Human machine interface• Reduce the potential for human errors

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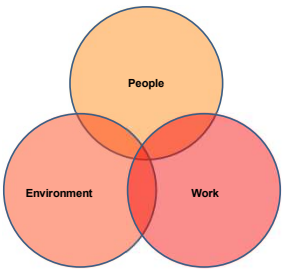
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Ergonomics / Human Factors




Prevent musculoskeletal disorders.

Reduce the potential for human errors.


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What is Ergonomics?




OSHA - Ergonomics

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Ergonomics and Other Sciences

Engineering SciencesPhysical SciencesBiological SciencesSocial and Behavioral Sciences

MechanicsStaticsDynamics

PhysicsChemistryBiochemistryPhysical Energy Stresses

PhysiologyAnatomyPhysiological Sciences

AnthropologyPhysical AnthropologyAnthropometry


PsychologySociologyGroup DynamicsIndustrial Psychology

BiomechanicsWork PhysiologyEngineering Psychology


ERGONOMICS

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Ergofacts

- 2.3 million people worldwide die from work-related accidents and diseases every year.
- 270 million people suffer work injuries/year
- 60 million suffer from short or long term illnesses related to their work annually

International Labor Organization (ILO)

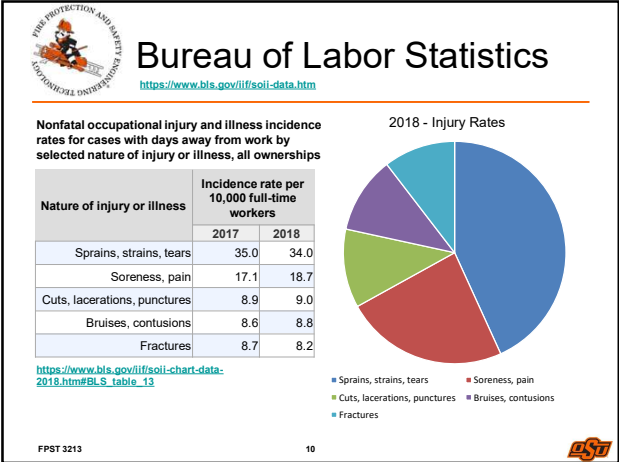
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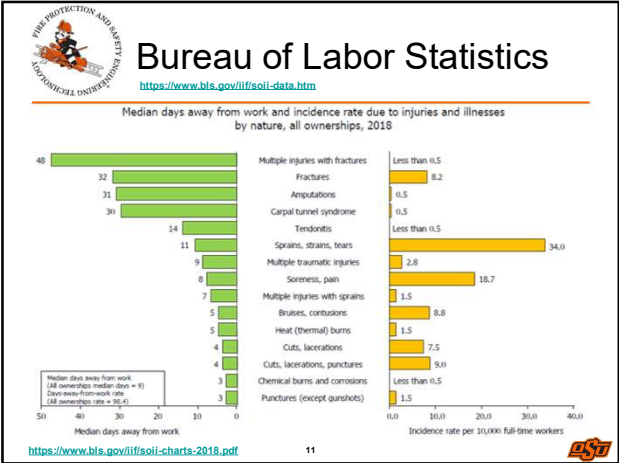


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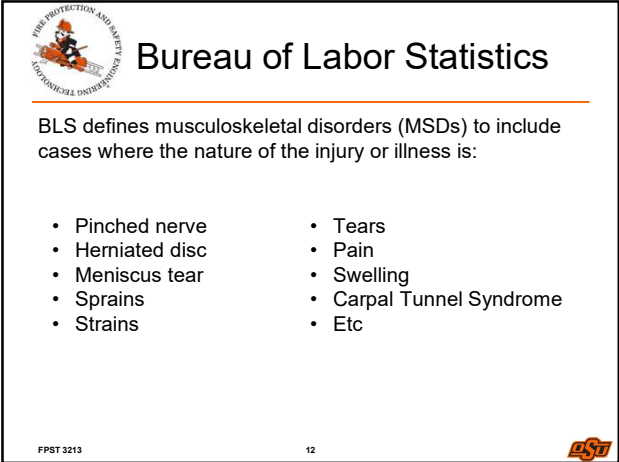
What is Ergonomics?



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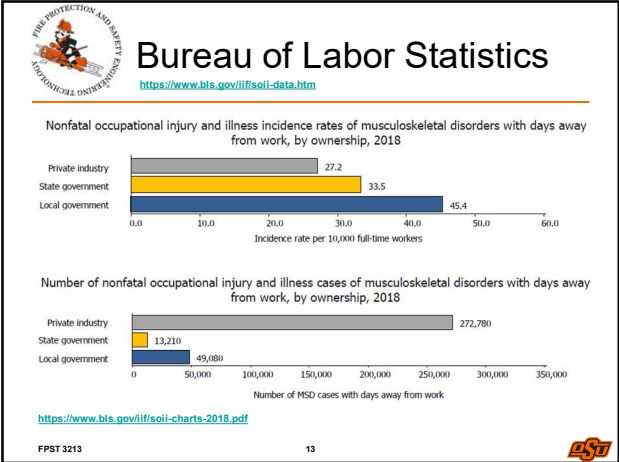


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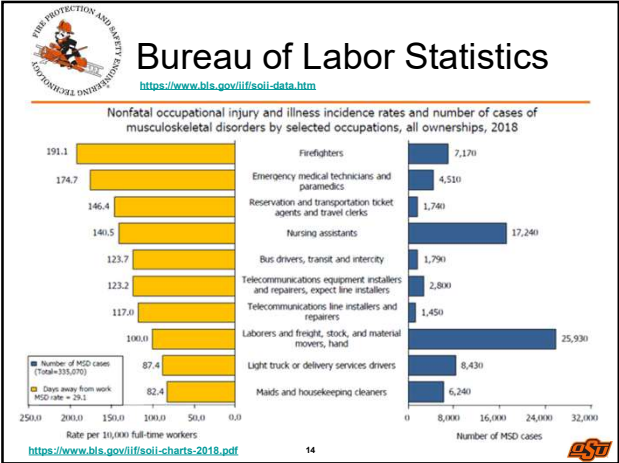


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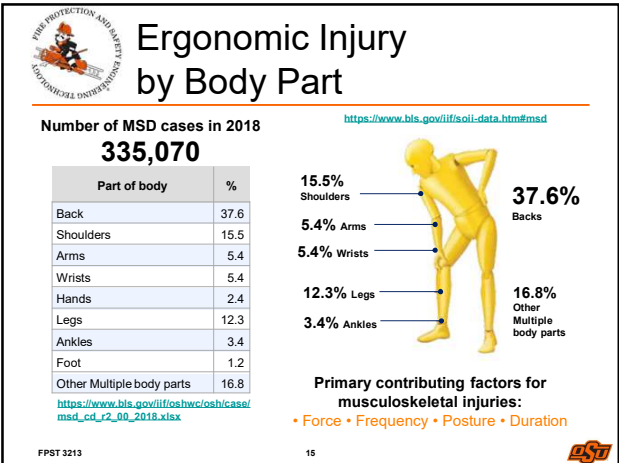
What is Ergonomics?



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What is Ergonomics?




Ergofacts


- MSDs require 38% more days away from work than other injuries
- 400,000 – 600,000 injuries per year

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Ergofacts


- Musculoskeletal Disorders (MSD's) account for 33% of all workers compensation costs
- Direct Costs of MDSs are approximately \$50 Billion per year
- Indirect costs are \$5 to every \$1 of direct costs

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OSHA Estimator

<https://www.osha.gov/safetypays/>

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What is Ergonomics?

- It is an injury or disorder to the human body's musculoskeletal (or "movement") system
 - Think of an MSD as a "movement system disorder"
- Micro-trauma to the soft tissues begins to outrun the body's recovery system developing into an MSD
- There is no singular cause of MSDs.

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- **Affect:**
 - Muscles
 - Joints
 - Tendons
 - Ligaments
 - Nerves

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- Frequency
- Awkward posture
- Forceful exertion
- Static posture
- Mechanical contact
- Stress
- Temperature
- Vibration
- Duration




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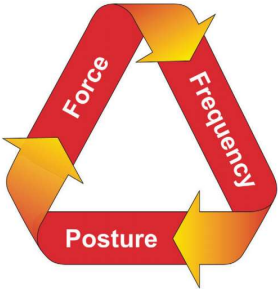
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What is Ergonomics?




Ergonomics Triangle




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Other Factors


- Obesity Epidemic
- Opioid Addiction Epidemic
- Aging Workforce
 - Disability accommodations
- Fitness for duty
- Gender

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Obesity Epidemic

1985

2008

2016



Insufficient data

<10%

10–14%

15–19%

20–24%

25–29%

30–34%


≥35%

* BMI ≥30, or ~30 lbs. overweight for 5' 4" person.
Data: Behavioral Risk Factor Surveillance System (1985, 2008, 2016), CDC.
Source: D. Blumenthal and S. Seervai, "Rising Obesity in the United States Is a Public Health Crisis," *To the Point*, the Commonwealth Fund, Apr. 23, 2018.

<https://www.cdc.gov/obesity/data/prevalence-maps.html>

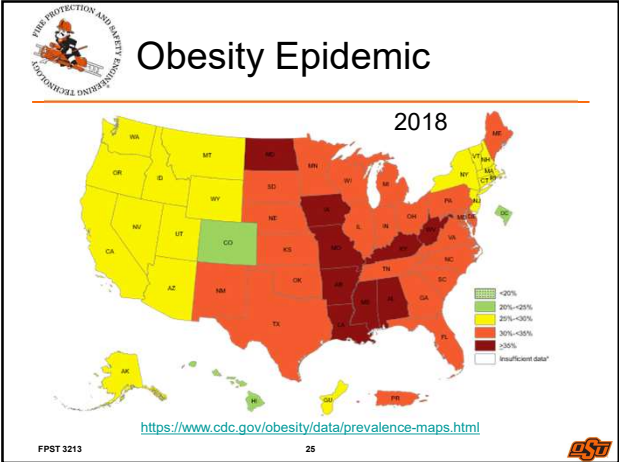
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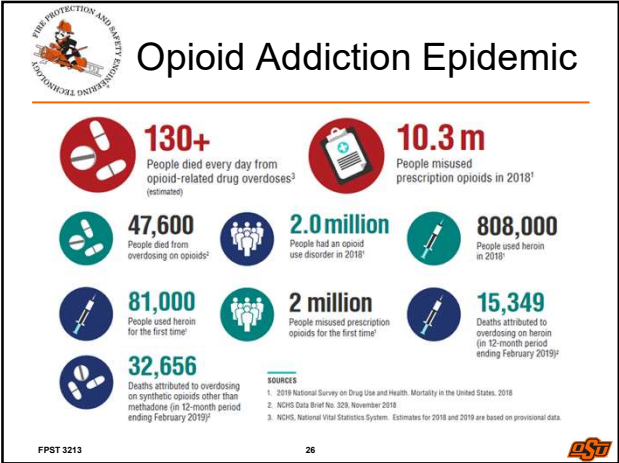


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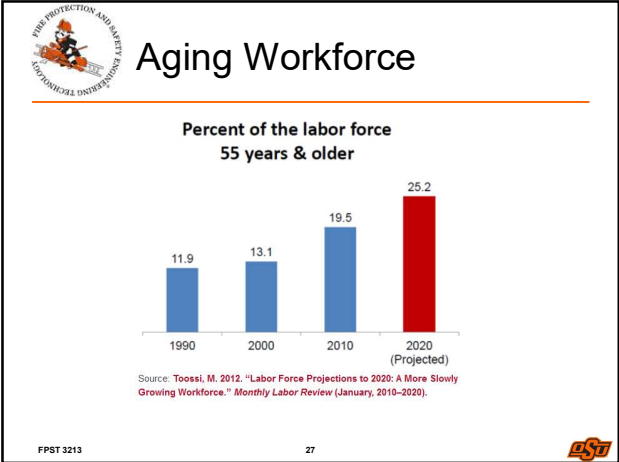
What is Ergonomics?



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What is Ergonomics?




Characteristics of an Aging Workforce


PHYSICAL	PHYSIOLOGICAL	PSYCHOSOCIAL
 <ul style="list-style-type: none">DECREASED STRENGTH, FLEXIBILITY, BALANCEDECREASED VISIONDECREASED REACTION TIME AND SPEEDDECREASED HEARINGDECREASED MANUAL DEXTERITY AND FEEDBACKDECREASED BODY FAT	 <ul style="list-style-type: none">DECREASED OXYGEN INTAKERISING SYSTEMIC BLOOD PRESSUREFASTER ONSET OF FATIGUEGREATER SUSCEPTIBILITY TO EXTREME TEMPERATURES	 <ul style="list-style-type: none">DIFFERENT SHIFT PREFERENCESDIFFERENT TRAINING AND LEARNING STYLESCAN TEND TO EXPERIENCE DISENFRANCHISEMENT WITH THEIR WORK AND COWORKERS

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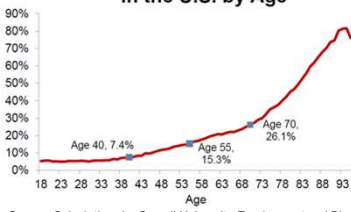


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Disability accommodations


Disability Prevalence in the U.S. by Age



Source: Calculations by Cornell University, Employment and Disability Institute, 2010 American Community Survey, Public Use Microdata Samples (PUMS). Estimates are for civilian non-institutionalized population.

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MSD's - musculoskeletal disorder



https://www.youtube.com/watch?v=KLkAC_eN2Hw


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What is Ergonomics?




Ergonomically Designed or Not

- To determine if equipment, tool, or device is ergonomically designed, we need to ask 3 questions:
 1. WHO (user) was it designed for?
 2. WHAT task was it designed for?
 3. WHAT environment will it be used in?

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People will find their comfort zone



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Adjustable Platforms



Workplace Design


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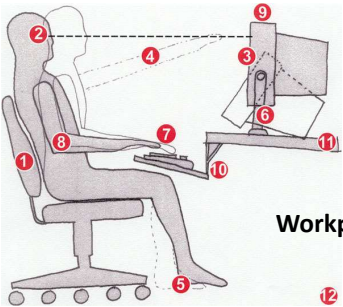


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What is Ergonomics?




Ergonomic Computer Workstation



Workplace Design

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Hazards – Computer Workstations



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Controls - Computer Workstations



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What is Ergonomics?




Importance of Posture




<https://www.youtube.com/watch?v=alY03KrcpKI>

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Ergonomic Program




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Ergonomic Program Elements

- Management Commitment
- Worker Involvement
- Worksite Analysis
- Medical Management
- Training & Education
- Ongoing Evaluation


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What is Ergonomics?




Proactive vs. Reactive Ergonomics


- Proactive Ergonomics
 - Making changes BEFORE injuries occur
- Reactive Ergonomics
 - Making changes AFTER injuries occur
- It's easier to build it in than to bolt it on

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Level of Responsiveness

ANALYSIS TOOLS

Sociotechnical and Environmental Assessment

Potential Ergonomics Problem-Solving Techniques and Engineer Checklists

Ergonomics Problem-Solving Techniques

Specific Ergonomics Intervention Assessment

Maturation Level

Individual Investigator

Participative Ergonomics


Reactive Proactive Strategic

Microergonomics Work/Work Area Focused Macroergonomics Design/Process/System Focused


ERGONOMICS RESPONSIVENESS

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Benefits of a Robust Ergonomics System

- Higher production
- Higher quality
- Higher compliance
- Lower workers' compensation costs
- Employment longevity
- Safe working conditions
- Higher quality of life
- Increased morale




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What is Ergonomics?




Problem Solving Process

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Problem Solving Process


- Identifying Jobs with Ergonomics Opportunities
- Defining the Job Demands
- Identify Risk Factors by Body Part for Each Task of Concern
- For Each Risk Factor, Ask Why It Is Present Until a Dead End is Reached

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Problem Solving Process


- Develop Strategies for How to Address the Root Causes and Generate at Least Three Solutions for Each Task of Concern
- Choose the Solution(s) That Will Substantially Reduce the Ergonomic Problems and Be Withing the Affordable Cost Guidelines for the Plant

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Class activity

Apply the problem-solving process to the following activity

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Planting a Tree




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Problem Solving Process

- Identifying Jobs with Ergonomics Opportunities
- Defining the Job Demands

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What is Ergonomics?



Responsibilities

1. Select a site
2. Collect and inspect tools
3. Dig the hole
4. Transport tree to location
5. Place and position tree into hole
6. Cut binding on root ball
7. Back-fill the hole
8. Stabilize tree
9. Water and fertilize the tree
10. Clean up work area




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Problem Solving Process


- Identify Risk Factors by Body Part for Each Task of Concern
- For Each Risk Factor, Ask Why It Is Present Until a Dead End is Reached

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Task Steps	Hazards
1. Select Site	Above/below ground obstacles/utilities
2. Collect and Inspect Tools	Condition of tools
3. Dig the Hole	Back strain, blisters, slips/trip/fall
4. Transport Tree to location	Back strain, obstacles, tree too heavy
5. Place and Position Tree into hole	Back strain, obstacles, eye injury
6. Cut binding on root ball	Foreign body in eye, cuts/scrapes,
7. Back fill the hole	Back strain, blisters
8. Stabilize tree	Striking hand/fingers, rope burn
9. Water and fertilize the tree	Slip wet surface, chemical exposure
10. Clean up work area	Slip/trip, damaged tools


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What is Ergonomics?



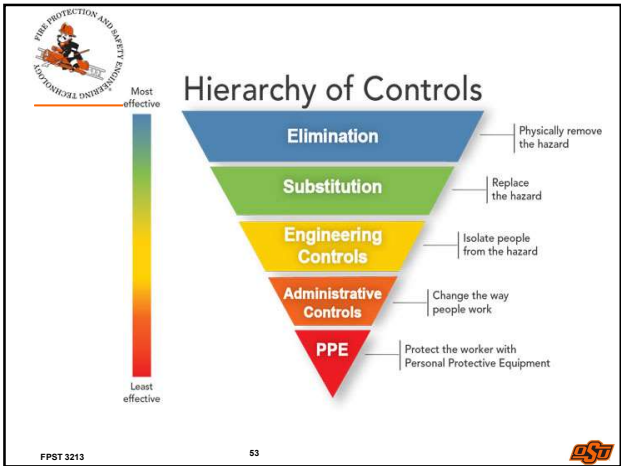
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9. Water and fertilize the tree	Slip wet surface, chemical exposure
10. Clean up work area	Slip/trip, damaged tools

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Problem Solving Process

- Develop Strategies for How to Address the Root Causes and Generate at Least Three Solutions for Each Task of Concern
- Choose the Solution(s) That Will Substantially Reduce the Ergonomic Problems and Be Withing the Affordable Cost Guidelines for the Plant


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What is Ergonomics?




Task Steps	Potential Hazards	Recommended Controls
1. Select Site	Above/below ground obstacles/utilities	Call One-Ok, check plans, consider future growth
2. Collect and Inspect Tools	Condition of tools	Inspect all equipment, do not use if defective.
3. Dig the Hole	Back strain, blisters, slips/trip/fall	Get help, dig with small shovel of dirt, move smoothly, wear gloves, and slip resistant shoes, lift with your knees.
4. Transport Tree to location	Back strain, obstacles, tree too heavy	Use mechanical device.
5. Place and Position Tree into hole	Back strain, obstacles, eye injury	Get help, use mechanical device, wear safety glasses
6. Cut binding on root ball	Foreign body in eye, cuts/scrapes,	Wear safety glasses and gloves, cut away from body. Watch for recoil of binding
7. Back fill the hole	Back strain, blisters	See number 3
8. Stabilize tree	Striking hand/fingers, rope burn	Wear gloves, keep hands off stakes
9. Water and fertilize the tree	Slip wet surface, chemical exposure	Slip resistant shoes, check MSDS and follow mfg precautions
10. Clean up work area	Slip/trip, damaged tools	Discard/repair damaged tools, avoid water mud accumulations.

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Choose the solution

- \$\$\$\$\$\$\$\$\$\$
- Worker's health vs tools/equipment

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People will find the easier way




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What is Ergonomics?




People will make it work




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People will find their comfort zone




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Healthy Use of Smartphones




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What is Ergonomics?



Summary


- MSD are real!!!
- Ergonomic design key questions?
- Ergonomic vs Human Factors
- Problem solving process
- Ergonomics is more than a regulatory guideline or requirement

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To do list

- HW What is Ergonomics?

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