

FPST 2023 – Industrial and Occupational Safety

Safety Through Design Part 2

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Types of Hazards

Chemical	Physical
Biological	Ergonomic

Malicious Threat



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Chemical Hazard?

- Can you think of an example of a chemical hazard you have encountered in a work environment?
- What about home?



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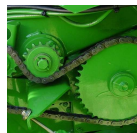
What about this?



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Physical Hazards

- Electrical
- Fire / Explosion
- Noise
- Radiation
- Thermal stress
- Caught in / on / between, pinch points
- Slips/trips/falls
- Striking against
- Struck by



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Biological Hazards

- Bloodborne Pathogens
- Sick Building Syndrome
- Legionnaires' disease
- Mold
- Plant and insect poisons
- Tuberculosis
- Water and wastewater
- Animals, reptiles
- Brucellosis



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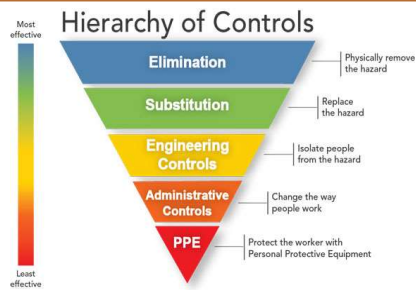
Ergonomic Hazards

Repetition
Forceful Exertions
Awkward positions
Contact Stress
Vibration
Work Area Design
Tool or equipment design



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Hazard Controls



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Elimination

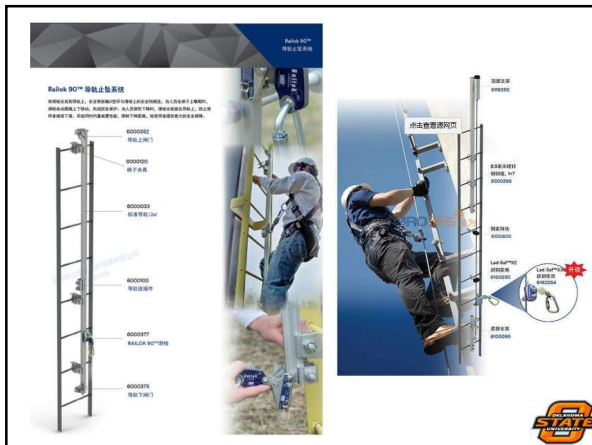
How would you physically remove the hazard?



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Substitution

Substitute for less hazardous material

Reduce energy

For example, lower speed, force, amperage, pressure, temperature, and noise

Example: Using Latex paint instead of oil-based paint substitutes a flammable liquid with a combustible liquid.



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Substitution

How would you use substitution to eliminate or reduce the fall hazard?



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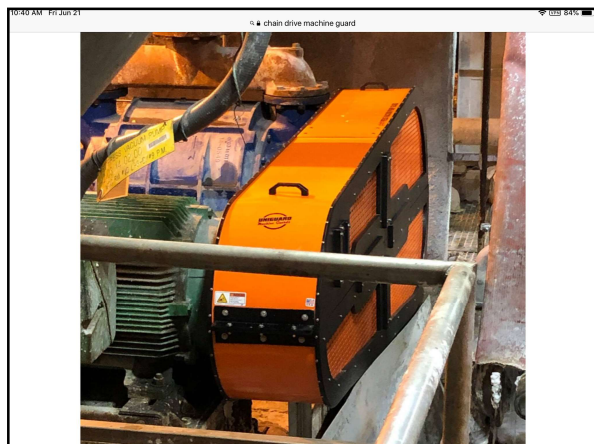
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Engineering Controls

How would you engineer out the hazard?



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Engineering Controls

Designing a protection into a system

- Intrinsically safe
- Designed in safety factors
- Fail-safe designs

Ventilation systems
Machine guarding
Sound enclosures


- Platforms and guard railing
- Mechanical Assistance Devices



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Administrative Controls


Warning Signs



- Training
 - Hazard Communication
 - Forklift
 - Confined Space
 - Crane Operations

Procedures

- Safe job procedures
- Rotation of workers
- Safety equipment inspections
- Changing work schedule



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Warnings

What warning signs could be used here?



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Administrative Controls

What administrative control could be used in this situation?



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Personal Protective Equipment

Safety harnesses and lanyards
Hearing protection
Safety glasses
Face shields
Respirators
Gloves



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Personal Protective Equipment

What PPE should be used?



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PPE is the last line of defense

If you jump to PPE first, what happens if PPE fails?

You should have layers of protection, such as warnings + administrative controls + PPE, if elimination, substitution and engineering controls are not feasible.

PPE should be the hazard control method of last resort

Often used as a quick reaction after an accident

In the long term, it can be more expensive and more difficult to manage than other methods



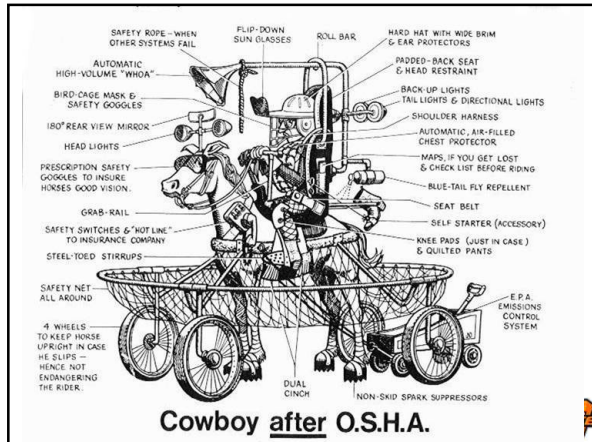
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A Word of Caution Regarding PPE

You can actually have too much PPE



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Hazard Control Methods

Most of the time, a **combination** of hazard control methods is used

Interim protection must be provided once a hazard is identified until the final solution is implemented

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Condition: Cleaning equipment with Chemical Solvent
 Hazard: Skin/Respiratory Irritation from Contact with
 Risk: **Medium**

Control Type	Control	Reasonable?
Elimination	Find new technology or equipment to eliminate need for cleaning	
Substitution	Use non-toxic or less harmful chemical	
Engineering Control	Design and build an automated process for cleaning where the worker is not exposed to chemical.	
Administrative Control	Training program re: safe use Clear work practices established Post signs warning employees about chemical its hazards, and proper use	
PPE	Gloves, safety goggles, respiratory protection	

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Writing a hazard description

1. State the Hazard (condition, behavior, practice or operation)
2. State the real or potential exposure to hazard
3. State the most probable outcome
4. Identify any regulatory references
5. Recommend appropriate corrective actions



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Writing a Hazard Description

Write in the 3rd person

1st person – I

2nd person – you

3rd Person – they or it

Use plain language

Delete all unnecessary words (a, the, it)

Use words that the reader can picture

Use past tense



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Write a Hazard Description



A fall hazard condition was observed at the River Pump platform.

Employees were exposed to an unguarded opening to a lower level approximately 15 feet below without an adequate guardrail which could result in severe injury or fatality.



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HAZARD OBSERVATION			
Copy and paste this blank template for each hazard observed.			
Number:	1	Hazard Description: A fall hazard condition was observed at the River Pump platform. Employees were exposed to an unguarded opening to a lower level approximately 15 feet below without an adequate guardrail which could result in severe injury or fatality.	Hazard Type/Subtype: <input type="checkbox"/> Chemical: _____ <input checked="" type="checkbox"/> Physical: <input type="checkbox"/> Fall Hazard _____ <input type="checkbox"/> Biological: _____ <input type="checkbox"/> Ergonomic: _____ <input type="checkbox"/> Other: _____
Date:	08/15/17		
Area:	Seminole Power Plant – River Pumps		
Location/ Equipment:	Lift Platform – lower level		
OSHA ref:	1910.28(b)(1)(i)	Energy Exchange: Fall to below	
Recommended Corrective Action (list the appropriate hierarchy of hazard control level): Install a removable rigid guardrail across the opening (Engineering Control).			
