

MODULE 4

HAZARD PREVENTION AND CONTROL

At the end of this module, you will be able to...

- Identify the factors OSHA includes under *hazard prevention and control* in its voluntary Safety and Health Program Management guidelines.
- Understand the key aspects of an engineering design and start-up review.
- Consider other control methods when the hazard cannot be engineered out of the job.
- Recognize the key components of an emergency plan.
- Recognize the key components of a medical program.

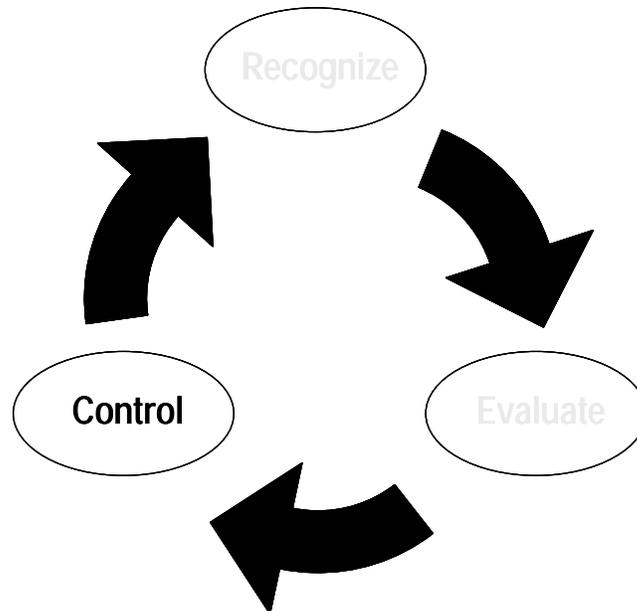


Introduction to Hazard Prevention and Control

What is the difference between hazard prevention and hazard control?



The Safety Process



Both hazard prevention and hazard control are considered to be a part of the *Control* portion of the safety process.

OSHA's Guidelines for Hazard Prevention and Control

Directions: The OSHA guidelines outline a number of factors that indicate performance of hazard prevention and control. Assess your organization by checking the items you feel your organization does well.

- The organization establishes control systems that are unique to an organization's particular characteristics and that ensure timely correction or control of hazards.
- The organization uses engineering controls wherever it is feasible.
- The organization uses administrative controls to reinforce the engineering controls.
- The organization uses administrative controls when engineering controls are not feasible or appropriate.
- The organization uses PPE to reinforce engineering and administrative controls.
- The organization uses PPE controls only as a last line of defense.
- The organization ensures that all procedures for safe work are followed through means of training, positive reinforcement of safe performance, correction of unsafe performance, and enforcement through the performance management process.
- The organization provides for consistent and thorough facility maintenance.
- The organization provides for consistent and thorough equipment maintenance.
- The organization plans and prepares for emergencies, including the conducting of training and drills.
- The organization has established a medical program which includes availability of first aid on site and a physician and emergency care nearby.

Note: The above checklist can be helpful during your efforts to build a safety management system. The list can be found as part of a larger consolidated checklist on your *Tools and Resources* CD.

The Hierarchy of Controls

Directions: To establish hazard prevention and control at your worksite, it is important to understand the hierarchy of controls. As your facilitator introduces each type of control, write examples in the space below.

Type of Control: Engineering

Top Priority—Use whenever feasible and appropriate

Examples:

Type of Control: Administrative

Second Priority—Use when engineering controls can't be used to remove the hazard

Examples:

Type of Control: Personal Protective Equipment (PPE)

Third Priority—Use only if engineering and administrative controls can't remove or control the hazard

Examples:

Engineering Design and Start-Up Review Process

The best type of hazard control is prevention. If an organization can design a hazard out of its operations completely (prevention through design), then it doesn't need to use less effective forms of control. The engineering design and start-up review process enables an organization to identify and eliminate potential hazards in the design stage before an operation begins.

Definition

An engineering design and start-up review is a thorough analysis of the processes involved in and the potential hazards associated with:

- A newly constructed building or facility.
- A remodeled or expanded building or facility.
- New tools or equipment.
- A new process or procedure.

The purpose of the review is to build engineering controls into the design of the new building or equipment.

When to Perform a Design and Start-Up Review

This review should be conducted during the design phase of any construction or installation project. Ideally, it should precede any capital or operational purchasing decisions.

Why a Design and Start-Up Review is Important

- You can reduce injuries, illnesses and environmental damage by building engineering controls into the system during the design phase.
- You prevent expensive retrofitting and rework to correct hazards not considered in the design phase.
- You increase productivity by integrating safety into the design.
- When safety is built into the design, an organization can expect lower overall installation and operating costs.

What a Design and Start-Up Review Assesses

- Potential hazards that may occur during the construction and/or installation phase of a project
- Potential hazards that may occur once the building and/or equipment is in use by its occupants
- Potential hazards that may occur during maintenance of the building and/or equipment

Engineering Design and Start-Up Review Process—continued

Who Should Perform a Design and Start-Up Review?

The review should be performed by a team of individuals who have first-hand knowledge of the project or who will be the end users of the facility or equipment. This includes but is not limited to:

- The design engineers.
- Construction personnel, when possible.
- Machinists.
- Employees who will be working in the new facility or on the new equipment.
- Employees who will be maintaining the new facility or equipment.
- Employees who are designated to oversee safety in the organization.

Qualifications of Engineers for the Design and Start-Up Review

Whether you use engineers from your organization or hire an engineer, you want to make sure they have the proper safety and health knowledge to do an adequate design and start-up review. Following is a list of the minimum qualifications an engineer should have.

- Knowledge of and familiarity with OSHA regulations
- An understanding of and ability to apply the basic principles of safety
- The ability to listen to the people who will be using what they design
- Concern for the impact a design will have on employee safety
- Attention to the impact a design will have on the environment

Where You Can Get Help and Assistance

- Look in the trade journals for your industry to get ideas for best practices.
- NIOSH has produced a series of nine instructional modules through Project SHAPE (Safety and Health Awareness for Preventive Engineering) that help integrate safety and health topics into engineering. The modules can be downloaded (www.cdc.gov/niosh/topics/SHAPE) for your engineering personnel to study.
- A variety of training programs are available on the NIOSH website (<http://www.cdc.gov/niosh/training/>).
- Contact your insurance carrier and seek their assistance. Insurance carriers are happy to help organizations in their efforts to reduce injuries and illnesses.
- Contact your local small business development center to determine what resources they can provide for you.
- Contact an OSHA consultation office for assistance.

Performing a Design and Start-Up Review

The following steps should be performed by the start-up review team at the beginning of any new installation, procedure or process.

1. Create a formal process to capture input and ideas.
2. Document ideas from the team and incorporate them into the design.
3. Identify every step involved in all the jobs and processes that will be performed in the new building/on the new equipment.
4. Identify all the current and potential hazards relating to each of the above steps.
5. Use 3D computer modeling to visualize proposed spaces and equipment.
6. Make a good-faith effort to create a design that integrates compliance with the applicable OSHA regulations to each job/process.
7. For each hazard, search for ways to eliminate the hazard through better design.
8. Integrate a sustainability component into the design.
9. Integrate additional safety components into each job and process. It is good to go beyond the minimum safety requirements.
10. Allocate resources to safety in both the capital and operational budgets.
11. Ensure the construction or installation will have an on-site manager.
12. Conduct daily tailgate meetings during construction, installation, and/or implementation.
13. When start-up of the building or equipment begins, provide training and orientation to every employee that is tailored to their job function.
14. Provide follow-up training every time something changes.



Note: The above process for performing a design and start-up review is available on your *Tools and Resources* CD.

Management of Change

So far we've talked about using the design and start-up review process during the design stage of a project. But there is another time when it is important to use and that is when something changes. The review is necessary so that you can determine whether the change affected your safety and health controls, causing them to be ineffective. The review process you would use is the same. However, since a change can occur at any time (not just at the beginning of a process), it is important to have a prompt or alert to remind you of the need for a review.

Prompts for Management of Change

- Structural changes to a facility
- Replacement of equipment or components
- Movement of equipment to another location
- Change of physical layout of work area
- Adding or changing wiring in a facility
- Adding or changing insulation in a facility
- Changes in raw materials
- Changes in computer programs, especially those involving safety controls
- Changes to pressure-relief devices
- Changes in safety settings such as alarms, interlocks or tripping devices
- Changes in PPE
- The testing or calibrating of equipment
- Change in utility provider
- Change in vendors
- Change in ventilation system
- Temporary fixes for equipment
- Changes in start-up or shut-down procedures
- Changes in maintenance procedures
- Changes in emergency procedures
- Removal of equipment

**Always Remember
Change = Review**

Sustainability Considerations

As you have seen, one element you will be assessing in the design and start-up review is whether the project will be sustainable. Following are some questions to address during the start-up review to ensure the project design is sustainable.

1. Can this design protect employees from exposures to hazards?
 - Chemical
 - Physical
 - Biological
 - Ergonomic
2. Is the design friendly toward the environment?
3. Can this design effectively use energy and control emissions?
4. Can this design reduce water use?
5. Can this design recycle water or use recycled water?
6. Can the materials used in this design be made from renewable resources?
7. Can the materials used in this design be non-toxic to employees and community members?
8. Will toxic substances be released into the air during construction, installation, or use?
9. When the materials are no longer useful, can they be discarded without harming the environment or using space in a landfill?



Design and Start-Up Review Worksheet

Job, Task, Process, or Procedure _____

Step	Related OSHA Regulation	Current or Potential Hazard	Design Ideas for Eliminating Hazards	How to Achieve Sustainability	Additional Safety Components

Note: The above worksheet is available on your *Tools and Resources* CD. Feel free to print it and use it as a guide for your design and start-up review.

Planning for Emergencies

No organization ever wants to have an emergency. That is why it is so important to practice hazard prevention and control. However, emergency preparedness is an important part of a good safety and health management system.

Directions: In your group, identify what you believe are the important components of an emergency program. Address what should be included in an emergency plan and how it should be communicated to the organization.

The Emergency Plan

What should be included in the plan?

How should it be communicated to the organization?



Note: OSHA has an e-tool that provides guidelines for developing an emergency plan. The web address is osha.gov/SLTC/etools/evacuation/need.html.

The Medical Program

Directions: Having a medical program is an important part of emergency planning. Following is a checklist of components that are an important part of the medical program. Check those that your organization already does, then check any you think your organization should implement.

Have	Should Have	Item
<input type="checkbox"/>	<input type="checkbox"/>	A management person who is responsible for developing the program, putting it in writing, and making sure it is implemented.
<input type="checkbox"/>	<input type="checkbox"/>	Training for key people on how to develop and implement the medical program.
<input type="checkbox"/>	<input type="checkbox"/>	A system for reporting and recording minor incidents, injuries, and illness, including who to report to and how to report.
<input type="checkbox"/>	<input type="checkbox"/>	A survey of medical facilities near your organization with which you can develop a cooperative relationship.
<input type="checkbox"/>	<input type="checkbox"/>	Identification and training of personnel who are available to give advice regarding employee health.
<input type="checkbox"/>	<input type="checkbox"/>	Identification of key people to perform first aid/CPR/AED.
<input type="checkbox"/>	<input type="checkbox"/>	Procedures that outline how to handle and report injuries on the job.
<input type="checkbox"/>	<input type="checkbox"/>	Emergency procedures, including a pre-arranged process with medical facilities to assist with emergencies.
<input type="checkbox"/>	<input type="checkbox"/>	Clear communication to employees about what the medical program is and how they should use it. Ideally this should include giving them a copy of the written plan.
<input type="checkbox"/>	<input type="checkbox"/>	Instructions to employees that they should program their emergency contacts into their cell phones.
<input type="checkbox"/>	<input type="checkbox"/>	A medical management program that includes proactive management of injuries including returning to work, reduction of hours, and finding ways to accommodate injured workers.

Note: The above checklist is available on your *Tools and Resources* CD. Feel free to print it and use it as a guide for developing a medical program.

Activity: Case Study

Directions: In Module 3, you analyzed a case study involving an incident with a palletizer. You identified some of the hazards that may have led to the incident. Now that you have learned about prevention and control, you are going to identify some controls that can be used to prevent future incidents. In your group, list some of the hazards you identified in Module 3 (see page 17). Now list controls that will either eliminate these hazards or control them. For each control, indicate whether it is an engineering, administrative or PPE control.

Hazard	Possible Control	E	A	PPE

What is top management's role in implementing these controls?

What is the supervisor's role in implementing these controls?

What is the employee's role in implementing these controls?

Activity: Case Study—continued

Directions: Now assume that management has decided to replace the palletizer. It has assembled a design team, including an engineer, the supervisor of the palletizers, and employees who work on the palletizers. Assume that your group is on the design team. What ideas do you have for designing the hazards out of the palletizer altogether? What ideas do you have for achieving sustainability with the new palletizer?

Hazard that Created the Problem	Design Ideas for Eliminating Hazard	How to Achieve Sustainability
Lack of inspection procedures/failure to have palletizer evaluated		
Failure to guard palletizer		
Failure to require lockout/tagout		
Failure of palletizer to detect pallets		
Dangerous method for adjusting the palletizer		