

Identifying and controlling safety and health hazards in the workplace is fundamental to the prevention of injuries and illnesses. Many different techniques are available to help identify hazards, including: workplace audits, supervisor observation, job safety analysis, injury claims analysis, and a variety of other methods. Hierarchy of hazard control is a system used to minimize or eliminate worker exposure to hazards.

When workplace hazards are identified, organizations often look for a quick fix, such as providing additional training or personal protective equipment. While these may be appropriate controls for some hazards, other control techniques, beginning with elimination, should be investigated as well. The hierarchy of hazard control, in order of effectiveness, is as follows:

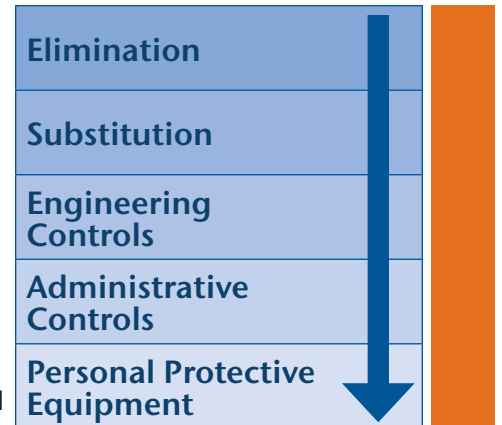
- **Elimination**—eliminating the hazard from the workplace
- **Substitution**—replacing a hazardous substance or activity with a less hazardous one
- **Engineering Controls**—isolating workers from the hazard; e.g. providing machine guards
- **Administrative Controls**—developing policies and procedures for safe work practices
- **Personal Protective Equipment**—providing and requiring the use of safety devices such as respirators, earplugs, hard hats, safety glasses, etc.

Elimination

When evaluating the best way to control a hazard, start at the top of the hierarchy with elimination. Elimination of a hazard is the most effective means of controlling it. Where no hazard or exposure exists, no chance of injury or illness exists. There are many ways to eliminate a hazard from the workplace. For example, consider the hazard of an operator repetitively placing metal parts into a press. Over time, the operator may develop cumulative trauma disorders from repetitive use of the hands and wrists. By automating the press so operators are not required to handle the parts, the hazard of repetition is eliminated.

Other examples of hazard elimination are:

- Redesign a workstation to relieve physical stress and remove ergonomic hazards
- Install a sound absorbing enclosure around a noisy machine
- Remove trip hazards in pedestrian walkways



Substitution

If it's not feasible to eliminate a hazard, the next most effective approach is substitution by removing something that produces a hazard and replacing it with a lesser hazard. For example, consider the case of stripping the floor finish from a terrazzo floor so new finish can be applied. The current method uses an extremely corrosive product known to cause chemical burns to exposed skin. In addition, workers are exposed to slip and fall hazards due to the slippery residue produced by the stripping process. The organization should investigate alternative processes, such as a dry removal process that does not use chemicals, thus eliminating the chemical exposure and slip and fall hazards. Other examples of hazard substitution are:

- Replace a larger parts container (70 lb capacity) with a smaller parts container (20 lb capacity) to reduce the risk of overexertion
- Substitute a "natural" pesticide for a pesticide that is a known carcinogen

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Engineering Controls

If you cannot eliminate a hazard or provide a less hazardous alternative, the next best approach is to reduce the hazard at its source. Engineering controls are a very reliable way to control worker exposures as long as the controls are designed, used and maintained properly. Engineering controls do not eliminate hazards, but rather keep people isolated from them. For example, consider the case of a road crew exposed to high levels of dust when cutting concrete. Since there is no way to eliminate or substitute the dust hazard, the road crew uses a wet method to keep airborne dust to a minimum. Other examples of engineering controls are:

- Ensuring that proper machine guarding is in place on all machinery and equipment
- Using mechanical aids (lift tables, hoists) to minimize material handling injuries
- Using ventilation to remove fumes and vapors at their source
- Providing adjustable workstations to accommodate employees of different heights

Administrative Controls

Administrative controls are management strategies or procedures designed to reduce employee exposure to hazards by changing the way people work. Administrative controls do not actually remove or reduce the hazard and should only be used when elimination, substitution, or engineering controls are infeasible, or until such controls can be implemented. For example, consider our previous case of an operator placing metal parts into a press. If automation is not feasible, the next best option might be to rotate operators every two hours so no single worker is using their hands and wrists constantly throughout the shift. As you can see, this option does

not reduce or eliminate the hazard itself, but might reduce the worker's exposure to the hazard. Other examples of administrative controls include:

- Training employees on safe job procedures
- Using team lifts for heavy parts
- Requiring workers in hot environments to take breaks and providing fluids for rehydration
- Installing warning signs and labels on equipment
- Performing maintenance involving hazardous materials at night when minimal staff is present

Personal Protective Equipment

Personal protective equipment (PPE) should only be used after all other steps in the hierarchy have been investigated. PPE is the least effective means of controlling hazards because of the high potential for the PPE to become ineffective due to damage or failure to be worn. There are many types of PPE available for controlling hazards such as noise, chemical exposure, sharp objects, etc. In many cases, PPE is used to supplement the existing engineering and administrative controls. For example, a lathe protected by a Plexiglas shield can reduce the amount of flying metal chips, but likely will not completely reduce the risk of a chip entering the operator's eye. To supplement the shield, safety glasses should be used as an additional means of protection. Other examples of PPE use include:

- Wearing earplugs or earmuffs in noisy areas
- Wearing gloves to prevent cuts and splinters
- Wearing a hard hat on a construction job site

For Additional Information

Occupational Safety & Health Administration:
www.osha.gov

- Safety & Health Management Systems eTool