QUICK GUIDE TO HAZARD IDENTIFICATION

MaSEE
Management System for Engineering Education

Identifying and Addressing Hazards in Design

A **hazard** is a situation or thing that has the potential to harm a person, asset or the environment.
Examples include: electricity, noise, chemicals, manual handling practices, confined spaces, and mechanical hazards such as cutting, crushing, entrapment or impact.
Hazardous situations include: having incorrect information, incorrect competence or poor situational awareness. Hazardous situations often occur when end-users interact with a design in a manner unintended or unforeseen by the designer.

Designers have duties under Work Health and Safety legislation, one of which is an obligation to manage hazards associated with designs. This includes the design of safe places of work as well as safe assets. A designer is anyone who makes decisions that affect design outcomes. The goal of hazard management (that is: identifying and then doing something to address hazards) is to prevent **harm**.

Hazard identification is seeking out what could potentially cause harm. Hazard identification should be a planned and purposeful exercise, which systematically analyses the product through all its lifecycle phases. There are many techniques for hazard identification.

It is vital to identify and address hazards early in the engineering lifecycle (concept, planning and design) when hazard elimination is less expensive and more practicable.

As well as **human safety**, hazard identification should also seek hazards to the **environment** and **assets**. It is important to identify hazards to these because harm to the environment or assets usually results in exposing people to hazards, either directly or indirectly.

Things to consider…

To help identify hazards, designers should consider foreseeable interactions (or interfaces) between the asset and: people, the environment and other assets, then determine how to make those interactions safe 'So Far As Is Reasonably Practicable' (SFAIRP). When identifying hazards a designer should consider:

- How will people interact with the design through all lifecycle phases? What tasks will people perform?
- Where will the design be located? How will people gain access to perform their tasks?
- How will the design interact with the environment? What environmental conditions will it encounter? What impact will it have on the environment?
- What are the sources of energy associated with the design? Can they be contained or isolated?
- What inherently hazardous conditions exist with the design? Are there moving parts, pressures, radiation, temperatures, potential for explosion?
- How could the design fail or malfunction? What would happen? How will it be brought to a safe state?
- How could the design be foreseeably used for a purpose for which it was not intended?

What is Risk?

In the context of human safety, **risk** is the possibility of harm (death, injury or illness) that might occur when exposed to a hazard. Risk is often expressed as a combination of potential consequence and the associated likelihood of occurrence. Designers have a legal duty to ensure (SFAIRP) that a design is without "risks" to health and safety. Risk is most effectively managed by considering how to eliminate the associated hazard/s. If a hazard cannot be eliminated, then control measures should be implemented, according to the hierarchy of controls, which will reduce the risk associated with tolerating the hazard.

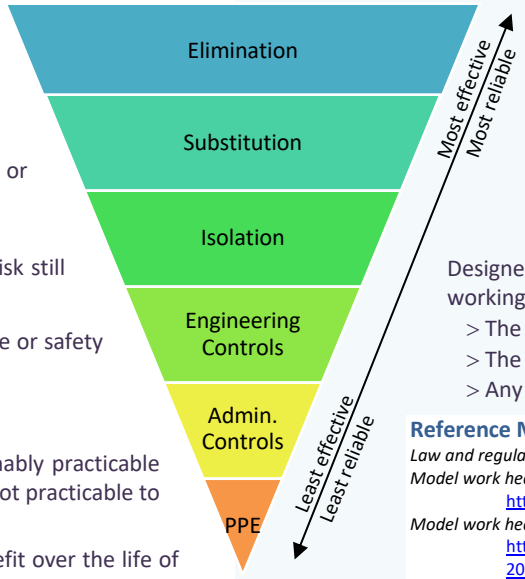
Hierarchy of Controls

Hazards are most effectively managed through controls introduced into the design by:

- **elimination**, that is completely removing the process or material causing the hazard;
- **substituting** the hazard for something less hazardous;
- implementing measures to **isolate** the hazard from persons, the environment or other assets; or
- implementing **engineering controls**.

If the hazard remains, it should be managed using: **administrative controls**, and, if risk still remains, using: **personal protective equipment** (PPE).

Many standards provide guidance on implementing hazard controls and designing safe or safety systems. They must be complied with where appropriate.



SFAIRP: Reasonably Practicable Decision Making

Hazard controls should be implemented to make the design safe, so far as is reasonably practicable (SFAIRP). That is, all controls which reduce the risk must be implemented unless it is not practicable to do so.

The determination of what is reasonably practicable should consider the cost vs benefit over the life of the design, and whether the cost is grossly disproportionate to the benefit.

Documentation

All identified hazards should be recorded in a Hazard Register noting:

- A description of the hazard
- The control measures used to address / treat / mitigate the hazard
- Who is responsible for actioning the control measure
- The status of the action, stating when the control measure is implemented
- Any residual hazard/s

Designers are obliged to provide information about the hazards to those who will be working with it through its life. This information includes:

- The purpose for which it was designed
- The hazards which remain with the design and the controls in place to manage them
- Any conditions necessary for the design to be used safely

Reference Material

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