

Safety Considerations During the Design Process

Senior Design
BAE 4112
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Mini-Exercise (you have 4 minutes):

- What are five reasons engineers why engineers should concern themselves with safety?
- As a group, rank your five reasons starting with the MOST important.

What is Safety?

- Webster's Dictionary: The state of being safe from the risk of experiencing or causing injury, danger, or loss....
- Safety function: $f(\text{Hazard, Risk})$
- Risk has two components --- probability of occurrence & severity of outcome

Hazard is something that could hurt you or cause loss/damage. Often categorized based on type of energy:

- Kinetic
- Potential
- Chemical
- Thermal
- Nuclear
- Biological



Hazard Analysis Worksheet

- Systematically identify hazards
- Evaluate them based on
 - likelihood of occurrence (or likelihood of people encountering the hazard)
 - outcome (measured by severity).

Who Determines How Safe is Safe Enough?

- Engineers
- Your customers
- The law (legislators, regulatory agencies)
- Standards making bodies (SAE, ASAE, NRCS, ASME, ASTM, etc.)
- Judges
- Juries
- Society
- You

Also from BAE 2113 – We discussed the concept of the “Safety Hierarchy”

What Is It?

A widely accepted “dogma” – set of beliefs, values, system of principles

1. Eliminate the hazard entirely – Design your system in such a way that the hazard does not exist.
2. Apply some type of safeguarding technology – such as shields, barriers, mechanisms to control or isolate energy.
3. Use warning signs, labels, decals.
4. Train and instruct operator or user how to effectively deal with the hazard that exists.
5. Provide or prescribe personal protective equipment.

Source: Numerous, including R. Barnett, 1985, Safety Hierarchy, published by Triodyne, Inc.

Things I Look for When I Evaluate Senior Design Projects (minimally)

1. Were all hazards associated with the product, system, or project appropriately identified? (and, how did you do that?)
2. For those hazards that you deemed to be the most significant based on frequency and severity (or some other systematic evaluation), what control measures are used or suggested?
3. Are those control measures consistent with the Safety Hierarchy?

Case Study

Things I Can Help You With

- Identification of standards?
- Brainstorming?
- Critique your “safety measures” that you have chosen.

- AGET 5212 -- Safety and Environmental Health Issues in Plant and Animal Production and Processing (Tue/Thur afternoons)