University of BRISTOL

Principles of Health & Safety and Risk Management

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Key Outcomes for This Week's Sessions

- By the end of this week, students should be able to:
  - Understand the basic legal framework for Health and Safety
  - Discuss Health and Safety Culture – behaviour and process
  - Understand the basic steps of Risk Assessment

- In addition, they will become aware of:
  - the key principles and legislation on product safety and liability
  - the legal processes that can come into play when things do go wrong

Legal Framework

- Health and Safety at Work Act 1974 – Primary legislation covering occupational health and safety in the UK
- Lots of other regulations beneath the HSWA
- Health and Safety Executive (HSE) are responsible for enforcing the Act

Health & Safety at Work Act – Why was it needed?

- Windscale Nuclear Site Fire, October 1957, radioactive contamination released into the surrounding area

- Aberfan disaster, October 1966, killed 144 people

- Six Bells Colliery disaster, June 1960, killed 45 people

Health & Safety at Work Act – Why was it needed?

- The Flixborough disaster, June 1974, killed 28 people & seriously injured 36
- Abbeystead Pumping Station Explosion, May 1984, 16 people killed & 28 people injured.
- The Kings Cross Fire, Herald of Free Enterprise disaster, Clapham Train Crash, Piper Alpha, Buncefield Explosion and these are just UK examples!

Health & Safety at Work Act – Key objectives

- Secure the health, safety and welfare of persons at work
- Protect persons, other than those at work, against risks to health or safety arising out of or in connection with the activities of persons at work
- Physical and mental health

So why? For the HEL of it really?

- Human - Moral Responsibility

  We should all care and want to do the right thing
- Economic – Financial considerations,

  Reputation, both corporate and personal

  It makes commercial sense
- Legal Responsibility

  Criminal, both corporate and personal

Roles and Responsibilities

- We all have them
- Now and in the future, regardless of what we do and where we are
- All employers will expect you to understand them and behave in the right way
- Understanding the basics now will help you in the future

Reasonably Practicable?

- Risk must be balanced against ‘sacrifice’, whether that is in money, time or effort to mitigate a risk
- This implies a requirement for an assessment of risk

Safety Culture – Everyone home safe every day

- Everybody has a responsibility to behave safely and challenge unsafe behaviours and conditions when we see them

Principles of Risk Assessment

How do you evaluate the risks?

- Consider the likelihood of it occurring and how serious the consequences of that occurrence would be.

Frequency Category	Classification Term
5	Frequent
4	Probable
3	Occasional
2	Remote
1	Improbable

Consequence Category	Classification Term	Description
1	Negligable	Non-reportable injury
2	Minor	Minor injury
3	Major	Major injury or multiple minor injuries
4	Critical	Single fatality or multiple major injuries
5	Catastrophic	Multiple fatalities

How do you evaluate the risks?

Likelihood		Consequence					Risk Classifications
		1	2	3	4	5	
		Negligible	Minor	Major	Critical	Catastrophic	
5	Frequent	5	10	15	20	25	1-5 NEGLIGABLE LOW RISK: Ensure control measures are maintained and reviewed as necessary to control residual risk as far as is reasonably practicable.
4	Probable	4	8	12	16	20	
3	Occasional	3	6	9	12	15	6-10 TOLERABLE RISK: Control measures to reduce risk rating to a level which is as low as reasonably practicable (ALARP). Add details of residual risk to drawings/docs.
2	Remote	2	4	6	8	10	
1	Improbable	1	2	3	4	5	11-25 INTOLERABLE RISK: Activity not permitted. Hazard to be avoided or reduced.

Typical Risk Assessment Register Headings

Risk Register Heading	Description
Date Added and Initials	The date the risk was registered and the person who made the registration
Area/Location of Risk Exposure	The place where the risk is most likely to arise
Description of Hazard and Risk Exposure	An accurate and concise narrative that clearly explains the potential issue
Primary Consequence	The consequence in the event of the hazard actually happening
Person(s) at Risk	Employees, customers, members of the public, etc.
Frequency	As defined in the risk assessment process
Likelihood	As defined in the risk assessment process
Risk Assessment	The product of frequency and likelihood
Mitigation Action	What activities may be taken to reduce the risk to an acceptable level

Typical Risk Assessment

Project Risk Assessment								
Project:			**Job Number:**					
Design Stage:			**Register Reference:**					
Date added and initials	Area/Location of risk exposure	Description of Hazard and risk exposure	Primary Consequence	Persons at risk	Frequency	Likelihood	Risk Assessment (LxC)	Mitigation Action

Product Safety and Liability

Product Safety and Liability

- Good design leads to safe design
- Sale of Goods Act 1979 - 'Fit for purpose'
- CE marking – electrical equipment, tele communications equip, machinery, gas appliances, recreational craft etc.
- Consumer Protection Act 1987 – manufacturers **strictly** liable for death, injury or damage caused by defective unsafe) products

Overarching Standards for Product Safety

- International Standards Organisation: ISO
  - https://www.iso.org/home.html
- British Standards Institution: BSI
  - https://www.bsigroup.com/en-GB/
- American National Standards Institute: ANSI
  - https://www.ansi.org/

Sample Relevant Standards for Health, Safety and Environment

Reference	Title	Comments
BS7000	Design Management Systems	Generic standard for the management of the design process
BS EN ISO9001	Quality Management Systems	Specifically of the design and manufacture of products
ISO14001	Environmental Management	Establishing and maintaining any organisation's environmental management system
ISO45001	Occupational Health & Safety	Establishing a framework to create safer, healthier workplaces all over the world

Roles and Responsibilities

- The Board of Directors
  - Legally responsible for all aspects of design safety for the organisation
- Departmental Managers
  - Supervision of employees and control of working practices/environment
- Product Designers
  - Required to conform to relevant professional codes of practice, standards and as part of routine business activities

Why do Product Safety Standards matter?

https://timedotcom.files.wordpress.com/2017/04/ford-pinto.jpg?w=720

http://i.dailymail.co.uk/i/pix/2015/11/28/01/2ED9E45D00000578-3337090-image-m-44_1448674336836.jpg

http://www.omgtoptens.com/wp-content/uploads/2012/07/THY-Turkish-Airlines-DC-10.jpg

Which ones should be used?

Domestic Government?

Export Market/Destination?

Industrial Codes of Practice?

International Organisations?

Internal Company Standards?

If something goes wrong, who is liable?

- Usually, the liability will fall on the corporate organisation responsible for the design, manufacture and production of the product (aircraft, super-tanker, washing machine, etc.)

- Employers are held responsible for the action of their employees
  - But sometimes individual designers can be prosecuted in civil actions

Civil Law of Tort

- Tort of Negligence
  - "A person harmed by a product can bring an action against anyone who was responsible for the defect in the product." (Abbott and Tyler, 1997)
- A civil rather than criminal legal process
  - remedy by compensation rather than imprisonment/fine
  - the plaintiff must prove both negligence and causation:
    - Does the law impose a duty of care (on the product manufacturer) for the consumer?
    - Is there a breach of that duty of care (where conducts has fallen below reasonable standards)?
    - Did the breach of the duty of care *actually cause the injury?*

Product Liability - Summary

- Companies must design & supply only safe products (for both intended use and foreseeable misuse)
- Designers must consider all necessary instruction/warnings to protect all people affected by the product (not just users)
- Legal liability arises when someone is injured by a defective product regardless of any issue of carelessness
- Government/Regulators are empowered to prevent supply if the goods are considered unsafe

Conclusions

- Engineering professionals must understand the basic legal frameworks for operational health and safety in order to fulfil their duty of care
- Employers and society expect a reasonable standard of care in conducting risk assessments
- Product liability can be dealt with in either criminal or civil legal proceedings