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# Risk analysis



### Technique sheet

Problem-based learning resources

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### Introduction

Every project involves risks – things that might go wrong. Identifying risks before the work begins means you can prepare for them. As well as reducing the chances of some problems occurring, you can also plan ways to minimise their effects. Fire extinguishers don't prevent fires occurring – but they could put them out before the whole building is lost!

### What is a risk?

A risk is something that has not yet happened but if it did happen there would be a problem. There is a risk that a machine will stop working or that you will hit your thumb when you're trying to hammer a nail into a piece of wood. You don't have a problem until the machine stops or you hit your thumb!

- Remember a risk is a measure of something that has not happened and with careful planning the chances of it happening can be reduced.

### What are the typical risks for an engineer?

Using a machine or tool incorrectly or without proper safety equipment (e.g. a guillotine that will cut through sheet metal will go through your finger just as easily!). Machines that have been

'fixed' in non-standard ways or maintained badly are particularly dangerous. Some machines or techniques require specialist protective equipment (e.g. sturdy boots, full body suits and radiation monitors for work in radioactive areas). Electrical equipment has special risks – you cannot tell if a wire is live by looking at it. Even if you know how to use the equipment properly and have all the required equipment accidents can still happen (e.g. people slip or drop things) so keep your wits about you.

- Make sure you are aware of the risks in any work you do, follow safety procedures and use all the safety equipment provided. Remember it is your responsibility to keep yourself and your colleagues safe so concentrate on what you are doing and don't cut corners just to finish early!

### What factors should be considered when thinking about risks?

Every risk has two dimensions: the likelihood of it happening and the impact of the problem it would create. The most serious risks are those that are likely to happen and have serious consequences. However, even very rare events must be taken seriously if the potential effects are serious. A single event at a nuclear power plant can have effects over very large areas which may last for many years. Your analysis of risk should always lead to action to reduce the likelihood of an event and the impact

it will have – you are not listing risks just to fill in a form!

- Make sure you consider the likelihood of an event and its impact when thinking about risks. Remember a risk analysis is not just a form to fill in – it should guide your behaviour to make you and your colleagues safer.

### How do you reduce risks?

Well maintained machinery operated by workers who are not tired or rushed tends to be safer than the opposite. Clean workspaces free of trip hazards or oil spills are safer than messy workplaces. A lot of risk reduction is about simple, small-scale strategies (e.g. keeping flammable liquids in a fireproof safe, ensuring safety labels on jars and bottles are visible and accurate, using facemasks and eye guards when required). Every workplace will have a list of these simple strategies and they should be part of your normal working practice.

- Make sure you build safe practices into your working habits but make sure you stay alert to the possibility of unexpected hazards.

### How do you reduce the impact of a problem?

A steel bolt dropped from a few floors up in a construction site can kill if it hits someone. However, a proper safety helmet changes the impact of this accident from fatal to very annoying. Masks, gloves, overalls and other Personal Protective Equipment (PPE) all help to reduce the impact of an accident. Machinery can also have automatic shutoffs that cut the power if something goes wrong. Fire sprinklers in buildings can come on automatically when a small fire is detected – this stops it from spreading and so reduces the impact of the original accident. Fire extinguishers are a great way to reduce the impact of a small fire. Always know what the fire alarm sounds like in your place of work and your quickest route to safety.

- Make sure that you know what safety equipment is nearby (e.g. fire extinguishers, eye baths for chemical spills etc.) and how to use it safely. Never undermine strategies to reduce the impact of accidents (e.g. blocking fire doors open, switching off safety alarms, not wearing required PPE).

### Who decides if some things are just too risky to do?

Most companies will have policies about risk and will emphasise safety above everything else. Senior managers may need to be involved if a risk analysis seems particularly concerning and some projects

will not start because of safety worries. However, the day-to-day work of risk analysis and safety decisions rests with the engineer onsite so everyone must take these things seriously. Even when a senior manager has said a job is safe enough to take on that doesn't mean it magically becomes safe!

- Make sure you know and follow all safety rules at your place of work and refer worries to an appropriate level if you have safety worries. Take responsibility for your safety and that of your colleagues.



### Check yourself

**You should be able to answer these questions easily after reading this sheet.**

1. What does the word 'risk' mean to an engineer?
2. What two factors should you consider when thinking about the seriousness of a risk?
3. Are any jobs completely risk-free? List any you think might be guaranteed 100% safe.



### Taking it further

**These activities will deepen your understanding of this topic.**

1. Review your work area and identify all relevant safety equipment (e.g. fire extinguishers, eye-baths). Make sure you know how to use these and what to do if an accident occurs.
2. Think about an accident you have had or have witnessed. Without deciding who is 'to blame' list the actions which led to the accident. Why did it happen? Could it have been prevented? If so, how?
3. Think about a typical job you may be asked to do. Conduct a risk analysis looking for things that might go wrong for any reason (include human factors, equipment failures and context issues) and give them a likelihood of occurring from 1 (very low) to 5 (likely). Now look at the impact of these events and give them a score from 1 (a minor inconvenience) to 5 (very serious). Multiplying the two scores together for each risk will give a measure of their significance. Now look at how you could reduce either the chance of it happening or the impact if it does. Adjust your scores to reflect your new approach. How low can you get the final score?