STAGE 5 – DESIGN AND TECHNOLOGY

- **For your project idea, complete the following:**

PROJECT MANAGEMENT STRATEGIES

Time Plan

- Proposed time of completion of each step.
- Actual time of completing each step.

Production Plan

- Details of specific steps.
- Identify tools and techniques, and safety considerations.

Resource List

- Identifies and justifies the ideas and resources that will be used throughout the design process.

Financial Plan

- Outline your budget, proposed and actual costs.

Risk Assessment

- Identify any possible hazards that may cause an accident. Identify and control measures to reduce the chance of injury occurring.

Areas of Investigation

- Tools, techniques and design ideas you will need to investigate for your design project to be successful.

Identification of needs and opportunities

It is important as a designer that you are aware of the need.

- Why are you developing this product?
- Who is your target market?

Identifying the need will help you in developing your product. Once you have identified the need, you must consider the opportunities and/or **limitations** you may encounter. The design brief is an outline of what you intend to achieve.

limitations
a restriction or rule that prevents progress

The opportunities may be a chance to design something new or to develop new experiences and skills. The limitations are factors the designer must consider that may hinder or slow down the design process. Time, resources available and skill are examples of limitations. The designer must list and describe the opportunities and limitations they could possibly encounter in relation to the need.

At school your teacher will provide you with a detailed design situation. It is important that you are familiar with the context that you are working with and then rewrite the brief in your own words so that you are very clear on what you will be designing.

Include some of these points in your own rewrite of the brief:

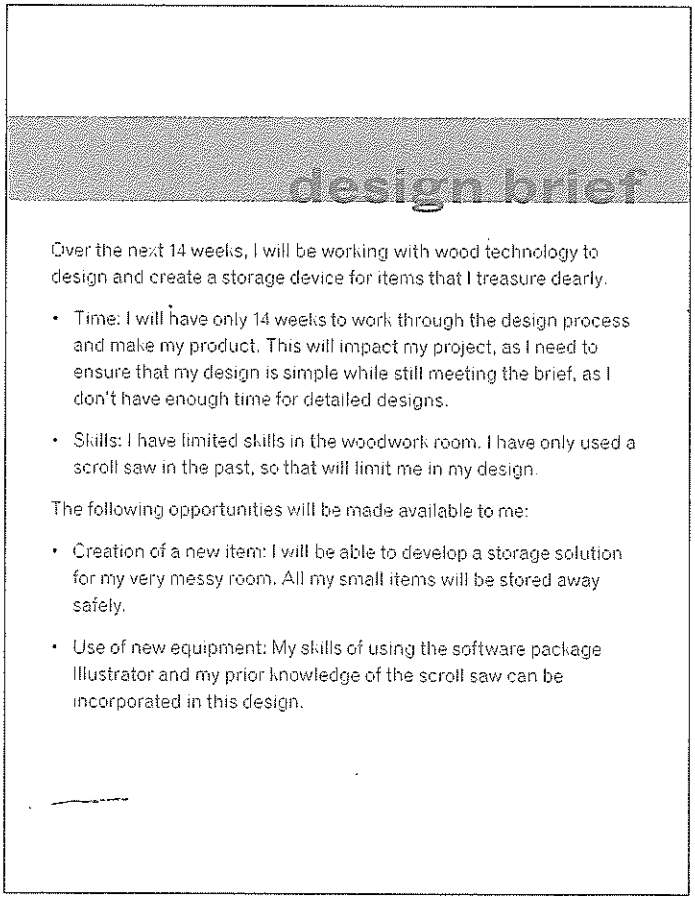
- the technology you are working with
- the name of the unit
- the product/system or environment you will be producing
- the materials you will need to develop this product
- any special instructions that you must follow
- tools or techniques that need to be implemented in the project
- the time frame.

Here are some examples of limitations:

- budget
- school constraints (e.g. equipment, tools, techniques)
- brief constraints
- skill level.

Here are some examples of opportunities:

- the possibility that your product may solve a problem
- opportunity to learn new skills
- opportunity to use new equipment.



design brief

Over the next 14 weeks, I will be working with wood technology to design and create a storage device for items that I treasure dearly.

- Time: I will have only 14 weeks to work through the design process and make my product. This will impact my project, as I need to ensure that my design is simple while still meeting the brief, as I don't have enough time for detailed designs.
- Skills: I have limited skills in the woodwork room. I have only used a scroll saw in the past, so that will limit me in my design.

The following opportunities will be made available to me:

- Creation of a new item: I will be able to develop a storage solution for my very messy room. All my small items will be stored away safely.
- Use of new equipment: My skills of using the software package Illustrator and my prior knowledge of the scroll saw can be incorporated in this design.

Figure 8.2 An example of a design brief

CASE STUDY ANALYSIS 8.1

SmartCup

The SmartCup is a reusable and eco-friendly coffee cup that fuses design, form and function with sustainability. It features a double-walled thermo-plastic outer layer that keeps coffee hotter for longer, and high-quality recyclable materials that are stain and odour resistant, BPA-free and non-toxic; has a spill-resistant design; and is entirely dishwasher-safe.

But the most impressive aspect of the SmartCup is its unique smart chip feature, which provides users a quick and easy way to pay for their coffee; all that's required is a swipe of the lid. Frank Green developed a world-first app, CafePay, to facilitate the function.

1 Discuss why the designer of the SmartCup would have developed a finance plan.
2 Outline how the SmartCup innovation has streamlined payment for coffee.
3 Describe, in detail, how the SmartCup addresses the factors of function, aesthetics, ergonomics and environment.

Figure 8.7 Smart Cup from Frank Green

9.1 Risk management

Design and Technology is a practical course and when participating in practical work, risk to ourselves and those around us is ever-present. Risk can be defined as a situation that may expose someone to danger, harm or loss. For example, when using a saw users are at risk of slipping and cutting themselves if their work is not secured properly. As a result, it is essential that everyone take the necessary steps to ensure that no one is exposed to harm. The right to work safely is covered by law in Australia, and this is explored later in this chapter.

While working safely in the practical classroom is essential in Design and Technology, it is also important to consider the safety requirements for all stakeholders when producing solutions in response to a design brief. Not only must the processes of production be safe, but the design itself must be safe for use by the intended target market. An example would be making sure that a child's toy does not have any small parts that may break free and become a choking hazard. Consideration should also be given to the safety of those who come into contact with the product once it is no longer useful and becomes waste; for example, the use of hazardous materials that may become a risk to others when being disposed of in common garbage systems.

Risk assessment

Before any task is undertaken, a risk assessment must be conducted. This may be for the project being made, the workshop being used or the individual tools and machines required.

During this process, an analysis is done of any possible hazards that may cause an accident, and the likelihood of the accident actually occurring is estimated. For example, during a practical lesson someone is more likely to hit their finger with a hammer than receive an electric shock from a power tool. Following the identification of possible causes, the level of the injury and treatment required is also estimated. Hitting a finger with a hammer is most likely to be a minor injury requiring first aid; an electric shock may be a serious injury leading to disability or even death. Good risk-management plans will also identify any control measures to reduce the chance of the injury occurring. Accidents such as hitting a finger may seem unavoidable, but good training and appropriate use of the tool will always help to reduce the likelihood. In the example of electrical shock and a greater level of possible injury, a higher level of control measures will be required, including inspection before use, regular electrical testing

risk
a situation that may expose someone to danger, harm or loss

hazard
something that is potentially very dangerous

	Very likely	Likely	Unlikely	Very unlikely
Death or disability	1	1	2	3
Long-term injury	1	2	3	4
Medical attention	2	3	4	5
First aid required	3	4	5	6

sk level key:
and 2 – High risk: Immediate action to control the risk is required before work can begin.
and 4 – Immediate short-term control is required before work begins, with a plan for a long-term solution.
and 6 – Attention is required in a reasonable time frame to control the risk.

gure 9.1 A risk-assessment matrix

Controlling risk with the risk-control hierarchy

We are able to control these risks through the application of a system called the risk-control hierarchy. The aim of this is to help those managing risk to minimise or eliminate exposures to hazards. There are six steps in the risk-control hierarchy, from the most effective to the least effective, and these are applied depending on the level of risk.

1. Elimination: Physically removing the hazard is the only way to ensure that it is no longer a risk to those who would come in contact with it. In a practical classroom, this may be removing a dangerous machine from the workshop that is not required.
2. Substitution: Swapping the hazard for something safer is a good way to reduce risk. For students, this could be using water-based lacquer on timber instead of an oil-based finish, or a cordless tool in preference to a corded power tool.
3. Isolation: When something is not needed, it can be controlled so that it cannot be used. An example of this is a power isolation switch in a practical classroom. The power to machinery can be isolated so that it cannot be turned on when not required, such as when a teacher needs to stop practical work to give safety instruction to the class.
4. Engineering: The fourth most effective control measure involves a technician modifying the equipment that is hazardous. In a practical classroom, this includes dust and fume extraction, such as that used on a laser cutter.
5. Administration: Administrative controls are rules put in place by a school or education department for how tools, machinery and equipment should be used when conducting practical work. This includes safety testing and instruction, signage and teacher supervision.
6. Protection: The use of personal protective equipment (PPE), such as safety glasses, aprons and enclosed leather shoes, is the final control measure used to minimise the risk of injury. This is implemented when other levels of the hierarchy are not practical.

Once hazards have been identified, assessed and controlled, good risk management continues with a monitoring process. The process should be documented and reviewed on a regular basis to ensure that the risk of the hazard occurring remains minimised for those working in the classroom. Identifying possible hazards, determining the level of injury they may cause and implementing control measures before the commencement of work are essential to managing risk within practical classroom spaces.

Due to the practical nature of the Design and Technology course, at times you will need to use a range of different tools and machines as you produce solutions to design briefs.

For a tool or item of machinery nominated by your teacher, conduct a risk assessment of any potential hazards that may result from its use. Use the risk-assessment matrix to determine the level of risk and document the assessment using a table like the one below.

Risk-assessment form

No	Hazard	Injury	Risk level (1–6)	Controls
1				
2				
3				
4				
5				

The process for completing a JSA is as ollows:

1. Identify the project to be undertaken.
2. List the steps required to complete the project. This includes any tools or machines required for each step.
3. Identify the hazards that may occur while using the tools or machines for each step. Reviewing risk assessment and safe operating procedures (SOPs) will help with this step and step 4.
4. List the controls that will be put in place to eliminate or minimise the risk.
5. Identify who is responsible for the controls. It may be the user wearing PPE or it may be the teacher checking that all required guards are in place.
6. Review the JSA as you work through your project to ensure you are adhering to your plan, and update it as required; for example, if additional hazards are identified, add them to your JSA.

Planning for safe work

Planning is an important part of safety in the school workshop. Being well prepared and organised is just as important as being able to read workshop drawings and knowing how to use tools and machines safely. A procedure is often used in Design and Technology classes to plan out what needs to happen. This is a description of each practical step needed to complete a project that includes the tools and techniques required to do so.

As a risk assessment is used to identify and manage hazards for individual tools and machines, a job safety analysis (JSA) is an industry tool that formally documents the safety analysis of a project where a greater level of risk exists. As with a risk assessment, the scaffolding a JSA provides helps us look at the tasks we are required to complete in order to finish a project in the safest possible way.

le 9.1 Job safety analysis (JSA) form

ame:			Date:
roject:			
tep:	Hazard:	Control:	Person responsible:

Key terminology

Discrimination
Equal employment opportunity (EEO)
Hazard
Job safety analysis (JSA)
Legislation
Personal protective equipment (PPE)
Risk
Risk assessment
Safe operating procedure (SOP)
Work health and safety (WHS)