

Design Context

= Where there are problems that need a solution the Design Context looks at where, how, when, by who a product will be used



Good examples of design context:

- Support for people with physical or learning disabilities
- Encouraging healthier lifestyles

Design Brief

= A short way of explaining what you intend to design, who it's for and its purpose

A good design brief should include:

- Context
- Client
- Problem to be solved
- Identify design constraints



Client

= The person that the product is being designed for

Client profile

includes:

- Age
- Where they live
- Job
- Car
- Holiday
- Hobbies and interests
- Any disabilities



Design Specification

= A document that lists all the needs and wants that the design solution must meet

Design specification to include when designing a product:

- Aesthetics – how it looks
- Cost
- Customer – what they need/want
- Environment
- Safety
- Size
- Function - how it works
- Materials and manufacturing



Designing and Making Principles

Manufacturing Specification

= The information needed to make a product

Areas to include:

- Scale of production – how many will be made
- List of all materials and parts
- Sizes
- Step-by-step instructions
- Testing
- Drawings
- Health and safety



Social Challenges

= The positive and negative effects that a product can have on people



For example:

Everyone now has the ability to play music from a phone, but music that is played too loud could damage the user's hearing.

Economic Challenges

= How money is made, organized and used in a society

For example:

If a product sells well, the company producing it can open new factories, creating more jobs and paying more workers. The more profit a company makes.



Environmental Challenges

= The impact/effect that a product will have on the environment



Products can affect the environment:

- Materials use up natural resources
- Processes use energy
- Product is powered
- Disposed of (thrown away) when no longer needed

Energy

= The power from something (e.g. electricity) that can do work, such as movement or heat



The most common type of **energy** used is electricity. Sources of **energy**:

- **Fossil fuels**
- **Nuclear power**
- **Renewable energy sources.**

Designer

= Someone who produces designs and ideas for new products



Sometimes **designers** work on their own, but often they work as part of a team. Some examples are *Jonathan Ive, James Dyson, Coco Chanel and Iris Van Herpen*

Design Ideas

= Work out the form of something using sketches, patterns and plans.



Examples Include:

- **Freehand sketching**
- **Working drawings**
- **Isometric projection**
- **Perspective drawings**
- **Exploded views**

Design Strategies

= Different approaches to designing a product



Sometimes designers work on their own, but often they work as part of a team, using approaches such as:

- **Iterative design**
- **User-centred design**
- **Inclusive design**
- **System thinking**

Designing and Making Principles

Prototypes

= **One-off product made to evaluate a design idea**



Prototypes can be made using:

- Hand tools / Machine tools
- Computer aided design
- 3d printing
- Breadboards for electronic systems

Testing and evaluating is done to make sure that a product does its job in the way it was intended.



Two different types of **testing** visual testing and user testing. Evaluation checks how well a product meets user needs and specification requirements.

Personal protective equipment (PPE)

= Equipment that provides a barrier between the person wearing it and a potential hazard



Types of **PPE** used in the workshop:

- Safety glasses/goggles
- Apron
- Ear protectors

Working Safely

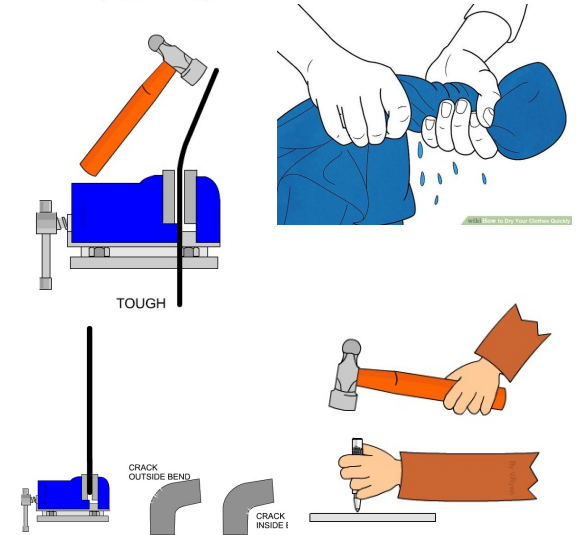
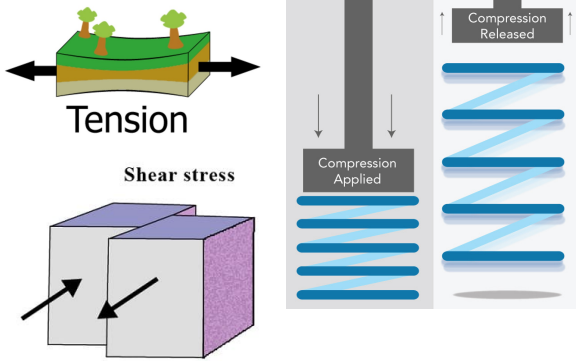


General safety rules:

- Follow all instructions in the workshop
- Wear an apron and remove any loose clothing or jewellery.
- Tie back long hair
- Always walk – never run
- Keep working area clean and tidy
- Only one person to use the machines

Material properties

= How a material will perform and what it can do

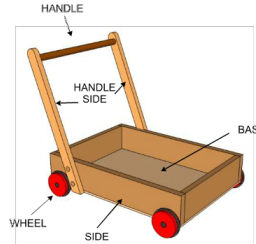


Selecting materials

= The success of a product depends on the selection of the right materials

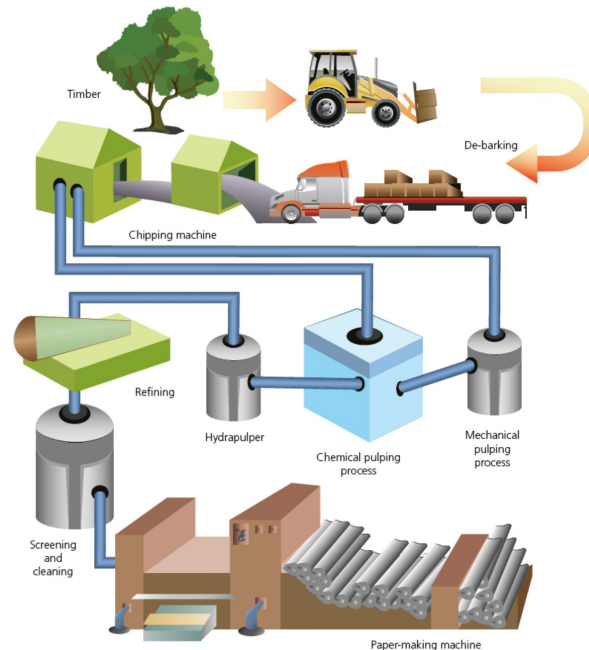
Material selection needs to look at:

- **Functionality**
- **Aesthetics**
- **Availability**
- **Cost**
- **Environmental factors**
- **Social and cultural**



Paper and boards

= Materials that mainly come from trees.



Paper and boards are made by chopping down trees and turning the chips into **pulp**

Polymers

= Plastic materials that are mostly made from oil.



Types of polymers:

- **Thermoplastic polymer** can be recycled.
- **Thermosetting polymer** cannot be reshaped.

Metals

= Materials that are made from metal ores, which are dug from quarries or mines.



Two main types of metals:

- **Ferrous metals** – contain iron. Examples Cast iron.
- **Non-ferrous metals** – do not contain iron. Examples Aluminium.

Timbers

= Material that comes from trees

Types of timber include:

- **Hardwoods** – from deciduous trees that can take up to 100 years to grow.
- **Softwoods** – from coniferous trees that take between 25 and 30 years to grow.
- **Manufactured board** – made by gluing particles or pieces of wood together

Textiles

= Fabric materials that are made from fibres.

Fibres - very fine, hair-like structures that are spun or twisted into **yarns**.

Natural fibres come from plants and animals.

Examples Cotton and wool.

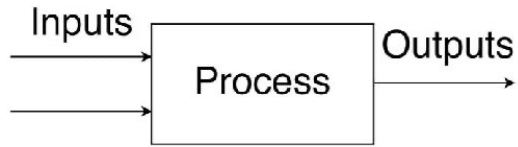
Synthetic fibres come from oil, coal or petrochemicals.

Examples Polyester and Acrylic.

Using and working with materials

System thinking

= A group of parts that work together to carry out a function.



The three blocks of the simplest system are:

- Input block
- Process block
- Output block

New and emerging technologies

= Items that are being developed continually.

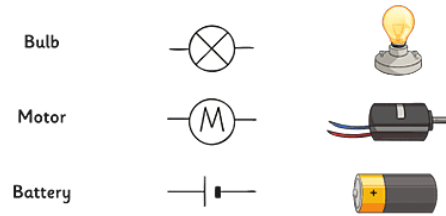


Technology is the use of knowledge to achieve a practical outcome. **Examples of these are:**

- Automation
- Computer-aided design (CAD)
- Computer-aided manufacture (CAM)
- 3d printing

Electronic systems

= Made up of a wide range of components.



These components are called:

- Input devices
- Output devices
- Passive components

Circuit diagrams – each component is drawn as a simple symbol.

New materials

= Materials that have improved properties or combinations of properties that were not previously possible.

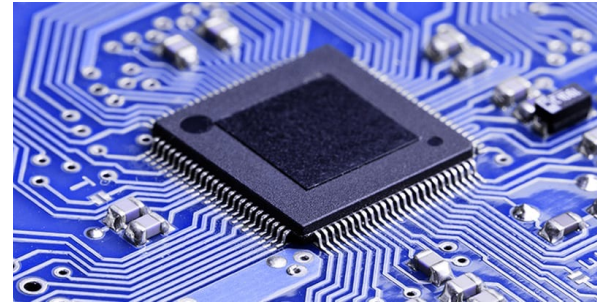


Examples of these are:

- Graphene
- Composites
- Smart materials
- Interactive textiles

Programmable components

= A component that can be programmed to do different tasks.



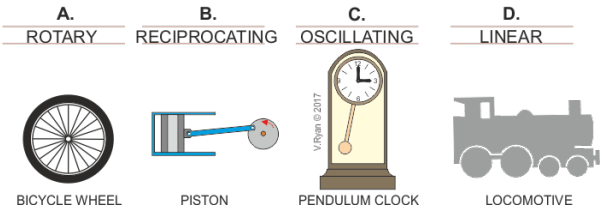
For example:

- **Microcontrollers** – work like small computers (computer chip)

Flowcharts and programming - set of instructions that tell the microcontroller what to do. Written on a computer and downloaded into the chip (microcontroller).

Mechanical devices

= A device that can change the amount or direction of force in a system.



The four types of movement are:

- **Linear motion** – moving in straight lines.
- **Rotary motion** – moving in a circle.
- **Reciprocating motion** – moving back and forth in straight lines.
- **Oscillating motion** – swings from side to side.

Types of devices:

Linkages, Gears, Pulley systems, Cam and follower and Rack and pinion.

Electronic and Mechanical Systems
New Developments in Technology