Design Technology - Engineering

SPECIFICATION

The specification is a very important aspect of the design process and is written at the end of research work and before design ideas are drawn up.

Be specific about possible materials, overall size, colour, shape, functions, features. Using the ACCESS FM framework will help to structure your document.

Aesthetics: What does the product look like?

Cost: How much does it cost?

Customer: Who would buy it?

Environment: What impact does the materials have on the environment

Size: How big or small is it?

Safety: How safe is the product during use?

Function: How does the product function?

Material: What is the product made from and importantly, why?

Vocabulary

Orthographic - A formal engineering drawing that uses a 2D drawing of each side of an object and consists of a front view, a side view and a plan view.

Isometric - Isometric projection is a method for visually representing three-dimensional objects in two dimensions in technical and engineering drawings

Cross section - a section of something that has been cut down the middle to show what is inside.

Hidden detail - occurs when a feature of an object cannot be seen in one or more views.

Engineering drawing

35 Dimension

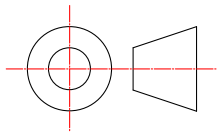
Construction line

Centre line

Drawing line

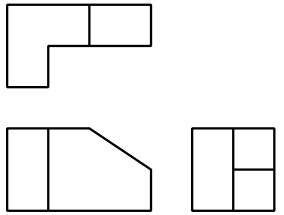
Ø Diameter symbol

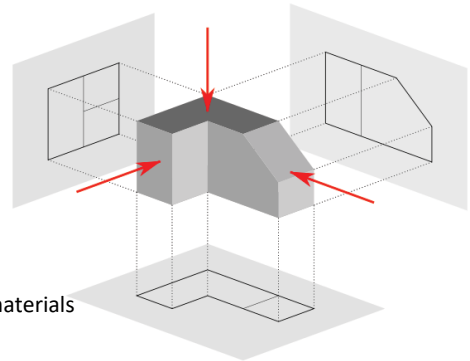
R Radius



Third Angle projection

An OP drawn in Third Angle will take an object, like the one shown below, and arrange the elevations in a specific orientation, shown left





Please see DRR for Orthographic/Isometric challenges and materials
There will be rewards for those who put in the extra effort!!

Design Technology - Fashion

Knowledge Organiser AQA Design & Technology 8552

1. Woods

Man-Made Woods

	Description	Uses
Medium density fibreboard (MDF)	•Has a smooth, even surface •Easily machined and painted •Available in water and fire-resistant form •Often veneered or painted to improve its appearance	•Furniture and interior panelling
Chipboard	•Made from chips of wood glued together with urea formaldehyde (glue) •Usually veneered with an attractive hardwood or covered in plastic laminate	•Kitchen and bedroom furniture •Shelving and general DIY Work
Plywood	•A very strong board, constructed of layers of veneer or piles, which are glued together with the grains at 90° to each other •Interior and exterior grades available.	•Furniture making •Boat building and exterior work
Hardboard	•A very cheap particle board •Can have a laminated plastic surface	•Kitchen unit and furniture back panels

Hard Woods

	Description	Uses
Oak	•A very strong, light-brown wood •Open grained •Very hard, but quite easy to work with	•High quality furniture •Beams used in building •Veneers
Mahogany	•Reddish-brown in colour •Easy to work with	•Indoor furniture •Shop fittings •Bars •Veneers
Beech	•A straight- grained hardwood with a fine texture •Light in colour •Very hard but easy to work with •Can be steam bent	•Furniture •Toys •Tool handles
Ash	•Open grained •Easy to work with •Pale cream colour, often stained black •Can be laminated (i.e. sliced into veneers which are glued together)	•Tool handles •Sports equipment •Furniture •Ladders •Veneers

Soft Wood

	Description	Uses
Pine	•Pale-yellow coloured with dark lines and a fine, even texture. •Medium in weight •Stiff and stable •inexpensive	•Readily available for DIY work •Mainly used for constructional work and simple joinery •Furniture

2. Plastics

	Properties:
Acrylic	• Hard wearing • Will not shatter • Can be coloured • Bathtubs, School Projects, Display signs
Polypropylene	•High Impact strength •Softens at 150°C •Can be Flexed many times without breaking •School chairs, Crates
High Impact Polystyrene (HIPS)	•Light but strong •Widely available in sheets •Used for casings of electronic products
Polythene (LDPE)	• Weaker and softer than HPDE. • Lightweight • Carrier Bags + Squeezy Bottles
Polythene (HDPE)	•Stiff strong plastic •Used for pipes and bowls •Buckets
Urea formaldehyde	•Colourless plastic •Can be coloured •Door and cupboard handles, Electrical fittings

3. Material Properties

Strength
The ability of a material to stand up to forces being applied **without it bending, breaking, shattering or deforming in any way**.

Elasticity
The ability of a material to **absorb force and flex in different directions, returning to its original position.**

Ductility
The ability of a material to **change shape (deform) usually by stretching along its length.**

Malleability
The ability of a material to be **reshaped in all directions without cracking.**

Hardness
The ability of a material to **resist scratching, wear and tear and indentation.**

Toughness
A characteristic of a material that **does not break or shatter when receiving a blow or under a sudden shock.**

3. Metals

	Properties:
Aluminium	•Light Weight •Light grey in colour •Can be polished to a mirror like appearance •Rust resistant
Mild Steel	•Heavy •Dark grey in colour •Rusts very quickly if exposed
Stainless Steel	•Heavy •Shiny appearance •Very resistant to wear / rust.
Cast Iron	•Re melted pig iron with some quantities of other metals •Strong in compression. •Brittle
Copper	•Reddish brown metal. •Soft •Excellent conductor of heat and electricity
Brass	•Yellow metal •Hard •Alloy

4. Composites

Carbon Fibre	GRP Fibreglass
Expensive in comparison to other materials. Very good strength to weight ratio. Used in the manufacture of high end sports cars and sports equipment.	GRP is composed of **strands of glass which are woven to form a flexible fabric. The fabric is normally placed in a mould and <u>polyester resin</u> is added.** **Glass reinforced plastic is lightweight** and has **good thermal insulation properties**. It has a **high strength to weight ratio**

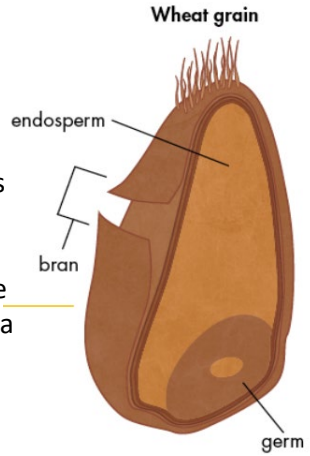
Design Technology – Food: Preparation and Nutrition

Key Vocabulary

Cereals	Cultivated grasses. The grains of these grasses are used as the food source. Once of the most important cereals is wheat
Primary Processing	Changing the raw food material into food that can be either eaten immediately or processed into other types of food products.
Fortified	Vitamins and minerals have been added to foods (for example calcium is added to flour
Fibre	The nutrient found in the cell walls of cereal grains. It is needed for the digestive system to remain healthy and function properly.
Gluten	Formed when water is added to flour and mixed.

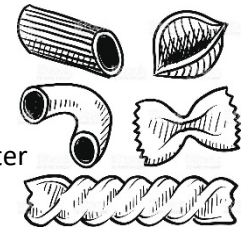
Cereals

Examples of cereals include Wheat, Rice, Oats, Maize and Barley.
Cereals are often referred to as staple foods. Staple foods form a large part of the diet and are usually starchy foods that grow well and can be stored for consumption throughout the year.
Wheat is the main staple crop in the UK. Wheat is used in food production, primarily flour, bread, biscuits, cake, pastry, pizza and breakfast cereals.
Cereals are a good source of starchy carbohydrate and protein. Fat is also found in whole grain as is a range of B vitamins and vitamin E. Fibre is also present in the bran.
Grains are an essential element in a healthy diet and eating high-fibre whole grains may help to reduce the risk of heart disease and type 2 diabetes and control blood cholesterol.



Pasta

Available fresh or dried. Dried pasta has a firmer, more solid texture when cooked. It is excellent for chunky vegetable and meat sauces such as Bolognese. Fresh pasta has a softer texture and will absorb the flavours of the sauce it is served with such as ravioli.
Pasta is made from 00 flour. This type of flour is made from durum wheat. Durum Wheat has a higher protein content that other wheat varieties. It produces a grainy, yellow coloured semolina on milling. Durum wheat makes a good quality pasta because it requires less water to make the dough, making it easier to dry the pasta.

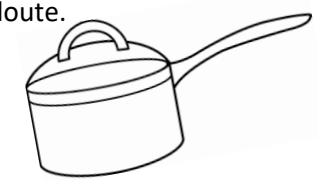


Rice

Short grain rice - Rounded grains, which tend to stick together and are used for sweet dishes such as rice pudding.
Long grain rice - The most popular rice as it has many uses. An accompaniment to dishes such as chilli and as an alternative to pasta or potatoes.
Arborio rice - Round grain used to make risotto
Brown rice - Available as short grain and long grain rice. Takes longer to cook because it contains the bran. Healthier than other types of rice but can be used in the same way

Sauce Making

Sauces are added to food to provide flavour, texture and colour. It binds ingredients together and makes some dishes look more appetising.
Starch is the main food source of plants. Made up of glucose molecules it is particularly useful at thickening mixtures.
When liquids and starch are mixed together and heated the mixture will thicken. This process is called **gelatinisation**.
Types of sauces commonly used include:
Roux and all-in-one or infused sauces such as béchamel and veloute.
Blended sauces such as custard or cornflour sauce.
Reduction sauces such as tomato, a jus or gravy.
Emulsion such as mayonnaise, hollandaise or salad dressing.



Design Technology - Workshop: Mortise and Tenoned Stool

Key Vocabulary

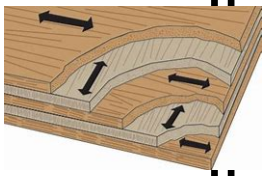
Mortise	Square or rectangular hole made to accept tenon
Tenon	Cut into the end of a rail to fit into a mortise
Mortiser	Machine used to make square holes or mortises in wood
Mortise gauge	Tool that scratches 2 parallel lines to mark out a mortise
Marking Kinfe	Tool used to mark across the grain, usually with a try square
Sash Cramp	Long cramp with adjustable ends
Managed forest	Forest where trees are grown as a crop and replanted
Conversion	The process of turning trees into useable wood
Plywood	Manmade board made from layers or laminates of wood
MDF	Board made from fine particles of dust stuck together
Laminate	A layer. This could be a veneer of plywood or plastic layer
Chipboard	Particle board often made from recycled wood
Sustainable	Will not cause environmental harm in it's use / manufacture
Finite	Limited. Eg oil is a finite resource, it will eventually run out
Infinite	Unlimited, will replenish. Eg bamboo

Manufactured Boards

Manufactured boards have become widely used in place of solid wood. These boards are available in large sheets of various thicknesses. An available range of manufactured boards includes plywood, chipboard and MDF

Plywood

Plywood is made by gluing several thin layers of wood together. Each layer is called a ply. The plies are arranged so that the grain of each layer is perpendicular to the layer above or below it.

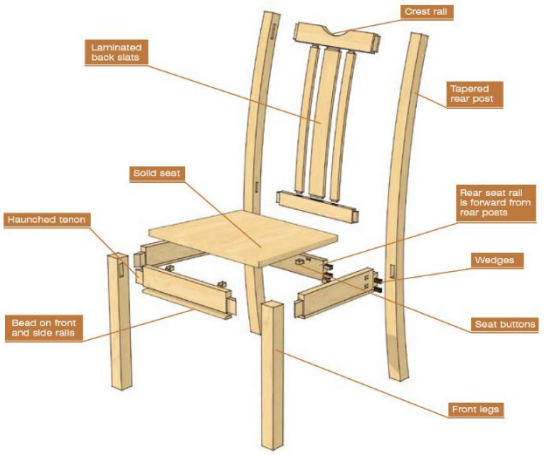


Chipboard

Chipboard is made by gluing tiny wooden chips together. Heat and pressure are used during the gluing process. Chipboard is a cheap material and is best used in dry condition. It is often made from recycled material

MEDIUM DENSITY FIBRE BOARD (MDF) - A quality board, relatively cheap. This board is composed of fine wood dust and resin pressed into a board. This material can be worked, shaped and machined easily.

Tools, Equipment and Processes



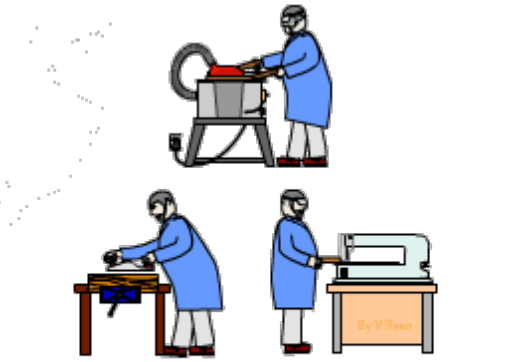
Mortise and **tenon** joints are used on many wood based frame products. The joint involves cutting one part to fit inside another. This helps locate arts in the correct place, provides mechanical strength and a large surface area for the glue

Sourcing, Harvesting and Converting Timber
Much of the timber we buy from a DIY shop is either **softwood** or **manufactured board**.

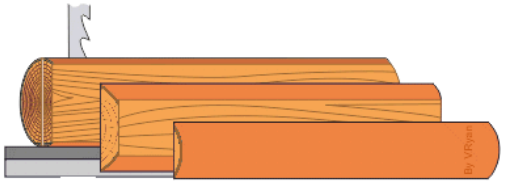
Most softwood comes from a managed forest and will be identified by logos such as the **FSC** Forest Stewardship Council stamp to certify that when trees are harvested new plans are grown in their place

Once harvested, the trees are stripped of their bark and cut into planks. These planks are dried. This can be carried out naturally but takes months or years to complete effectively. Usually they are put into a kiln where the moisture is removed in a controlled environment over a few weeks.

Rough sawn planks of timber can finally be cut and machined into their required dimensions



WHEN SEASONED, THE WOOD BOARDS ARE CUT TO SIZE AND SHAPE



TREES ROUGH SAWN TO BOARDS