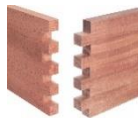


Year 9 Resistant Materials Knowledge Organiser



Finger joint



Norman Foster is an architect who specialises in glass and metal buildings such as The Gherkin and Millennium Bridge in London.



Sir James Dyson reinvented the vacuum cleaner to no longer need a bag. He famously prototyped thousands of designs before refining his cyclone-suction, bag-free design.



Dowel joint



Lap Joint

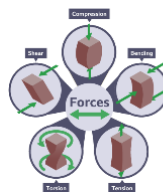


Butt joint

Forces and stresses

Forces act on materials all the time - even if a material appears stationary it still has a force acting on it. There are five terms used to describe what type of force can act on a material:

- **tension** - a pulling force
- **compression** - a pushing force
- **bending** - forces at an angle to the material
- **torsion** - a twisting force
- **shear** - forces acting across the material



Machinery and Tools in the workshop



Tenon Saw: used for sawing straight lines in wood.



Chisel: used to shape wood. Can cut out sections



File: Abrade a thin surface area of wood.



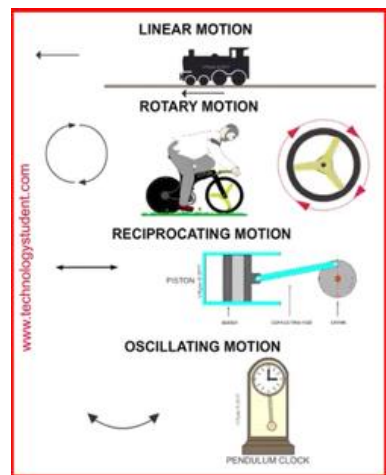
Hand Drill: used to drill holes into materials



Rasp: Abrade a thick surface area of wood.



Coping Saw: used to saw curved lines into wood.



Product analysis - Looking at products that already exist can help improve further designs by pinpointing issues to improve designs and **prototypes**.

Modelling

Modelling ideas in card, paper, clay or other materials can create a cheap and quick way to do initial trials with a product. Using an easy to modify material provides a good way of seeing how a product looks and works, eg checking handles are in the right place or parts fit together well. Taking photographs or video throughout this can show development.

Paper	Properties	Uses
Layout paper	Lightweight, thin, cheap, smooth surface	Graphic drawings, animations
Bleed proof (marker) paper	Contains more chalk, smooth, hard, doesn't absorb ink, doesn't bleed	Creating special effects for designers or artists
Tracing paper	Good transparency, expensive	For seeing an image underneath
Grid paper	Covered with continuous square grid	Used in many maths contexts
Cartridge paper	Heavier weight, good quality, opaque	Writing and sketching

Boards

Board is selected by its thickness, measured in microns. One micron is 1/1,000th of 1 mm. Sometimes the thickness of board is given in **sheets**, referring to the number of pieces of paper that have been glued together to make a sheet of board.

Board	Properties	Uses
Corrugated cardboard	Strong, lightweight	Packaging protection in transportation of products and used to package some hot food such as a pizza due to its insulating properties.
Duplex board	Cheaper than white board, available with different finishes (metallic, holographic etc.)	Food packaging, eg biscuit boxes or containers
Solid white board	Top quality, range of thicknesses, excellent to print on	Hardback books
Foil-lined board	Expensive, good quality, aluminium foil lining, excellent barrier against moisture	Pre-packed food packages, cosmetic cartons
Inkjet board	Expensive, printable, photo quality	Posters, photography, art reproductions
Foam-core board (foam board)	Strong, lightweight, paper face, foam core	Model making, mounting photographs

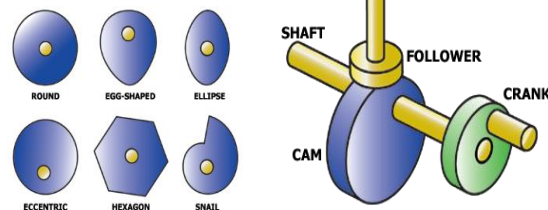
ecological footprint An analytical measurement of the amount of global resources used at each stage in a products lifecycle.

environmental design Designing products by ensuring minimal impact on the environment.

Cams and followers

A **cam mechanism** has two main parts:

- a **cam** - attached to a **crankshaft**, which rotates
- a **follower** - touches the cam and follows the shape, moving up and down



Linkages

Levers can be joined together to form **linkages**. Simple linkages change the direction of motion and the amount of force.

