

1. Paper and board forming processes

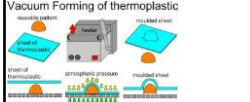
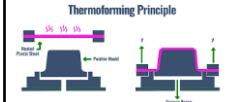


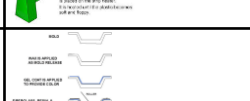
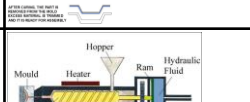
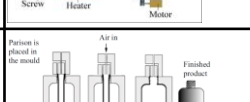
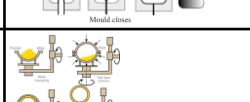
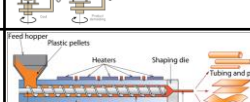
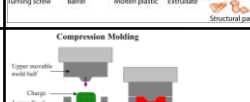
Be aware of the ways that paper and board can be shaped into different products such as packaging.

1	Die Cutting	Using a die to shear webs of low-strength materials, such as rubber, fibre, foil, paper, corrugated fibreboard,, paperboard.
2	Laser Cutting	This works by directing The output of a high-power laser most Commonly through lenses.

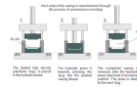
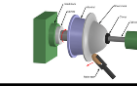


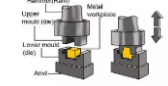

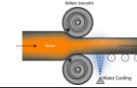




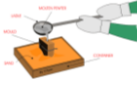
3. Metal Processes – Wasting Processes.

1	Milling	The process of machining using rotary cutters to remove material by advancing a cutter into a work piece.
2	Turning	A material removal process , which is used to create rotational parts by cutting away unwanted material.
3	Flame Cutting	Known by many names, such as oxy acetylene cutting, oxy fuel gas cutting, oxygen burning is the process of cutting steel plate.
4	Plasma Cutting	Is a melting / cutting process in which a jet of ionised oxygen gas at temperatures above 20,000°C is used to melt sheet metal.
5	Laser Cutting	Works by directing the output of a high-power laser most commonly through lenses
6	Punching /Stamping	Similar to cutting-out Christmas cookies from a dough, stamped parts are punched out of flat materials

2. Polymer processes

1	Vacuum Forming	A sheet of plastic is heated to a forming temperature, stretched onto a single-surface mould, and forced against the mould by a vacuum .	
2	Thermoforming	A plastic sheet is heated to a soft forming temperature, formed to a specific shape in a mould, and trimmed to create a usable product.	
3	Calendering	A speciality process for high-volume, high quality plastic film and sheet, mainly used for PVC as well as for certain other modified thermoplastics. The melted polymer is subject to heat and pressure in an extruder and formed into sheet or film by calendering rolls.	
4	Line Bending	Used to bend thermoplastics in a straight line.	
5	Laminating (Layup)	The method of laying down fibre glass / carbon fibres onto a mould and coated with a matrix resin, layer by layer until the desired thickness is obtained.	
6	Injection Moulding	The process of melting plastic pellets (thermosetting/ thermoplastic polymers) that once malleable enough, are injected at pressure into a mould cavity, which fills and solidifies to produce the final product.	
7	Blow Moulding	Blow moulding is a specific manufacturing process by which hollow plastic parts are formed such as bottles or other containers.	
8	Rotational Moulding	A heated hollow mould which is filled with granules / powdered polymer. It is then heated and slowly rotated, causing the softened material to disperse and stick to the walls of the mould.	
9	Extrusion	Used to create objects of a fixed cross-sectional profile. A material is pushed through a die of the desired cross-section.	
10	Compression Moulding	A process in which a plastic sheet is placed between two matching moulds then is softened by the heat and forced to take the shape of the mould as the mould closes.	


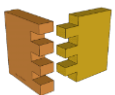

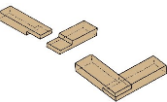


3. Metal processes

1	Press Forming	A pressing force is applied to a metal to deform it to match the size and shape of the mould / die. The material then maintains that shape forever.	
2	Spinning	A process by which a disc or tube of metal is rotated at high speed and formed into an axially symmetric part.	
3	Cupping / Deep Drawing	A manufacturing process used to create deep, seamless and round shapes from sheet metal . Used to produce such items as cartridge cases, zinc dry cells, flashlights, aluminum and steel cans	
5	Forging	Make or shape a metal object by heating it in a fire or furnace and hammering it.	
6	Drop Forging	A steel shaping process whereby a heated steel billet is placed on a lower die mould block, while an overhead, die-equipped ram hammer drives or "drops" down, forcing the metal to fill the contours of the two die blocks.	
7	Bending	Shape or force something straight into a curve or angle using a vice ., folding bars or a forming jig .	
8	Rolling	The process of shaping metals into semi-finished or finished forms by passing between rollers is called rolling	
9	Casting	An object made by pouring molten metal or other material into a mould .	
10	Sand Casting	A manufacturing process where the molten metal is poured into the expendable sand mould cavity either by gravity or by force.	
11	Die Casting	A manufacturing process in which molten metal is poured or forced into steel moulds.	
12	Investment Casting	Derives its name from the pattern (mould) being invested (surrounded) with a refractory / ceramic material. The mould (made from wax) then evaporates when the metal is poured into the encased wax pattern.	
13	Pewter Casting	Low temperature casting (sand or die) uses pewter. This is an ALLOY which means it is composed of more than one metal. Most modern pewter is composed of 96% tin and 4% copper.	





3. Metal processes; addition/fabrication

1	Soldering	Soldering is a process in which two or more metal items are joined together by melting a filler metal into the joint—the filler metal having a relatively low melting point. Soldering is used to form a permanent connection between electronic components.
2	Brazing	A metal-joining process in which two or more metal items are joined together by melting and flowing a filler metal (alloy of copper & zinc) into the joint.
3	Spot Welding	A type of electric welding used to weld various sheet metal products, in which contacting metal surface points are joined by the heat obtained from an electric current.
4	Riveting	A metal bolt that is hammered to secure pieces together.
5	Metal Inert Gas (MIG) Welding	An electric arc forms between a consumable MIG wire electrode and the workpiece metal, which heats the workpiece metal, causing them to melt and join.
6	Tungsten Inert Gas (TIG) Welding	An arc welding process that uses a non-consumable tungsten electrode to produce the weld.
7	Self-tapping Screws	A screw that can tap its own hole as it is driven / screwed into the material.
8	Oxy-acetylene Welding	A processes that use fuel gases and oxygen to generate the heat required to weld or cut metals.





4. Wood Processes, Permanent Joining

1	Dovetail Joint 	Including Furniture, Cabinets, Log Buildings, And Traditional Timber Framing. Noted For Its Resistance To Being Pulled Apart, The Dovetail Joint Is Commonly Used To Join The Sides Of A Drawer To The Front
2	Comb Joint 	Also Known As A Finger Joint, Is A Woodworking Joint Made By Cutting A Set Of Complementary, Interlocking Profiles In Two Pieces Of Wood, Which Are Then Glued.
3	Housing Joint 	A Slot Running Across A Piece Of Wood So The Edge Of Another Piece Fits Into It.
4	Half-lap Joint 	Two Pieces Of Stock, Which Are Typically The Same Thickness, Have Half Of The Material Removed So That The Two Boards Fit Together So That The Joint Adds No Thickness
5	Dowel Joint 	Dowels are round wooden pins of small diameter used to strengthen (reinforce) a butt joint .
6	Mortise And Tenon 	Mainly when the adjoining pieces connect at right angles. The tenon portion of the joint works as a peg, and the mortis is the hole or slot

4. Wood Processes; Temporary Joining

1	Knock Down (KD) Fittings 	Are used to join parts together within ready to assemble and flat pack furniture. Generally they can be put together easily, using only a screw driver, drill, hammer or other basic tools.
2	Wood Screws 	A metal screw with a sharp point designed to attach two pieces of wood together. They are commonly available with flat, pan or oval-heads.
3	Nuts And Bolts 	Nuts are almost always used in conjunction with a mating bolt to fasten multiple parts together.
4	Coach Bolts 	A carriage bolt, coach bolt or round head square neck bolt is a form of bolt used to fasten metal to wood.

4. Wood Processes

1	Laminating 	The process of forming multiple sheets of veneer, chips or solid timber using moulds and bonded together by very strong adhesives, to produce rigid, lightweight structures.
2	Steam Bending 	Wood is placed in a steam heated retort to make it pliable enough to bend . Once prepared, the wood is bent around a former to provide the right shape for the furniture in mind.
3	Routing 	Is a tool that is used to rout out or to hollow out an area of a relatively hard workpiece and other materials.
4	Turning 	The process of using tools to cut and mould shapes onto wood while it turns on an axis of rotation. It usually uses a tool called a wood lathe

You should be aware of the ways that **paper and board**, **polymers**, **metals and wood** can be **shaped**. The different methods used for **forming** these materials and the suitability of the different forming methods for a range of specific products and **scales of production** (one-off, batch, mass production).

Forming – Bending, Shaping, Or Wasting (Removing Material)

Redistribution – Melting The Material And Then Remoulding / Casting.

Addition – Joining Materials Together.