Design & Technology

Components, joints and adhesives

Components are the smaller parts that make up a product, often used to join materials together. Different kinds of component are used to join plastics, woods and metals, and adhesives are used to join materials together by glueing.

Components

Components made from resistant materials are usually bought ready-made. The most common components are **nails**, **screws**, **hinges** and **catches**.

Common components

Component	Description and use
Nails	Generally used where appearance is not important or where a quick job is needed. Made of mild steel.
Panel pins	Used to fix backs onto cupboards and

Component	Description and use
and veneer pins	bottoms onto boxes. Veneer pins are finer (or thinner). Made of mild steel.
Wood screws	Used to join metal or plastic components to wood, or to join two pieces of wood to make a strong joint.
Machine screws	Have a screw thread to fit into a threaded hole or a hexagonal nut. They can be used to join two or more pieces of metal or plastic.
Bolts	Have a screw thread which fits into a threaded hole or a hexagonal nut, and are normally used to join two or more pieces of metal or plastic. A bolt is only threaded for part of its length. Bolts normally have hexagonal heads.
Set screws	Have a screw thread along the whole or most of their length, and normally have hexagonal heads.
Pop rivets	Originally designed for use in the aircraft

Component	Description and use
	industry but are now used in many different products. They are often used where there is only access to one side of the material.
Hinges, catches and locks	Used on boxes, cabinets and cupboards. They can be used on products made from wood, metal or plastic. They are normally fixed to the product with wood screws or machine screws and nuts.

Joints

Most products are made from more than one piece of material, so when the product is assembled or fabricated the pieces need to be joined.

Permanent and temporary joints

Permanent joints are intended to stay put. They may be assembled using *adhesives* [**adhesive**: *A substance which bonds the surfaces of materials together.*], nails, rivets, or one of the heat processes of brazing, soldering or welding. Assembly *jigs* [**jigs**: *Devices for holding parts in position while*

they are being worked on or assembled.] are often used to hold components in place while they are being joined. For example, the parts of a steel roof frame can be put into the jig and then welded together.

Temporary fixings usually involve components with a *screw thread* [**screw thread**: *The projecting spiral rib of a screw or bolt.*], such as screws, nuts and bolts, or one of the many knock-down (KD) fixings.

Joining plastics

Plastic products are often moulded so they snap together. To make a permanent joint, a specialist adhesive, rivets, bolts or machine screws are used.

Joining wood

The method used for joining wood will depend on the function, strength and quality of the product.

Wood joints can be made with screws, nails, glues and *knock-down* [**knock-down**: *Joint made up of separate components which are designed to be easily assembled and disassembled.*] components, or with frame joints, such as butt joints, halving joints, mortice-and-tenon, dovetail and box joints.

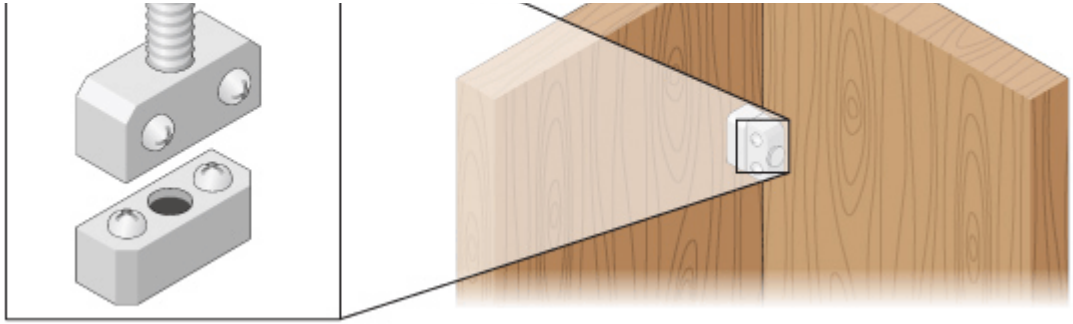
Screws

Two sizes of hole are needed. The clearance hole must be very slightly bigger than the *shank* [**shank**: *Smooth, narrow part between the head and core of a screw.*] of the screw so that the shank can move freely in the clearance hole. The pilot hole must be smaller than the *core* [**core**: *Working part of a screw in which the screw thread is cut.*] of the screw so that the core fits tightly into it.

Nails

Nails are cheaper and easier to use than screws and come in many shapes and sizes. Holes need to be drilled to prevent the wood from splitting, or when using hard woods.

Knock-down joints

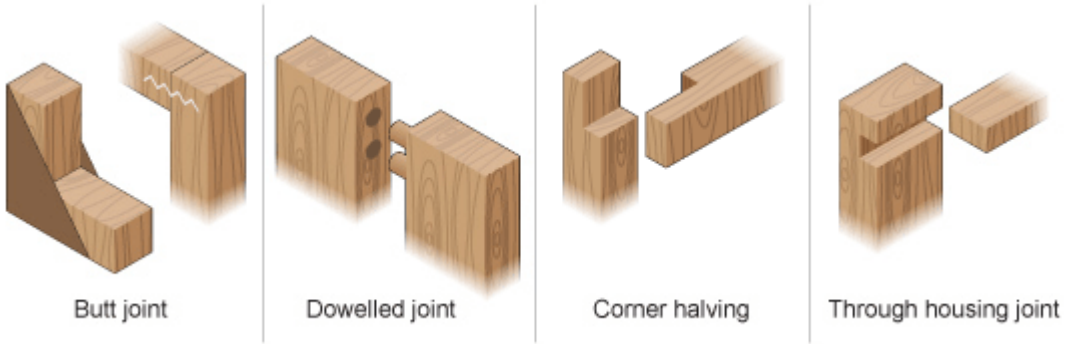


Knock-down (KD) joints are commonly used in flat-pack furniture, which is assembled by the customer at home. Usually KD joints are made from a plastic, such as nylon.

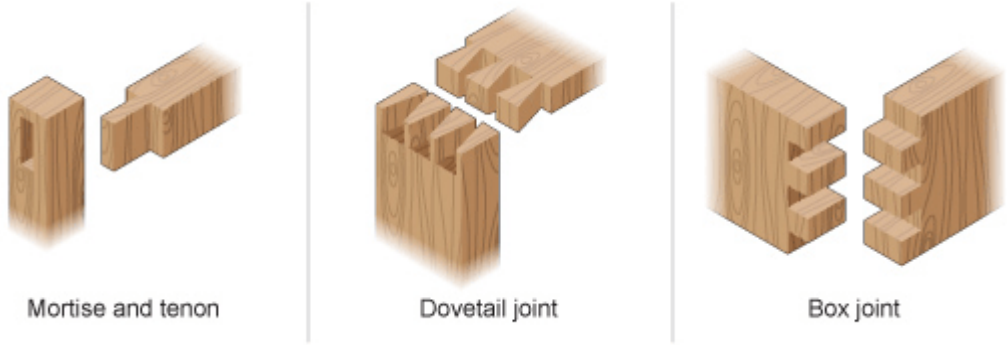
Frame joints

Strong, permanent and neat-looking joints in wood are achieved using one of the many types of frame joint. Frame joints are right-angled, jointed frames common in furniture, boxes and many other types of assembly.

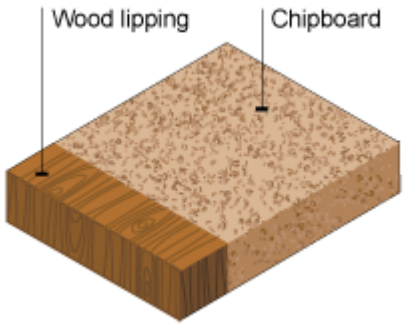
Simple frame joints



More complex frame joints



Edging



Lipping is a strip of wood used to reinforce a joint, or to make the edge of a piece of wood look neater.

With floorboards or timber cladding, the edge of a thin strip of wood fits into a slot in the next piece of wood. This is called a **tongue-and-groove** joint.

Joining metal

Metal joints can be made by brazing, soldering, welding or using rivets.

Brazing

Brazing is a way of bonding materials by melting a filler metal or alloy between the components. The filler metals used in brazing must have a lower melting point than that of the material being joined. Brazing forms very strong, permanent joints.

Soldering

Soldering is a type of brazing which works at lower temperatures.

Soft soldering is used to make permanent joints between copper, brass, tin-plate or light steelwork, and is normally used to join components to electronic circuit boards.
Hard soldering is used for stronger joints.

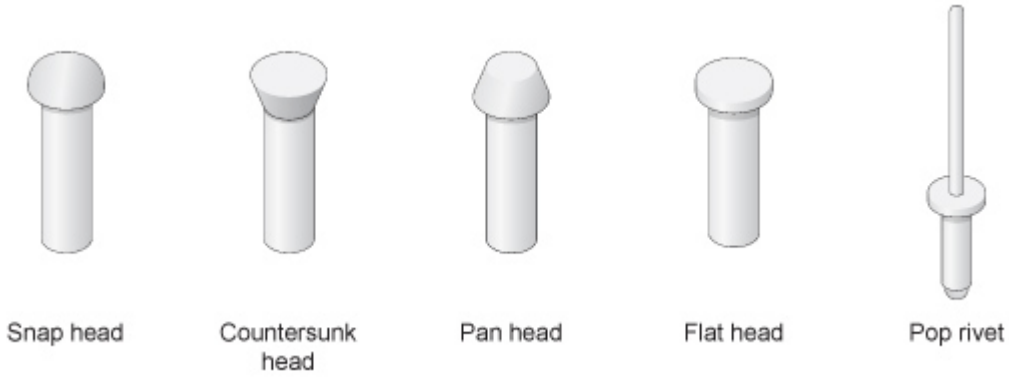
Welding

In welding, two pieces of metal are melted along the joints - fusing together as they cool. No filler is used. A filler rod may be used for a really strong joint.

Machine screws

Machine screws are special screws for joining metal components. Holes have to be pre-drilled into the component. They must have the correct internal thread.

Rivets



Rivets are used to join metal, plastics and plywood. The rivet is placed in a hole drilled through both pieces of material, and its end beaten into a dome. A tool called a **rivet set** or a **rivet snap** is used to to finish the joint. Some rivets are countersunk.

Pop rivets are used where there is only access to one side of the work. They are used to join thin sheets of material together.

Adhesives

Adhesives are used to join materials by glueing. Different types of adhesives are used for different materials - for example, if a product is going to be used outside, then a waterproof adhesive should be used.

Adhesive types

The main types of adhesive are PVA (polyvinyl acetate), synthetic resin, epoxy resin, contact adhesive and acrylic cement.

Uses of adhesives

Adhesive	Uses
PVA (polyvinyl acetate)	General purpose woodwork glue. Some PVA adhesives are water resistant.
Synthetic resin	A strong water-resistant glue for woodwork. It needs to be mixed up immediately before use.

Adhesive	Uses
Epoxy resin	For joining metals and plastics. It is waterproof but must be mixed up immediately before use.
Contact adhesive	For joining polystyrene and fabrics. Also useful for fixing plastic laminates to a wooden base.
Acrylic cement	For the joining of acrylic and some other types of plastics. The adhesive "melts" the surface of the plastic and fuses it together.

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