

JOINING METHODS FACTSHEET

Temporary

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Tapping And Threading

Uses

- For creating thread either external or internal depending on application

Advantages

- Allows bolts to be used where a temporary fixing may be required
- Can be used in plastic and metal
- Can be used to restore damaged threads
- Allows for nuts to be used as a temporary fixing if required
- Thread size can be varied by adjusting pinch bolts on the die stock

Disadvantages

- If dies are not set square you will get a drunken thread
- Smaller sizes break easily if not used correctly
- Clogs up easily due to swarf build up
- Can be difficult to start



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Nuts, Bolts And Washers

Uses

- Nuts and bolts provide a temporary fixing and a convenient method of securing parts that can be easily be undone

Advantages

- Can be undone so items can be taken apart
- Come in various lengths and sizes
- Lock nuts can be used for firm fixings

Disadvantages

- Can work loose with vibration
- If correct size spanner is not used you can round the head
- Can become cross threaded damaging the threads



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Screws

Uses

- Screws offer a reliable and neat method of fixing wood metal and plastic. They can be removed making them a temporary but sturdy.

Advantages

- Can be easily removed
- Some new screws do not need pilot holes or clearances
- Can be used to joint dissimilar materials e.g. plastic to wood

Disadvantages

- Steel screws will rust if outside
- Some screws can be hard to remove
- It is difficult to get screws out if they shear off
- If holes are not correctly prepared, screws can split material when inserted



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Knock down fittings

Uses

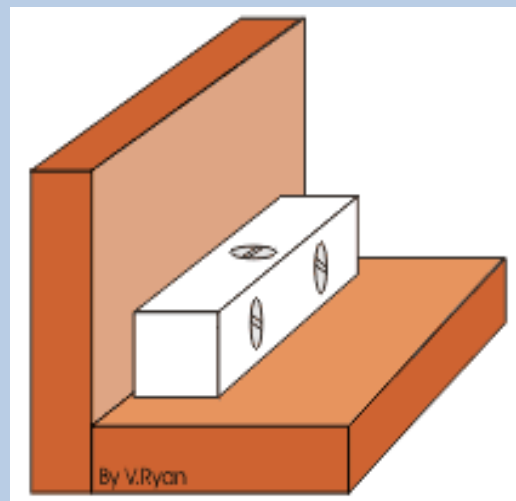
- There are many knock down joining methods, all of which allow joints to be made quickly and easily.
- The parts can be taken apart easily and quickly, so the whole construction can be “knocked down” or flat packed for easy transportation

Advantages

- Allows larger assembly to be transported
- Can be taken apart multiple times
- Parts interchangeable

Disadvantages

- Can some times make things unstable
- Not the greatest of weight bearing joint.



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Permanent

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Round Wire Nail

Uses

- Nails are a quick method of joining wood. As nails are driven into wood, they grip by forcing the fibres of the wood away from the head. This makes them difficult to withdraw
- A general Rule when using nails is nail length should be three times the width of the wood being joined

Advantages

- Big flat head makes it easy to hit
- Sometimes serrated which helps them grip

Disadvantages

- Longer nails can bend when being hit



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Oval Wire Nail

Uses

- Nails are a quick method of joining wood. As nails are driven into wood, they grip by forcing the fibres of the wood away from the head. This makes them difficult to withdraw
- A general Rule when using nails is nail length should be three times the width of the wood being joined

Advantages

- Can be punched below the surface and the hole filled

Disadvantages

- Very difficult to get out as the head is below the surface



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Panel Pin

Uses

- Nails are a quick method of joining wood. As nails are driven into wood, they grip by forcing the fibres of the wood away from the head. This makes them difficult to withdraw
- A general Rule when using nails is nail length should be three times the width of the wood being joined

Advantages

- Small heads can be punched below the surface with a nail punch

Disadvantages

- Bend more easily due to their thinness



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Wood Joints

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Halving Joint

Description

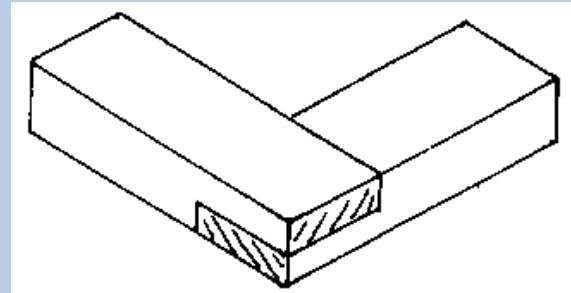
- Halving joints are made by cutting away half the thickness of the material on each half of the joint. Halving joints can be used on corners, tees, or for cross halving.

Advantages

- Stronger than butt joints
- Can be strengthened easily by adding dowels

Disadvantages

- Accuracy must be maintained to archive a perfect finish



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Butt Joint

Description

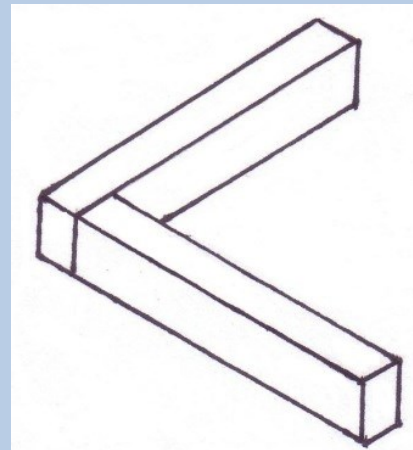
- Butt joints are the simplest form of joint and the weakest since they only have a small gluing area, which means they can be pulled apart. They are used in cheap furniture and sometimes have dowels added to reinforce them.

Advantages

- Cheap
- Most simple joint
- Can be strengthened relatively easily

Disadvantages

- Weak due to small gluing area



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Rebate Joints

Description

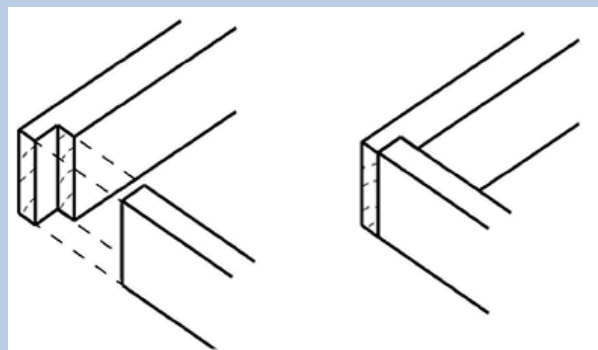
- Rebate joints are also known as lap joints. One part of the two pieces being joined is left plain and the other has a rebate cut into it, which means that half the thickness of the material is removed to form a lip

Advantages

- Stronger than a butt joint due to a larger gluing area and weight bearing lip

Disadvantages

- Still potentially weak to certain forces



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Housing Joint

Description

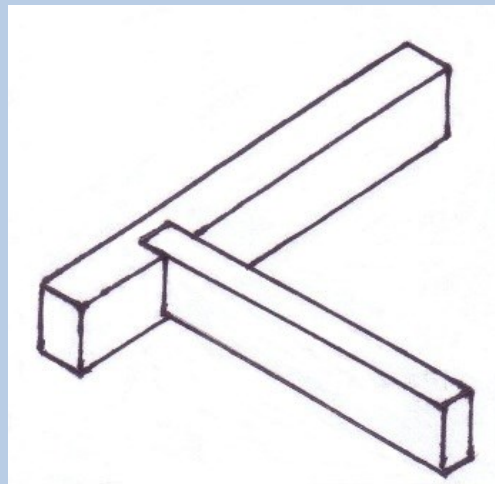
- Housing joints can be cut in to natural timber and manufactured boards. They are commonly used in the constructions of cabinet work for shelves or dividers

Advantages

- Provide a neat finish for shelves
- Weight bearing

Disadvantages

- Difficult may be experienced in getting both sides exactly level for a shelf



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Mortice and tenon joint

Description

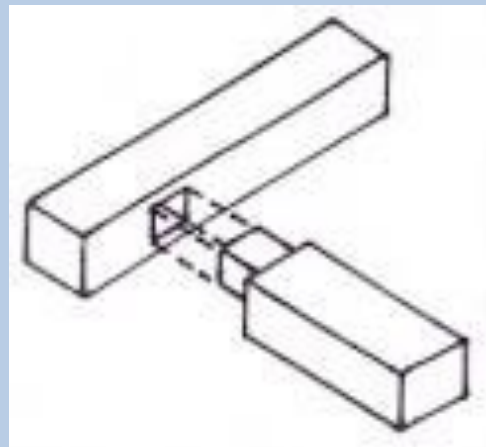
- Mortise and tenon joints are widely used in the construction of furniture frames. The mortise is marked out with a mortise gauge and cut with a mortise chisel. The width of the tenon should be one third the width of the timber.

Advantages

- Strong Joint
- Neat

Disadvantages

- If not accurately cut out the tenon may “float” creating an unstable frame.



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Dowel joint

Description

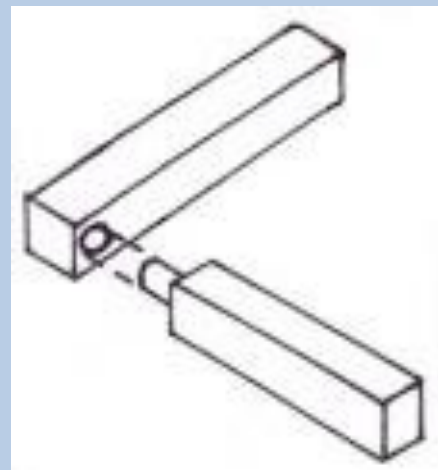
- Dowel joints are butt joints with dowels used as reinforcements. Dowels are made from beech or ramin. Holes are drilled in both pieces and glue is used to secure the dowels in place and between the joining surfaces.

Advantages

- Cheap reinforcement method
- Two or more dowels will prevent work pieces rotating if glue cannot be applied

Disadvantages

- Relatively weak
- If holes are drilled accurately the two mating surfaces will not match up



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Metal Joints

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Snap riveting

Description

- Rivets are most commonly used in sheet metal, although they can also be used to join acrylic and some woods to metals. They are normally made from soft iron and are available with a range of heads, the most common being the countersunk or round head. This round head type of rivet is known as snap head rivet

Advantages

- Can be drilled to undo joints
- Joints can be created as hinges
- Little specialist equipment required

Disadvantages

- Can be time consuming when snap riveting

Rivet types



snap head



countersunk head



pan head



flat head



pop rivet

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Pop riveting

Description

- Another form of rivet is the pop rivet, which is used with a pop rivet gun and is very useful when you only have access to one side of the object or are joining a very thin sheet of material. A pop rivet consists of a hollow rivet mounted on a head pin. As the head pin is drawn up through the hollow rivet by the gun, it will pop when the tension on it reaches a certain point. The pop riveting process is simple and only requires a hole to be drilled for the rivet to be placed into. Although technically a permanent method of joining, both snap and pop riveted joints can be undone simply by drilling through the two pieces to removed the rivet itself

Advantages

- Can be drilled to undo joints
- Joints can be created as hinges
- Little specialist equipment required

Disadvantages

- Can be time consuming when snap riveting

Rivet types



snap head



countersunk head



pan head



flat head



pop rivet

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Soft soldering

Description

- Soft soldering is a process for making joints in brass, copper and tinfoil. When the area to be jointed has been cleaned, a flux is used to prevent build up of a surface oxide and to aid the flow of solder. A thin layer of solder is applied to both pieces being joined. This is called tinning. When both pieces have been tinned they can be placed together and sweated. This means heat is applied and both tinned sides join to become one.

Advantages

- Cheap
- Allows dissimilar metals to be joined
- Can be done on a DIY basis
- Better when working with awkward shapes

Disadvantages

- Not very strong
- Can release toxic fumes



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Brazing

Description

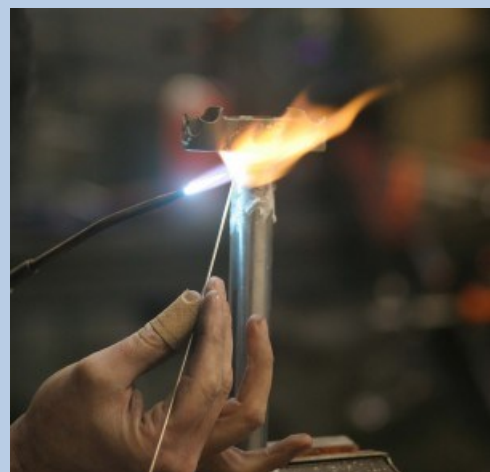
- When brazing, a gas burning torch provides the heat and the flame is controlled by mixing gas and air. A flux usually borax, is mixed with water to make a paste and is spread around the joint. The flux prevents excess oxidation and helps the brazing spelter the flow. Brazing spelter is the filler material that joins the pieces together and melts at 875° brazing therefore is only suitable for use with mild steel because other metals would melt due to the temperatures involved.

Advantages

- Allows to dissimilar metals to be joined
- Better when working with awkward shapes

Disadvantages

- Not very strong
- Can be release toxic fumes
- Very hot creating potential for burns



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Arc welding

Description

- Arc welding uses large electrical current to jump across a small gap. With a current between 10 and 120 amps enough to heat can be generated to melt metal. A flux coated filler rod carries the current. As it is burnt away during the welding process, the flux also burns away and protects the weld from oxidation.

Advantages

- Strong Joint
- Can be used on material 5mm up to 50mm thick
- Slag builds up on the weld so no inert gas is needed

Disadvantages

- Very hot causing potential for serious burns (Around 3000°C to 20000°C)
- Can only join similar metals
- Blowing hole in the parent metal if settings are incorrect
- Welding angles must be adhered to for strength
- Emission of UV Light
- Cannot be used on thin metals



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Mig welding

Description

- MIG welding is similar to electrical arc welding but uses a continuous feed of filler rod so it does not have to be replaced. An arc is struck between the work piece and the filler rod and an inert gas flows through the torch to prevent surface oxidation and the formation of slag

Advantages

- Good for general purpose
- Can weld between 1.6mm to 10mm thick steel plate
- Generally neat finish
- Strong joint

Disadvantages

- Very hot causing potential for serious burns (Around 3000°C to 20000°C)
- Can only join similar metals
- Blowing hole in the parent metal if settings are incorrect
- Welding angles must be adhered to for strength
- Emission of UV Light



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Tig welding

Description

- Is an arc welding process that uses a non-consumable tungsten electrode to produce the weld. The weld area is protected from atmospheric contamination by an inert shielding gas (argon or helium), and a filler metal is normally used, though some welds, known as autogenous welds, do not require it E.G. Aluminium. A constant-current welding power supply produces energy which is conducted across the arc through a column of highly ionized gas and metal vapours known as a plasma.

Advantages

- Can be used on stainless steel, aluminium as well as mild steel
- Very neat welding seam
- Strong joint
- Some metal do not need filler rods

Disadvantages

- Very hot causing potential for serious burns (Around 3000°C to 20000°C)
- Blowing hole in the parent metal if settings are incorrect
- Can only join similar metals
- Welding angles must be adhered to for strength
- Emission of UV Light
- Inert gases must be used e.g. Argon

