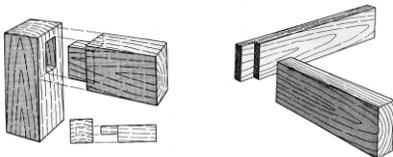




Wood Fasteners, Joinery, and Adhesives

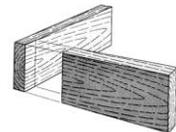
Joinery

- The process of *connecting or joining two pieces of wood together* through the use of various forms of wood joints.
- In basic materials processing, common forms of joinery include dovetail joints, mortise-and-tenon joints, biscuit joints, lap joints, and spline joints.



Butt Joint

- An easy but often weak technique for joining two boards together simply by gluing and pressing two flat surfaces together.
- Typically made by gluing an end to an adjoining flat surface.



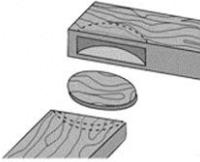
34-20a. Butt joint on edge.



34-20b. Butt joint flat.

Biscuit Joint

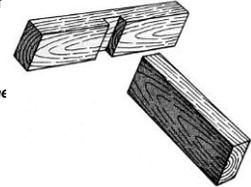
- A butt joint that is reinforced with football- or lozenge-shaped wooden "biscuits."
- Biscuits are usually made from compressed wood, frequently birch wood.
- When the biscuit comes into contact with glue in the biscuit slot, it swells thus creating a tighter joint.
- Sometimes called a plate joint.



Dado Joint

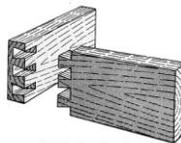
- A joint where one piece is grooved to receive the piece which forms the other part of the joint.
- **Dado (definition)**
 - A groove which is cut across the grain to receive the butt end or edge of a second piece.

34-43. A simple dado joint. The groove is cut to a width equal to the thickness of the second piece and to a depth of about one half the thickness of the first piece.

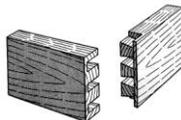


Dovetail Joint

- Joining two boards in which alternating slots (or tails) and protrusions (or pins), each resembling in shape the v-shaped outline of a bird's tail, are snugly fitted together, thus increasing the gluing area.
- Produces a joint that, even without glue, can be difficult to pull apart.
- Regarded as one of the strongest and most reliable forms of wood joinery.



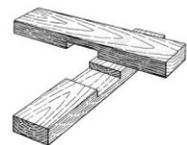
34-76a. Lap dovetail.



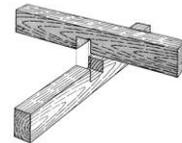
34-76b. Stopped-lap dovetail.

Lap Joint

- A joint where one piece of wood is crossed over another.



34-51. Cross lap or middle half lap.



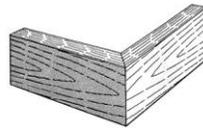
34-53. Edge lap.

Miter Joint

- The woodworking joint created when two boards are cut at an angle to one another.
- The most common miter joint is the 45-degree miter such as the cuts used to build square or rectangular picture frames.



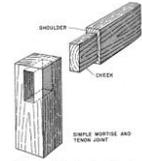
34-59. Flat miter. This may be held together by nails, screws, or other metal fastener.



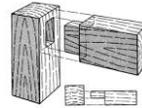
34-60. Edge miter.

Mortise-and-Tenon Joint

- A joinery technique where the cut end (tenon) from one board fits into the matching opening (mortise) of another.
- **Mortise (definition)**
 - An opening chiseled, drilled or routed into a board to receive the end of an intersecting board.
 - The opening or socket that receives the tenon in the classic woodworker's mortise-and-tenon joint.
 - The female part of a mortise-and-tenon joint.
- **Tenon (definition)**
 - The end of a board, cut to a specific size and shape, that is inserted into the mortise, or opening, in a second board.
 - The male part of a mortise-and-tenon joint.



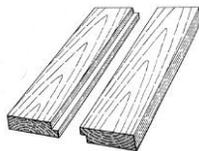
34-73. The blind or single mortise-and-tenon.



34-74. Half-lap mortise-and-tenon.

Rabbet Joint

- A joinery technique where an “L” groove across the end of the edge of one piece of wood fits into a edge or end of another board with an “L” groove.
- **Rabbet (definition)**
 - A rectangular, stepped recess cut along the edge of a section of wood. (May be used as a verb or noun.)



34-34. Rabbet edge. This is also called ship lap when used in siding.

Scarf Joint

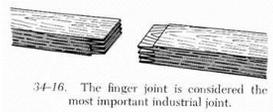
- A joinery technique where two wedge-shaped pieces have been cut to correspond to one another.



34-15. Scarf joint. This is sometimes strengthened with dowels or by nailing a strip on either side.

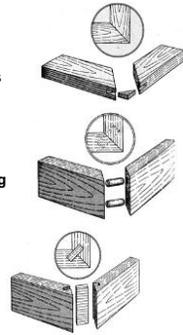
Finger Joint

- A joinery technique used mostly in industry where small “fingers” are cut into corresponding pieces that will be joined together.
- Finger joints are used to making wide boards, in extending the length of dimensional lumber, and in laminated construction.



Joinery Reinforcements

- **Key (or Biscuit)**
 - A small, flat lozenge-shaped dowel for edge or corner-jointing. Wood biscuits are fitted into slots that are created with a biscuit jointer.
- **Dowel pin**
 - Pegs of wood that fit into two matching holes to strengthen a joint.
- **Spline**
 - A thin piece of wood that fits in the mating grooves cut into two pieces of wood.



Wood Fasteners

- What fastener is best to use?
- There are a few questions you need ask to determine which type of fastener you need to use.
 - What materials need to be joined? *Wood, metal and masonry all require different fasteners.*
 - What is the thickness of the material to be joined? *For a secure connection, the fastener must be the correct length.*
 - What weight or strength requirements are there? *From framing a house to hanging a picture, there's a fastener for the job.*
 - How permanent will the connection be? *If the work will be disassembled at some point, use a screw.*
 - Will the work be indoors or outdoors? *There are specific fasteners for both types of applications.*

Nails

- The nail has been around for thousands of years.
- The first versions were heat-forged. When machinery entered the picture, they were cut from sheets of metal.
- Today, most nails are drawn and cut from rolls of wire.



Finishing Nail

- Small nail with cupped head for fastening trim when nail heads should not show.
- Can be countersunk with a nailset, then filled over.



Brad

- Smaller version of the finishing nail up to about 1" long.
- Used for detail work such as attaching molding or trim.



Casing Nail

- Similar to finishing nail, but thicker and heavier.
- Used to attach case molding or rough trim where strength and concealment are required.



Tack

- Very short nail with relatively large head and very sharp point.
- Used to fasten upholstery or carpet or to perform other light fastening jobs.



Upholstery Tacks

- Short nails with ornamental or colored heads.
- Used for attaching upholstery where fasteners will show.



Screws

- For fastening, screws are stronger than nails.
- They can be removed with less damage to the material (especially wood) than nails.
- When using with wood, best practice is to pre-drill a “pilot” hole to guide the screw into position.



Screw Slot Types

- **Slotted**
 - Conventional single-groove screwhead.
 - Applied with a flathead screwdriver.
- **Phillips**
 - Cross-slotted screwheads with U or V-Shaped slots of uniform width.
 - Driven with a Phillips screwdriver.
- **Torx™**
 - Require special drivers with six point heads.
 - Commonly used in electronics, metal or automotive applications.



36-29c Plain screw drivers for slotted head screws.



36-26b Reversed or Phillips head screw driver.



Screw Head & Thread Types

- **Head Types**
 - **Oval**
 - Lower portion is countersunk and top is rounded.
 - Easier to remove & better looking than flathead screws.
 - **Round**
 - Used where the fastened piece is too thin to permit countersinking.
 - Also used on parts that may require a washer.
 - **Flat**
 - Used in applications where the head needs to be flush with the surface.
 - Slotted and Phillips type are available.
- **Thread Styles**
 - **Fine-thread**
 - Work best for hardwoods.
 - **Coarse-thread**
 - Intended for soft woods.



Wood Glues & Adhesives

- By definition, *glue* is made from animal byproducts such as skins and bones.
- An *adhesive* is any product that joins materials together.
- Today, the words "glue" and "adhesive" have become interchangeable.
 - *Natural Glues* are made from animal byproducts (hide glue and casein) or plant sources (paste, cellulose and rubber).
 - *Synthetic Adhesives* include polyvinyl acetate (PVA), aliphatic resin, contact cement, hot melt, and polyurethane.
- *Whether natural or synthetic, the bond is formed as the liquid dries and hardens.*
- *Adhesives are often used in conjunction with fasteners to strengthen wood joints.*



Animal Glues

- Used mostly for furniture making and woodworking.
- They are easy to work with, but less resistant to heat or cold.
 - **Hide glue**
 - » Made from bones, hoofs and skin from animals and fish.
 - » Dry form is mixed and heated (in a glue pot) into a gelatinous mixture that is applied with brush.
 - **Casein**
 - » Made from milk, powdered and reformulated with water.
 - » Creates a waterproof bond.

White Glue (polyvinyl acetate)

- For wood, engineered wood, paper, crafts and simple projects.
- Most commonly available in plastic squeeze bottles.
- Begins to set within one hour, dries clear.
- Has easy clean up, doesn't stain, nontoxic, nonflammable.
- Is not waterproof.
- Requires work to be clamped for best results.



Yellow or Carpenter's Glue (aliphatic resin)

- For woodworking.
- "Refined" version of PVA.
- Packaged in squeeze bottles.
- Varieties typically come in yellow or brown.
- Begins to set within 15 minutes.
- Water-resistant nontoxic, nonflammable.
- More resistant to temperature and water than white glue.
- Work needs to be clamped for best results.
- Used for indoor and outdoor applications.



Contact Cement

- For bonding wood veneer and plastic laminates to countertops.
- Water-resistant.
- Applied to both surfaces needing to be bonded.
- After a designated curing time, the two work pieces are put together.
- Forms an instant bond, leaving no margin for error.
- Water-based versions are nonflammable.



Hot Melt

- For crafts, general projects and repair.
- Requires an electric glue gun.
- Adhesive is a 2-4" glue stick that is inserted into the gun. Heat converts solid to liquid for application.
- Begins to set in about a minute as it cools and solidifies.
- Fills gaps for good adhesion.



Polyurethane

- For woodworking.
- Synthetic plastic-based material.
- Requires moistening of one or both sides of the materials to be joined.
- Creates a strong bond.
- Can be difficult to clean up.

