

Wood Joints, glues and clamping

pages 120-122, 215-248, 302-303 and joint handouts

TED 126
Spring 2007

Wood Joints

- “joints”...this term is used to describe the close securing or fastening together of two or more smooth, even surfaces.

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Wood Joints

- The **joint to select** for each kind of construction depends to some extent on the need for:
 - The **strength**
 - The **appearance**
 - The **difficulty of fabrication**
 - The **equipment available**

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Wood Joints

- Most joints are permanently fastened together with **glue** and sometimes screws or nails.

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Wood Joints

- The following are **common methods of strengthening joints.**

- **Dowels**
- **Splines and Biscuits**
- **Key**
- **Glue Blocks**
- **Corner Blocks**

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Wood Joints

- The following are **common methods of strengthening joints.**

- **Dowels**

You can put a dowel into butt, miter, lap joints etc. to add strength to the joint.



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Wood Joints

- The following are **common methods of strengthening joints.**

- For a **Spline** to add strength to a joint, its **grain must run across the joint**, not parallel to it.



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Wood Joints

- The following are **common methods of strengthening joints.**

- **Biscuits**

- Using thin **wood wafers** called **biscuits** can strengthen wood joints by providing more glue bonding area. Biscuit will expand 2X.
- You can use a **biscuit joiner** (also called a plate joiner) to cut precision mating slots in boards for the biscuits.



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Wood Joints

- The following are **common methods of strengthening joints.**

– **Key**



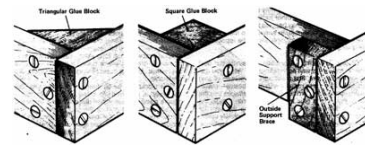
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Wood Joints

- The following are **common methods of strengthening joints.**

Glue Block-small triangular or square blocks

Corner Blocks-larger than a glue block



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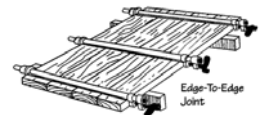
Eight basic wood joints

1. **Edge**
2. **Butt**
3. **Rabbet**
4. **Dado**
5. **Miter**
6. **Lap**
7. **Mortise and Tenon**
8. **Dovetail**

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Eight basic wood joints

- **Edge-to-edge:**
- This joint is used when laminating boards together edge-to-edge to obtain a wider piece of wood.
- Used for table top, desktops and cabinet sides.



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Eight basic wood joints

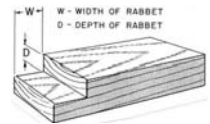
- **Butt**
- For simple boxes, cases, cheap drawers, frames and chairs.
- Very weak joint.



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Eight basic wood joints

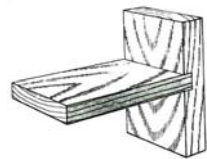
- **Rabbet**- A cut or groove along or near the edge of a piece of wood that allows another piece to fit into it to form a joint. L-shaped groove cut across the **edge** or **end of one piece**.
- For simple boxes, cases, cheap drawers, frames and chairs
 - It is usually reinforced with screws or nails.
 - Rabbet joints are easy to make and moderately strong.
 - They are used chiefly for boxes, drawers, shelving and at the corners of cabinet pieces.
 - Rabbet joints are sometimes made with a dado variation.



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Eight basic wood joints

- **Dado**- is a groove cut **across the grain**.
- typically used in making book shelves, drawers, steps, and book cases. This is a strong joint.
- In very old furniture, a dovetail dado joint is a real work of art because of the time the cabinetmaker had to spend to cut it.



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Eight basic wood joints

- **Miter**- the joining pieces are cut at a 45-degree angle and joined to form a right angle.
- Miters are used for decorative molding and for frames.
- They are very weak and are often reinforced with dowels, spline, or mechanical fasteners.

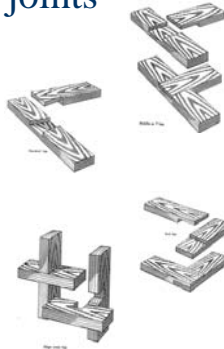


Polygon miters- cuts at angles of more or less than 45 degrees to form three- to ten-sided objects.

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Eight basic wood joints

- **Lap** joints are really a large group of joints in which one side laps over the other.
- A cross-lap joint joins two pieces with flush faces.
- The pieces may cross at any angle.
- Cutting dadoes of equal width and depth on the two pieces so that the face surfaces are flush when they are assembled makes the joint.
- Used for legs of furniture, doors, furniture frames and braces. This joint is strong.



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Eight basic wood joints

Mortise and Tenon

- One of the most common joints used for joining the rails and legs of tables, chairs and other type of furniture is the **Mortise and Tenon** joint.

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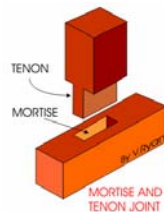
Mortise and Tenon

A large range of mortise and tenon joints exist and the most simple of these is shown.

The tenon is the part that fits into the mortise.

A glue is applied before the joint is pushed together.

Clamps are used to hold the joint firmly together, usually for twenty-four hours.



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Mortise and Tenon

- The **Plain Mortise and Tenon** joint (shown below) is very common and is widely used for the joints of tables.
- Although it is quite strong, if enough force is placed on the joint it will eventually break or come lose.



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Mortise and Tenon

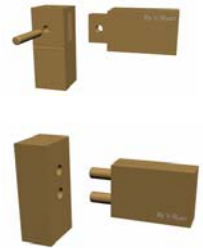
- The **Wedged Mortise and Tenon** joint is extremely strong because the tenon passes all the way through the mortise and is wedged at the other side.
- However, the **Wedged Mortise and Tenon** is more difficult to mark out and cut and requires much more technical skill.



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Mortise and Tenon

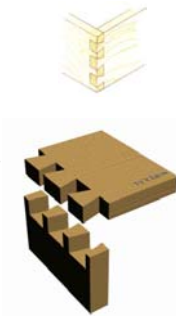
- In this example, a piece of **dowel rod** is drilled through the **mortise and the tenon**.
- This helps keep the joint together even when it is under great pressure.
- This is used as a joint on chairs and other pieces of furniture so that the joints do not break apart when extra weight is applied.



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Eight basic wood joints

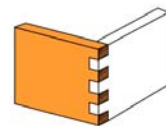
- The **DOVETAIL JOINT** is very strong because of the way the **tails and pins** are shaped.
- This makes it difficult to pull the joint apart and virtually impossible when glue is added.
- This type of joint is used in box constructions such as draws, jewellery boxes, cabinets and other pieces of furniture where strength is required.
- There are different types of dovetail joint and when cut accurately they are very impressive and attractive.



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Finger Joints

- It is ideal for **box constructions** and is suitable for use with natural woods such as pine and mahogany or even manmade boards such as plywood and MDF.
- The **joint is strong** especially when used with a good quality glue.



By V.Ryan

FINGER JOINT
EXPLODED VIEW

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Glues

- **White glue (polyvinyl acetate, or PVA):** PVA glue is a white liquid, usually sold in plastic bottles.
 - It is recommended for use on porous materials -- wood, paper, cloth, porous pottery, and nonstructural wood-to-wood bonds.
 - It is not water resistant. Clamping is required for 30 minutes to 1 hour to set the glue; curing time is 18 to 24 hours

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Glues

- **Yellow glue (aliphatic resin or carpenters' glue):**
 - Aliphatic resin glue is a yellow liquid, usually sold in plastic squeeze bottles and often labeled as carpenters' glue.
 - Yellow glue is very similar to white glue but forms a slightly stronger bond.
 - It is also slightly more water resistant than white glue.
 - Clamping is required for about 30 minutes until the glue sets; curing time is 12 to 18 hours.
 - Yellow glue dries clear but does not accept wood stains.

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Glues

- **Plastic resin glue (urea formaldehyde):**
 - Plastic resin glue is recommended for laminating layers of wood and for gluing structural joints.
 - It is water resistant but not waterproof and is not recommended for use on outdoor furniture.
 - This glue is resistant to paint and lacquer thinners.
 - Clamping is required for up to 8 hours; curing time is 18 to 24 hours.

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Glues

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Glues

- **Polyurethane glue** is one of the best **waterproof glues** available, but until recently was not available outside professional circles.
- It is a one-part adhesive that will adhere to wood, metals, stone, ceramics and many plastics.
- Polyurethane glue does not dry like PVA glues, but instead chemically reacts with moisture in the objects being glued or even in the air.

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Glues

- **Polyurethane glue** is one of the best waterproof glues...
- This reaction causes an expansion of the glue, filling all voids and giving an exceptionally solid glue joint. If the material is dry, spraying a light mist onto it before gluing accelerates the curing process.
- In many ways, polyurethane may be the best wood glue. It both accepts wood stains and sands well in thin coatings, neither of which are true for PVA wood glues.
- Most other adhesives act as a sealer on the wood surface. And removing these other adhesives can be difficult because they dry to a "gummy" texture that resists removal from the wood by sanding... the second strong reason to consider trying polyurethane glue for your next project.

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Glues

- A problem that can negatively affect joint strength is inconsistent glue coverage.
- While this would seem like an easy task to master, remember that different wood species absorb glue at different rates.
- Differences in the consistency within each piece of wood also create varying absorption rates.
- The amount of glue necessary to bond two pieces of oak together might be nearly completely absorbed by softer woods such as pine, resulting in a glue-starved joint in the pine that will almost certainly fail.

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Glues

- Stronger, safer, easier to clean up and **less expensive** than polyurethane glues.
- Allows eight minutes of open time and has an application temperature as low as 47 degrees F.
- One hour clamp time!
- Cleans up with water.
- Does not foam.
- Superior waterproof



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Basic Clamping Systems

- Hand Screw or Wooden Parallel Clamps
- Steel Bar or Cabinet Clamps
- Wood Bar Clamps
- Spring Clamps
- C or Carriage Clamps
- Quick, Band, Hinged Clamps
- Miter-and-Corner Clamps

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Basic Clamping Systems



What is a **caul** ?

The end

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