



Essential Tools & Safety

Hand Tools

Measuring & Marking:	Measuring tape, combination square, marking gauge, ruler, protractor.
Cutting:	Hand saws (rip, crosscut, dovetail), chisels, planes.
Shaping & Smoothing:	Files, rasps, sandpaper, block plane, spokeshave.
Fastening:	Screwdrivers, hammers, hand drills.
Sharpening:	Sharpening stones (oil or water), honing steel.
Assembly Tools:	Clamps (various sizes), mallet

Power Tools

Cutting:	Table saw, miter saw, circular saw, jigsaw, bandsaw.
Shaping & Smoothing:	Router, sander (orbital, belt).
Drilling & Fastening:	Drill/driver, impact driver.
Dust Collection:	Shop vacuum, dust collector.

Safety Essentials

- Eye Protection:** Safety glasses or goggles are crucial to prevent eye injuries from flying debris.
- Hearing Protection:** Earplugs or earmuffs protect against loud noises from power tools.
- Respiratory Protection:** Dust masks or respirators are necessary when working with wood dust, finishes, or chemicals.
- Proper Ventilation:** Ensure adequate airflow to prevent the buildup of harmful fumes or dust.
- Safe Work Practices:** Avoid loose clothing or jewelry, secure workpieces, and always focus on the task at hand.
- First Aid Kit:** Keep a well-stocked first aid kit readily accessible.

Wood & Joinery

Wood Selection

Hardwoods:	Oak, maple, cherry, walnut. Durable, dense, and often used for structural parts and fine details.
Softwoods:	Pine, fir, cedar. Easier to work with, less expensive, and suitable for carcasses and paint-grade projects.
Sheet Goods:	Plywood, MDF, particleboard. Stable, cost-effective, and used for large surfaces and hidden components.
Considerations:	Grain pattern, color, cost, availability, and workability.

Basic Joinery Techniques

Butt Joint:	Simple, weak joint. Often reinforced with screws or dowels.
Rabbet Joint:	Stronger than butt joint. One piece fits into a groove on the other.
Dado Joint:	Similar to rabbet, but groove is in the middle of the piece.
Mortise and Tenon:	Strong, classic joint. Tenon (tongue) fits into mortise (hole).
Dovetail Joint:	Very strong, interlocking joint. Used for drawers and boxes.
Pocket Hole Joint:	Fast, easy joint using screws driven at an angle.

Gluing & Clamping

- Types of Glue:**
- PVA (Polyvinyl Acetate):** Common wood glue, good for general use.
 - Hide Glue:** Traditional, reversible glue. Used for fine woodworking.
 - Epoxy:** Strong, waterproof glue. Used for gap-filling and demanding applications.
- Clamping Techniques:**
- Use clamps to apply even pressure across the joint.
 - Protect wood with cauls to prevent clamp marks.
 - Allow glue to dry completely before removing clamps (usually 24 hours).
 - Clean up excess glue with a damp cloth before it dries.

Finishing Techniques

Surface Preparation

- Sanding:** Start with coarse grit sandpaper (e.g., 80-grit) and gradually move to finer grits (e.g., 220-grit) to achieve a smooth surface.
- Cleaning:** Remove all dust and debris with a tack cloth or vacuum.
- Raising the Grain:** Dampen the wood to raise the grain, then sand again after it dries. This helps prevent the grain from rising after finishing.

Types of Finishes

Oil Finishes:	Penetrate the wood, enhancing the grain. Easy to apply and repair. Examples: linseed oil, tung oil.
Varnish:	Durable, protective coating. Available in various sheens (gloss, satin, matte). Can be brushed, sprayed, or wiped on.
Lacquer:	Fast-drying, hard finish. Requires spraying equipment and good ventilation.
Shellac:	Traditional finish, easy to apply and repair. Dissolves in alcohol.
Paint:	Opaque coating, provides color and protection. Requires primer and multiple coats.
Wax:	Provides a soft sheen and protection. Applied over other finishes.

Application Techniques

- Brushing:** Use a high-quality brush and apply thin, even coats. Avoid drips and runs.
- Spraying:** Requires proper equipment and ventilation. Provides a smooth, even finish.
- Wiping:** Apply finish with a cloth and wipe off excess. Good for oil finishes and some varnishes.
- Drying Time:** Follow manufacturer's instructions for drying times between coats.

Design Considerations

Ergonomics

Seating: Consider seat height, depth, and angle for comfort. Lumbar support is also important.

Tables: Determine the appropriate height for the intended use (e.g., dining, work).

Storage: Design storage spaces to be easily accessible and organized.

Workflow: Think about how the furniture will be used and design it to support efficient movement and tasks.

Aesthetics

Proportion: Consider the relationship between different parts of the furniture. Use the Golden Ratio for harmonious proportions.

Balance: Create a sense of visual equilibrium. Symmetrical designs are balanced, while asymmetrical designs require careful consideration.

Form: Choose shapes and lines that are pleasing to the eye and complement the overall design style.

Texture: Incorporate different textures to add visual interest and tactile appeal.

Color: Select colors that harmonize with the surrounding environment and reflect the desired mood.

Sustainability

Wood Source: Choose sustainably harvested wood from certified forests (e.g., FSC).

Materials: Use eco-friendly finishes, glues, and hardware.

Durability: Design furniture to last, reducing the need for frequent replacement.

Waste Reduction: Minimize waste by carefully planning cuts and using offcuts for smaller projects.