

Hand Tools

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Vises	

- Using the right saw for the job makes cutting easy
- The main difference between saws is:
 - Shape
 - Number of teeth
 - Pitch of teeth
- The fewer the teeth the faster the cut
- Several different types of saws include
 - Backsaw
 - Compass (key hole) saw
 - Coping Saw
 - Drywall Saw
 - Hacksaw
 - Handsaw (crosscut or rip saw)

Backsaw

- 8" to 14" long
- 11 to 14 tpi
- Has broad flat blade
- Has reinforced back edge
- Used cut miter joints and tenons



Compass

- Also called Keyhole saw
- Standard blade is 12" t
- 7 to 8 tpi
- Cuts curves in wood qu
- Fit in tight places
- Cuts on push stroke or



Coping

- Has narrow blade
- 6 ¾" flexible blade
- Attached to curved frame
- Can be rotated to cut at angles
- Blades range from 10 to 20 tpi
- Blade can be adjusted to cut on the pull or push stroke



Dovetail

- A small backsaw
- Blade is 10"
- 16 to 20 tpi
- Used for cutting fine
- Used for cutting dovetail



Hacksaw

- Blade sizes ranges from 8" to 16"
- 14 to 32 tpi
- Sturdy frame with pistol grip handle
- Blade tightened with wing nut
- Used for cutting through metal
- Designed to cut on push stroke



transparent handle

Handsaws

16.1.0

- Also called a crosscut or ripsaw
- Standard blade is 26"
- 8 to 14 tpi for crosscut
- 5 to 9 tpi for ripsaw
- Made of tempered steel
- Crosscut saw designed to cut across the grain
- Ripsaw designed to cut with grain
- Cut edge is called kerf



How to use a saw

14.1.1

1. Mark the place to be cut with a measuring tool
2. Support the piece (both ends) to preventing splitting of the kerf
3. Place the saw teeth on the edge farthest away from you on outside edge of mark
4. Start the cut with the part of the blade closest to the handle
5. Use the thumb of the hand that is not cutting to guide the saw so it stays vertical to the work
6. Place the saw at about a 45 degree angle to the wood, then pull the saw to make a small groove
7. Start sawing slowly, increasing the length of the stroke as the kerf deepens

How to use a Ripsaw 16.1.2

- Start the cut as with a crosscut saw
- Once you started the kerf make the angle steeper-about 60 degrees

Safety Maintenance 16.2.0

- Clean your saw blade with a fine emery cloth
- Apply a thin coat of oil
- Always lay a saw down gently
- Have your saw sharpened by an experienced sharpener
- Brace yourself so you won't be thrown off balance on the last stroke
- Don't let saw teeth come in contact with stone, concrete, or metal

Files and Rasps

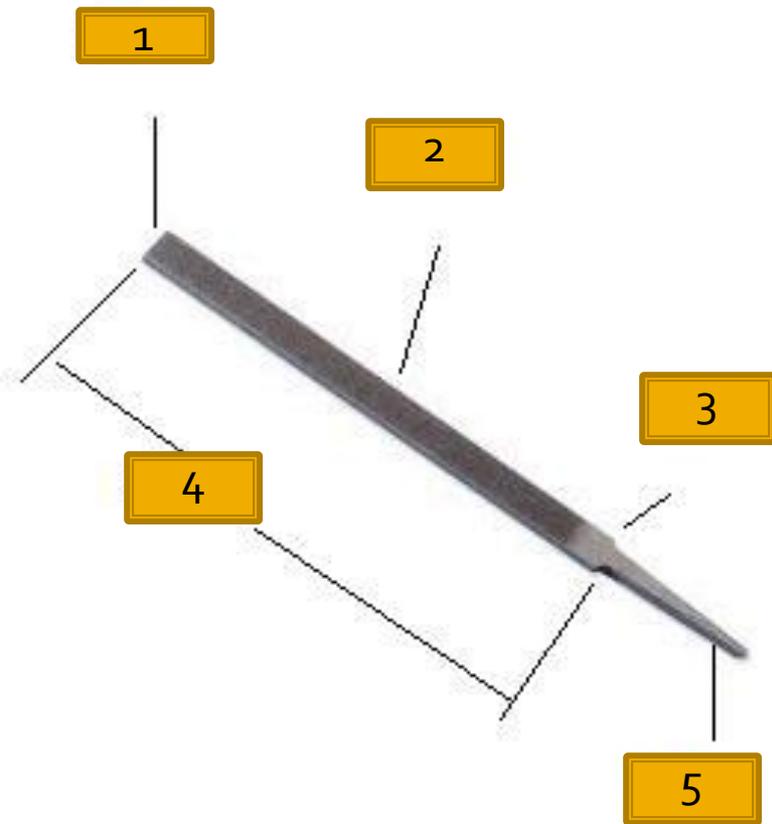
17.0.0

- Used to:
 - Cut
 - Smooth
 - Shape
- Files have slanting rows of teeth
- Rasps have individual teeth
- Made from hard tempered steel
- Sized by length minus the handle
- Available in square, flat, round, half-round, and triangular shapes
- Files for soft material have very sharp teeth for hard materials they are more blunt and closer together
- Never use a file without a handle
- Files classified by the cut of their teeth
 - Single-cut and double cut
 - Rasp-cut
 - Curved teeth

File identification of parts

1. Point
2. Belly
3. Heel
4. Length
5. Tang

These are parts
common to
almost all files



Various Files and Rasps

- Number 1 is a rasp
- Other three are files
- Handles are shown
At the bottom of page



How to use of file or rasp 17.1.0

1. Mount piece to be filed in a vise @ comfortable height
2. Don't lean over your work
3. Hold file with handle in right hand (if right-handed)
4. For average work place thumb on top and two finger underneath. For heavy work use full hand on point of file
5. Apply pressure on forward stroke only
6. Raise the file of piece or backstroke to prevent damage to the file or rasp
7. Clean file by lightly tapping point after each stroke

Safety and maintenance 17.2.0

- Use the correct file for the material being worked
- Always put a handle on a file before using it
- Brush the filing from between the teeth with a wire brush, pushing in the same direction as the line of teeth after each use
- Store files in a dry place and keep them separated to prevent chipping and breaking
- Don't let material vibrate in the vise, it will dull the teeth

Clamps

18.0.0

- Many types and sizes of clamps each designed to solve a different holding problem
- Come in sizes from 1" to 24"
- Common clamps include
 - C-clamp
 - Locking C-clamp
 - Spring clamp
 - Bar clamp
 - Pipe clamps
 - Hand-screw clamp
 - Web clamp
 - Ratchet strap
 - Quick Grip bar clamp

Spring Clamp



Locking C-Clamp



C-Clamp



Bar Clamp

Clamps

How to use a clamp 18.1.0

- When clamping wood or other soft material place pads or thin blocks of wood between the work piece and clamp to protect work
- Tighten the clamp's pressure mechanism
- Don't force it
- Don't over-tighten it (this can spring the clamp)

Safety and Maintenance 18.2.0

- Store clamps by clamping them to a rack
- Use pads or thin wood blocks when clamping wood or other soft materials
- Don't over tighten
- Never use a pipe or wrench on handle for leverage
- Clean and oil threads
- Make certain swivel on end turns freely
- Don't use a clamp for hoisting or pulling work
- Don't use a clamp with a bent frame (discard)

Chain Falls and Come-Alongs 19.0.0

- Used to move heavy loads safely
- Chain hoist/block and tackle:
 - Fitted to an endless chain
 - Used for lifting heavy loads
 - Usually suspended from an overhead track
- Come alongs:
 - Is used to move loads **horizontally** over the ground for short distances

Chain Falls 19.1.0

- Has an automatic brake that holds the load
- Brake holds until the lowering chain is pulled
- Steel hanging hook is larger than the lifting hook and allows the chain fall to hang
- Geared to allow for easy lifting
- Hand chain is a continuous loop
- Load chain used to lift the load
- Attach the load to the hook (safety latch must be in place to prevent loss of load)

Come-Alongs 19.2.0

- As called *cable pullers*
- Use ratchet handle to position load (not to be used for lifting)
- Can support loads of 1 to 6 tons
- Some use chains and others use cables

Safety and Maintenance 19.3.0

- Follow manufacturer's recommendations for lubrication of the chain fall or come-along
- Inspect before each use
- Try out on a small load first
- Have a qualified person to ensure you are fastened to a support strong enough to do the job
- Don't lubricate the clutches
- **Never put your hand near pinch points on chain**
- **Never stand under a load**

- Almost every craft uses shovels when doing construction
 - Digging ditches for wiring or plumbing
 - Digging footings for concrete work of form building
 - Clean up trash, scrap or slag from welds
- Three basic blades
 - Round-for digging holes or remove large amounts of dirt
 - Square-move gravel or clean up construction debris
 - Spade-for moving large amounts of dirt or digging trenches
- May have wooden, fiberglass, or even metal
- A long handle is 47 to 48 inches and short handle is 27 inches

How to use a shovel 20.1.0

- Select the proper shovel for the job
- Place the tip of the shovel or spade at the point where you will begin digging or removing soil
- With one foot balanced on the turned step press down and cut into the soil with the blade

For Square shovel-Place the leading edge of the shovel blade against the gravel or construction debris and push until the shovel is loaded

Safety and Maintenance 20.2.0

- Always check the handle before using a shovel. There should be no cracks or splits
- Use proper PPE including gloves, safety glasses and steel toed boots when digging trenches
- Don't let dirt or debris build up on blade of the shovel
- Always rinse of the shovel blade after using it

Pick 21.0.0

- A swing tool similar to an ax
- Has a wooden handle 36-45 inches long
- Forged steel head
- Weighs 2-3 pounds
- Long handle picks
 - Used for digging holes
- Short handle picks
 - Breaking concrete

How to use

21.2.0

1. Select to correct pick
2. Place one hand at the end of the handle and your dominant hand about $\frac{2}{3}$ of the way up the handle
3. For short handle (hard strikes) raise the pick over your head like an ax
4. For Long handled (normal strikes) raise the pick up to chest height then swing it toward the ground.

Safety and Maintenance 21.2.0

- Make certain head is secure in handle
- Make certain no one is in swing path
- Use appropriate size pick for job
- Use over the head swing only when necessary
- Wear eye protection

Wedges

- Made from hard rubber, plastic, wood, or steel that is tapered to a thin edge
- Used to lift or separate objects

How to use a wedge

- Choose a wedge that won't scratch or damage the material
- Choose one of proper size
 1. Place wedge at the edge of the object
 2. Check to be sure object is well supported
 3. Strike the heel of the wedge with a hammer

Safety and Maintenance

- A wedge can be dangerous if used without proper caution
- Wear appropriate PPE including safety glasses and a face shield
- Keep your hands away from the heel of the wedge when you are striking it.

Wire Brushes

- One of the most common tools in the construction industry
- Many different styles of brushes
 - Carpenters use stainless bristles for cleaning tools
 - Welders use carbon steel to clean welds
 - Brass often used for heavy jobs
- Do not use a brush for finishing work it will scratch the surface
- Keep them clean

Bench Vises

- Used for gripping and holding tools
- Proper use
 - Place object in the open clamp of the vise
 - Turn T-handle clockwise to tighten
 - To loosen object turn handle counter-clockwise



Bench Vise Safety

- Fasten vise securely to the bench
- Clamp work evenly in the vise
- Support the ends of long pieces
- Work as close to vise as possible
- Keep threaded parts clean
- Don't use the jaws of the vise as a pounding surface
- Don't place hands in vise
- Never use a hammer or a pipe as leverage to tighten the vise