

## CARPENTRY

### INTRODUCTION AND DESCRIPTION OF CARPENTRY COMMON TOOLS.

#### SAFETY PRECAUTION

What is accidents?

An accidents is an unplanned and uncontrolled event in which the action or reaction of an object, substance, person or radiation result in personal injury or the probability these of.

Percentage of accidents is,

1) NEGLIGENCE	70 %
2) UNKNOWING	20 %
3) SUDDENLY	10 %
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	100 %

We can avoid 90% accidents by following safety precautions.

#### CAUSES

1) Carelessness. 2) Ignorance. 3) Disobedience. 4) Over confidence

It is most important of any workshop or a factory. Safety precaution in workshop and factory's are very differ accounted to the nature of different trade. The following are the safety precautions to be observed in common and also in particular to your trade. Safety first is a term used when planned measures or precautions are taken to control situations and act in an endeavor to **prevent** 1) Injury to the person concerned 2) Injury to others 3) Damage to the workshop, it's equipments and materials

Type of **SAFETY** used in carpentry workshop.

#### **Personal safety precaution:-**

- 1)In workshop wear a short sleeve shirt or boiler suit.
- 2)If you are wear tie, tuck in or chain, wrist watch, ring or loose ornaments remove it, especially working on machine.
- 3)Always wear safety shoes

#### **Tools safety precaution:-**

- 1)Dull tools are dangerous always keep them sharpening
- 2)Do not keep hand tools on machine
- 3)Never keep sharp tools in your pockets,
- 4)Never use your hands as a brush to sweep away chipping burrs etc.
- 5)When anybody ask you to give a sharp tools, hold the edge in your hand and the handle to other person.
- 6)Always use the proper tools to the right job. This will help you to make your job easier, faster and ensure safety.

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### **House keeping safety precaution:-**

- 1)Keep always your workshop neat and clean.
- 2)Stack the material neatly so that it will not fall when taking from the stock.
- 3)Always keep Fire extinguisher at easily reach to hand in emergencies.
- 4)Do not store any material in the way.

### **Machine safety precaution:-**

All wood working machine have mechanical safe guards they only think that you must be properly.

- 1)Keep the safety devices in good working condition.
- 2)Never allow any else to be near a machine when you are operating it.
- 3)No machine parts should shifted from it's position without the knowledge regarding that particular part respect of the machine.
- 4)Operate the machine only after you have a trough instructions.
- 5)Before starting a machine to check and see that all clamps and levers other components are fixed properly in proper place.
- 6)Do not apply cutting lubricants with cotton wast or rug and the same should be never used for oiling revolving or moving parts of the machine.
- 7)Never touch a cutter tools while it is working.
- 8)Never try to shift a moving belt by hand.
- 9)Do not talking while working on the machine.
- 10)Always use a clamps or vice and not your hand to hold pieces of wood on a drilling machine.
- 11)Use a goggles while grinding, turning and cutting on machine.
- 12)Joking and horseplay around the machine and in workshop are dangerous. **Conduct your self like good workman.**
- 13)Be careful while working on machine .

### **Electrical safety precaution:-**

- 1)Remember always that 230 volts can kill or give a serious injury, burn or shock.
- 2)Check your electrical tools before using it for a broken plugs, bad condition, broken socket, switches or poor condition of the cord.
- 3)Keep the cord away from hot, rough or oily places.
- 4)Do not use electrical tools in the presence of inflammable gas.
- 5)Make sure that your hands are dry(should not wet) before using an electrical tools.
- 6)Do not pull the cord to remove the plug from the outlet. pull the plug for removing it from power connection.
- 7)All electrical plugs and tools must be earthing connected.

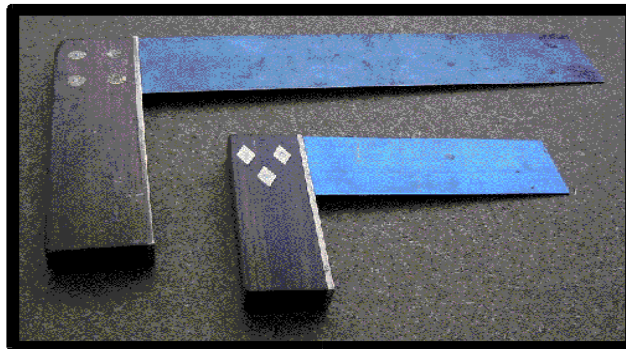
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## COMMON TOOLS USED IN CARPENTRY

- 1) **METAL JACK PLANE** :- Plane is made of wood or metal. But now a days, a metal jack plane is used in carpentry. This is the quick adjustable plain. It is 14" in length. It's blade's grinding and sharpening angle of 20-25° and 25-30°. It is used for smoothing as well as removing rough surfaces es quickly to bring in required size of sawn wooden piece.



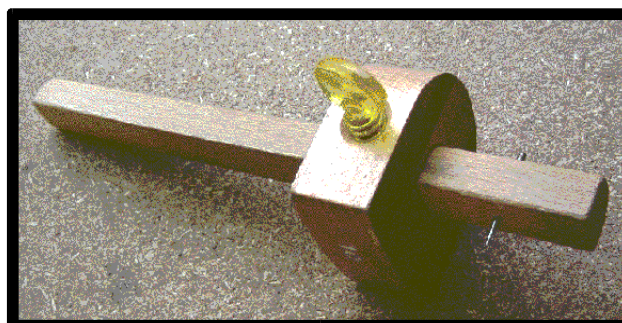
- 2) **TRY-SQUARE** :- Try-square is used for testing the squareness of material and enabling lines to be marked at right angles(90°) to a given surface. It's parts is a) Blade b) Stock c) Rivets.



- 3) **STEEL RULE** :- It is made of steel. millimeter(mm) & centimeter's (cm) marking marked on one edge and inches(") marking marked on another edge. It is used for taking accurate dimensions on the job. It is getting in the market in length of 6", 12", 24", 1meter & 2meter.

- 4) **PENCIL** :- Used om drawing lines in the setting out the shapes of parts of the job. Always used when setting out chamfers,levels or slopping edges. etc.

- 5)**MARKING GAUGE** :- Marking Gauge is used for for marking lines parallel to a face or an edge. It's parts is a)Stock b)Stem c) Thumb screw d) Spur



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6) **CUTTING SAWS** :- There are three types of saws,



1) Taper blade saw:- Hand saw is 15" to 18" in length. It is used for cut the wood in cross.

2) Parallel blade saw :- Tenon saw– it is used for fine and accurate cutting in joinery . It is 8" to 12" in length with 12 to 14 teeth per inch with closed handle.

3) Frame saw. Hack-saw- this saws is used for cutting metal, like screws, nails etc,

7) **BENCH VICE** :- It is used to hold the job while performing various operations like planing, sawing, trenching, chiseling, screwing, gluing etc.

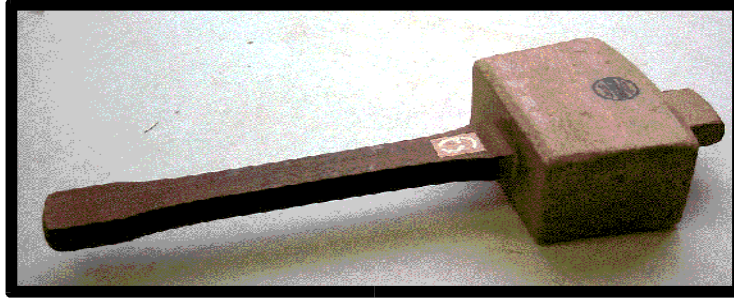


8) **CHISELS** :- Mostly Firmer chisel and Mortise chisel are used in carpentry. It's size depend on the width of blade, range in 3,6,9,12,18,21,25mm,....up to 50mm. Both chisel consist of two main parts a) Blade and b) wooden handle. It's angle of grinding and sharpening is 15 to 20° and 20to25°. Firmer chisel is used for finish laps, mortise socket, pins, etc. And Mortise chisel is used for making rectangular holes in wood called mortise.



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9) **MALLET** :- It is used for driving chisel handle as well as assisting in assembling jobs. It is also called as wooden hammer.



10) **CLAW HAMMER** :- It is used for where heavy hammering is necessary to drive large nails. Useful size being 0.45 to 0.57kg. It is also has claws for extracting nails.

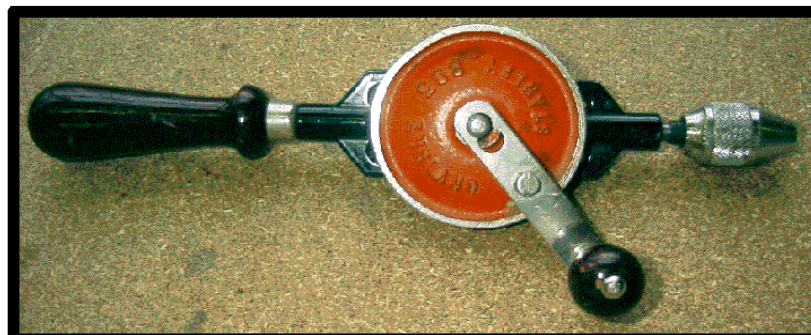


11) **SCREW DRIVER** :- It has an alloy blade or bar ( flat, round, or square ) and wooden handle. Common screw drivers used in carpentry is London pattern and Cabinet making screw drivers for loosening or tightening the screws.



12) **PINCER** :-It is used for pull out the nails from wood. It is also called as a nail puller. It is used in upholstery work to take out the nails.

13) **HAND DRILL MACHINE** :- It is used for making holes up to 12mm in wood.



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14) **OIL STONE** :- It is used for sharpening the tools like chisels and planer blade.

15) **THE WORK BENCH** :- It is used for give support to the job while operations like cutting, chiseling, planing etc. It is 6ft in length, 3ft wide and 33inch in hight. It's top's lower portion is called as "Well" to accommodate tools.



**RAW MATERIAL** :- The raw material of carpentry is wood. It has two types 1) Hard Wood 2) Soft Wood. Specially teak wood is used in carpentry. It is commercial wood and it's cost depends on the cubic feet or running feet.

**PLYWOOD** :- There are two types of plywood A) Marine ply and B) Commercial ply. It is used for making furniture or cabinet works. It is getting in market in the size or 4'x6', 4'x8', 3'x7', 4'x4'. Price is depends upon thickness range in mm 4, 6, 9, 12, 15,18, 21, 25mm.

**NAILS** :- Nails are made by mild steel ,brass, copper, etc. Some types being supplied with decorative or corrosion resistant coating i e galvanized zinc coating. It's types are :-Diamond head nails, Bullet head nails, Flat head nails, Roofing nails, Panel pins, Takes, Corrugated nails.

**TYPES OF NAILS :-**

- 1) Diamond head nails
- 2) Bullet head nails
- 3) Flat head nails
- 4) Roofing nails
- 5) Panel pins
- 6) Wire nails
- 7) Tack nails
- 8) Corrugated nails

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**When Ordering nails:-** Nails are sold by mass and priced at much per kilograms

- 1) Quantity:- in Kg
- 2) Metal:- steel, brass etc.
- 3) Type:- Name of nail (head)
- 4) Coating :- galvanized
- 5) Size :- In Length

USES :- Nails are used for fixing two or more wooden pieces together.

## **SCREWS**

Wood screws are mostly made of mild steel, copper or brass. They consists of ,

- 1) Head
- 2) Shank
- 3) Thread
- 4) Point

USES :- For securing pieces of Timber together, strengthening joints and fixing metal fitting such as hinges, catches, locks to wood.

## **TYPES OF SCREWS :-**

- 1) Counter sunk head screws
- 2) Round head screws
- 3) Raised head screws
- 4) Coach screws

**When ordering screws:-** Screws are sold in packet of 100, 200, or large by Numbers

- 1) Quantity:- numbers of screws or packets
- 2) Material:- steel, brass
- 3) Name or type:- counter sunk or round head
- 4) Size in length (mm) and gauge:- 25/7,35/8.

**GLUE:-** Now a days mostly ready made glue is used in carpentry work like FEVICOL. It is known as a synthetic resin. It is used for stick two or more wooden pieces together.

Application of Fevicol:- Clean the both joint pieces. Pest equal quantity glue on both side. Hold the both pieces together by G clamps or vice. Remove surplus glue with cloth and give the cramping time to dry.

**JOINTS:-** Two or more wooden pieces joint together is called joint.

USES:- Joints are used for making furniture, cabinet building construction and make different shapes. Carpentry joints are classified into three main groups:-

### **1)Angular, Box or Framing joints**

(e. g. cross lap joint, tenon & mortise joint, etc.)

### **2)Widening or Broadening Joints**

(e. g. simple butt joint, dowel joint, rebate joint. etc.)

### **3)Longitudinal or Lengthening Joints**

( e. g. table scarf joint, bevel scarf joint. etc.)

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## **CONVERSION**

Conversion means cut the logs into different marketable size by live sawing, back sawing, quarter sawing methods called conversion.

## **SEASONING**

Seasoning is a simply the drying out of the excess moisture from the wood by the methods of Natural seasoning and Artificial seasoning.

## **DEFECTS**

Defects is any irregularity occurring in or on the timber which may lower its strength, durability or utility value.

## **WOOD WORKING LATHE MACHINE**

### **INTRODUCTION**

The lathe is one of the oldest machine tools and came into existence from the early tree lathe which was then a novel device for rotating and machining a piece of work held between two adjacent trees. A rope wound round the work with its one end attached to a flexible branch of a tree and the other end being pulled by a man caused the job to rotate intermittently. Hand tools were then used. With its further development a strip of wood called "lath" was used to support the rope and that is how the machine came to be known as Lathe. This device continued to develop through centuries and in the year 1797 Henry Maudslay, an Englishman, designed the first screw cutting lathe which is the forerunner of the present day high speed, heavy duty production lathe, a machine tool which has practically given shape to our present day civilization by building machines and industries.

### **FUNCTION OF THE LATHE**

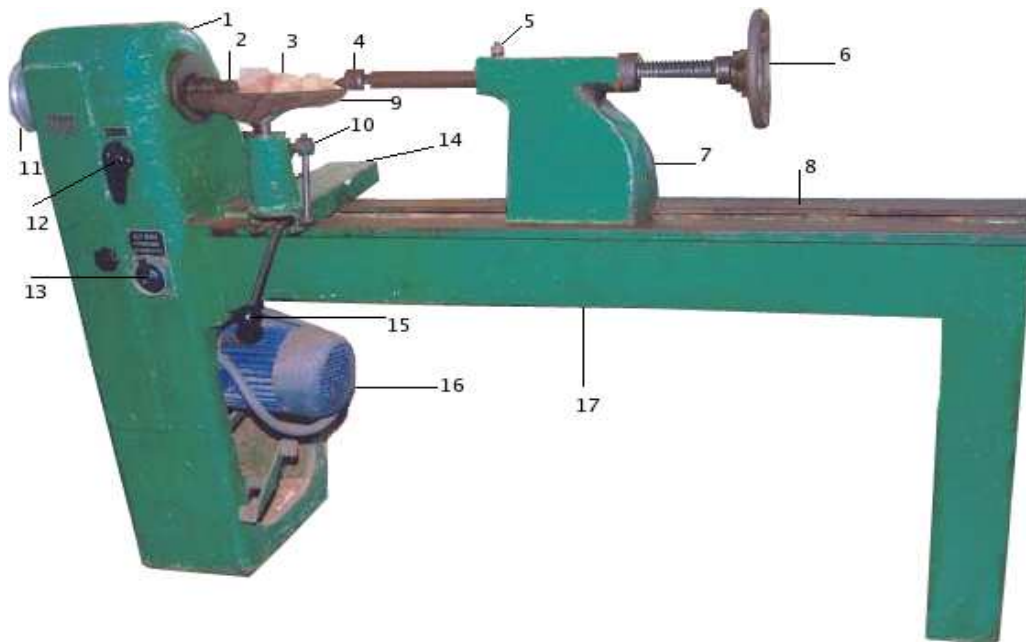
The main function of a lathe is to remove the excess material from a piece of work to give it the required shape and size, This is accomplished by holding the work securely and rigidly on the machine and then turning it against cutting tool which will remove the material from the work in the form of chips. To cut the material properly the tool should be harder than the material of the workpiece, should be rigidly held on the machine and should be fed or progressed in a definite way relative to the work.

The wood working lathe in construction and operation, is the simplest of all types of lathe. It consists of a bed, a headstock, a tail stock and a too-post mounted on an adjustable slide. There is no feed box, lead screw or conventional type of carriage. The tool is mounted on the adjustable slide and is fed into work purely by hand control. This characteristic of the lathe enables the designer to give high spindle speeds which usually range from 1200 to 3600rpm. As the tool is controlled by hand, the depth of cut and the thickness of chop is very small.

The headstock construction is very simple and only two or three spindle speeds are available. Light cuts and high speeds necessitate the use of this type of machine where cutting force is minimum such as in woodworking, spinning, centering, polishing, etc.

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## WOOD WORKING LATHE MACHINE

Parts of wood working lathe machine.

- 1)Head Stock
- 2)Spur center.
- 3)Wooden Piece. (job)
- 4)Dead center.
- 5)Dead center clamp lever.
- 6)Spindle feed wheel.
- 7)Tail stock
- 8)Machine Bed
- 9)Tool rest (adjustable)
- 10)Tool rest clamp lever.
- 11)Stop wheel
- 12)On/Off switch.
- 13)Speed control / revers forward switch.
- 14)Tool rest bracket (adjustable)
- 15)Binding lever.
- 16)Electric motor
- 17)Bench or lathe stand.

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# Planing Practice

**Material required:- Teak wood Size:- 245x45x45mm Quantity:- 1 No.**

Tools required:- Jack plane, Try-square, Steel rule, Pencil, Marking gauge, Bench vice, etc.

## PROCEDURE:-

1) Selection of material & Select one good side which must be straight, without knots or cracks. it is called as face side.

2) Hold the wooden piece into the Bench vice as selected face side should be up side.

3) Plain it (face side) with the Jack plane. 4) Check its flatness with Try-Square.

5) Mark the face side mark with Pencil. Select another good side which is either left or right side of the face side. It is called as face edge. Hold the wooden piece into the Bench vice as selected face edge side should be up side. Plain it (face edge) with the Jack plane.

Check flatness as well as squareness with Try-square by keeping it's stock on plained face side. If true mark it as face edge with Pencil.

6) Fix the required thickness by using steel rule and mark on the both edges and ends of wooden piece by keeping it's stock on plained face side for planing the other rough side. It is called as back side.

7) Hold the wooden piece into the Bench vice as marked back side should be up side.

8) Plain the back side with the Jack Plain up to marking as well as maintain flatness.

9) Fix the required width in marking gauge by using steel rule and mark on the both sides and ends of wooden piece by keeping it's stock on plained face edge for planing the other rough edge. It is called as back edge.

10) Hold the wooden piece into the Bench vice as marked back edge should be up side.

11) Plain the back edge with Jack Plain up to marking as well as maintain flatness and squareness with face side.

12) Recheck all dimensions with steel rule.

## SAFETY PRECAUTION

1) Hold the wooden piece parallel to the floor (straight level)

2) Do not give pressure on right hand when you start planing.

3) Do not put pressure by left hand at end of stroke

4) Try to plain the wooden surface uniformly

5) Do not plain without checking the surface accurately

5) While planing the Jack plane must not touch to any metal (vice, nails etc.)

6) While planing always check that wooden piece should not plain less than required size.

8) Keep the plainer on its side when not in use. ( not on it's cutting edge.)

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# Cross Half-Lap Joint

Material required:- Teak wood Size:- 245x45x45mm Quantity:- 1 No.

Tools required :- Jack plane, Tri-square, Steel rule, Pencil, Marking gauge, Bench vice, Firmer chisel, Mallet, Tenon saw, etc.

## PROCEDURE:-

- 1)Preparation:- Prepare the wooden piece to the required width and thickness in one length.
- 2)Setting out:- a)Mark the center of both pieces and set out position of both trenches about these center lines.  
b)Gauge depth of trenches from face sides of both pieces. This ensures the face side being flush in the finished joint. Mark waste on sides and edges with crosses .  
c)Check fitting of trench place the piece in position and check the accuracy of the lines.
- 3)Cutting out :- a) Square side of the trench across with cut lines.  
b) Pare sloping grooves on waste sides of the line for sawing.  
c)Saw sides of trench down to the gauge line.  
d) Pare out bulk of waste by firmer chisel, chiseling half way through from both edges using chisel bevel side down.  
e)Pare out remaining waste down to gauge lines use bevel side up paring half way.
- 4)Assemble :- clean up edges and assemble both pieces each others and finish faces sides with planer.

## Safety Precaution

- 1)Remove loose fitting outer garments
- 2)Don't gauge with blunt spur
- 3)while planing adjust the plane blade and back iron properly
- 4)Paring with firmer chisel half way through from both edges
- 5)While chiseling hold the piece with the help of 'G' clamp
- 6)Don't saw or chisel without holding
- 8)Always use proper sharpened tools

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# 'Tee' Bridle Joint

Material required:- Teak wood Size:- 245x40x30mm Quantity:- 1 No.

Tools required:- Jack plane, Try-square, Steel rule, Pencil, Marking gauge, Bench vice, Tenon saw, Firmer chisel, Mortise chisel, Mallet etc.

## PROCEDURE:-

1)Preparation:- Prepare the wooden piece in one length to the required width and thickness.

Setting out:- 1) mark position of center in length of long piece to cut in to the two equal parts and give the name A to one piece and B to another. 2) mark the position of pin in center of length on edge and face side of A piece. This distance between the shoulder lines being equal to the width of the other piece (i e 40mm )3) Mark these lines on back side and back edge of the A piece 4) Take 40mm distance from one end of B piece with the help of steel rule & pencil and mark it all sides (face side, face edge & back side, back edge) of the B piece with the help of try-square. 5)set down marking gauge with 10mm distance and make marking on the edges of both pieces by using its stock from face sides. 6) Mark the waste of pin on both sides and socket between the marking gauge lines on both edges.

2)Cutting Pin:- 1) Cut the piece from center and check marking of fitting. 2)Carefully cut the shoulder down to the gauge lines (marking) 3) pare out waste by using firmer chisel

3)Cutting socket:- 1) sides of the socket cut down to the required depth sawing on the waste sides of gauge lines. 2) Chisel half way through from both edges by using mortise chisel .

4)Assembling:- assemble and if required remove waste ends from socket.

## Safety Precaution

- 1) Remove loose fitting outer garments
- 2) Don't gauge with blunt spur
- 3) while planing adjust the plane blade and back iron properly
- 4) Paring with firmer chisel half way through from both edges
- 5) While chiseling hold the piece with the help of 'G' clamp
- 6) Don't saw or chisel without holding
- 7) Always use proper sharpened tools.
- 8) Check properly other setting out before sawing or chiseling.
- 9) After assembling always face sides and face edges should be in front side. and equal surface level.

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## Wood Turning Job (parallel turning)

Material required:- Teak wood

Size:- 245x40x30mm

Quantity:- 1 No.

Tools required:- Jack plane, Try-square, Steel rule, Pencil, Marking gauge, Bench vice, Tenon saw, Firmer chisel, Round nose chisel, Parting tools, Mallet, Lathe machine, Out side caliper

Procedure:-

- 1) Cut the material as per length given in drawing
- 2) Preparation:- if the wooden piece is not right angle then square it by planing or sawing
- 2) Marking:- after planing mark diagonal of square piece at both ends of the piece. Then divide the width and thickness in to three equal parts and joint the lines thus making octagon on both ends join lines of both octagon lengthwise. Mark the waste.
- 3) Planing:- Plane down the waste till marking and prepare a octagon piece.
- 4) Fix the octagonal piece in the lathe machine at the centers between the live spur and dead spur. check for all the guards are in proper position.
- 5) Take dimensions on the outside caliper for the job. start the machine and use outside gouge chisel to make it fairly round. After that off the machine and check for roundness. Then take the flat chisel and make it perfectly round to given dimensions of the job. Always leave a half inch distance from both the ends. check it with out side caliper.
- 6) For final finishing use sand paper. After completion of job remove and clean the machine.

### Safety Precaution

1. Always make octagon for the piece to be used for turning work. Never directly use square piece in lathe machine with sharp edges.
2. Always sharpen the tools before using on lathe machine.
3. Always use goggles and hand gloves while working on lathe machine.1)Remove loose fitting outer garments
4. Always use proper sharpened tools
5. Remove loose fitting out garments and ring, watch, Bengals while working on lathe machine
6. Always check for all safety guards before starting the machine.
7. Do not chisel loosely while turning. Always rest the tools on the tool rest while the machine is in operation.

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# 'Tee' Half-Lap Joint

Material required:- Teak wood Size:- 245x45x45mm Quantity:- 1 No.

Tools required :- Jack plane, Tri-square, Steel rule, Pencil, Marking gauge, Bench vice, Firmer chisel, Mallet, Tenon saw, etc.

## PROCEDURE:-

- 1)Preparation:- Prepare the wooden piece to the required width and thickness in one length.
- 2)Setting out:- a)Mark the center of one piece and set out position of trench or socket about these center lines. As well as set out the position of pin at the end of another piece.  
b)Gauge depth of trench and pin from face sides of both pieces. This ensures the face side being flush in the finished joint. Mark waste on sides and edges with crosses .  
c)Check fitting of trench place the piece in position and check the accuracy of the lines.
- 3)Cutting out :- a) Square side of the trench across with cut lines.  
b) Pare sloping grooves on waste sides of the line for sawing.  
c)Saw sides of trench and pin down to the gauge line.  
d) Pare out bulk of waste by firmer chisel, chiseling half way through from both edges using chisel bevel side down.  
e)Pare out remaining waste down to gauge lines use bevel side up paring half way.
- 4)Assemble :- clean up edges and assemble both pieces each others and finish faces sides with planer.

## Safety Precaution

- 1)Remove loose fitting outer garments
- 2)Don't gauge with blunt spur
- 3)while planing adjust the plane blade and back iron properly
- 4)Paring with firmer chisel half way through from both edges
- 5)While chiseling hold the piece with the help of 'G' clamp
- 6)Don't saw or chisel without holding
- 8)Always use proper sharpened tools

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# Corner Bridle Joint

Material required:- Teak wood Size:- 245x40x30mm Quantity:- 1 No.

Tools required:- Jack plane, Try-square, Steel rule, Pencil, Marking gauge, Bench vice, Tenon saw, Firmer chisel, Mortise chisel, Mallet etc.

## PROCEDURE:-

1)Preparation:- Prepare the wooden piece in one length to the required width and thickness.

Setting out:- 1) mark position of center in length of long piece to cut in to the two equal parts and give the name A to one piece and B to another. 2) mark the position of tenon at one end of length on edge and face side of A piece. This distance between the shoulder lines being equal to the width of the other piece (i e 40mm )3) Mark these lines on back side and back edge of the A piece 4) Take 40mm distance from one end of B piece with the help of steel rule & pencil and mark it all sides (face side, face edge & back side, back edge) of the B piece with the help of try-square. 5)set down marking gauge with 10mm distance and make marking on the edges of both pieces by using its stock from face sides. 6) Mark the waste of tenon on both sides and mortise between the marking gauge lines on both edges.

2)Cutting tenon:- 1) Cut the piece from center and check marking of fitting. 2)Carefully cut the shoulder down to the gauge lines (marking) 3) pare out waste by using firmer chisel

3)Cutting mortise:- 1) sides of the mortise cut down to the required depth(40mm) sawing on the waste sides of gauge lines. 2) Chisel half way through from both edges by using mortise chisel .

4)Assembling:- assemble and if required remove waste ends from socket.

## Safety Precaution

- 1) Remove loose fitting outer garments
- 2) Don't gauge with blunt spur
- 3) while planing adjust the plane blade and back iron properly
- 4) Paring with firmer chisel half way through from both edges
- 5) While chiseling hold the piece with the help of 'G' clamp
- 6) Don't saw or chisel without holding
- 7) Always use proper sharpened tools.
- 8) Check properly other setting out before sawing or chiseling.
- 9) After assembling always face sides and face edges should be in front side. and equal surface level.

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