

Participant Handbook

Sector
Furniture & Fittings

Sub-Sector
Modular Furniture

Occupation
Production Wooden Furniture

Reference ID: FFS/Q0103, Version No. 1.0
NSQF level: 3



**Assistant Carpenter
– Wooden Furniture**



Shri Narendra Modi
Prime Minister of India

“ Skilling is building a better India.
If we have to move India towards
development then Skill Development
should be our mission. ”



Certificate
COMPLIANCE TO
QUALIFICATION PACK – NATIONAL OCCUPATIONAL
STANDARDS

is hereby issued by the

FURNITURE & FITTINGS SKILLS COUNCIL

for

SKILLING CONTENT : PARTICIPANT HANDBOOK

Complying to National Occupational Standards of
Job Role/ Qualification Pack: "**Assistance Carpenter – Wooden Furniture**"
QP No. "**FFS/Qo103 NSQF Level 3**"

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The preparation of this handbook would not have been possible without the Furniture & Fittings Industry's support. Industry feedback has been extremely encouraging from inception to conclusion and it is with their input that we have tried to bridge the skill gaps existing today in the industry.

This participant handbook is dedicated to the aspiring youth who desire to achieve special skills which will be a lifelong asset for their future endeavours.

About this book

This Participant Handbook is designed for providing skill training and /or upgrading the knowledge level of the Trainees to take up the job of an "Assistant Carpenter Wooden Furniture" in the Furniture & Fittings Sector.

This Participant Handbook is designed based on the Qualification Pack (QP) under the National Skill Qualification framework (NSQF) and it comprises of the following National Occupational Standards (NOS)/topics and additional topics.

- (FFS/N0104) Assist in furniture planning and organizing work to meet expected outcome
- (FFS/N0105) Assist in furniture making
- (FFS/N8601) Ensure health and safety at workplace
- (FFS/N8501) Maintain work area tools and machines
- (FFS/N8801) work effectively with others
- Employability and Entrepreneurship Skills

Symbols Used



Key Learning Outcomes



Activity



Summary



Tips



Notes



Unit Objectives



1. Assist in Furniture Planning and Basics of Wood Work



- Unit 1.1 Introduction
- Unit 1.2 Types of Furniture
- Unit 1.3 Measurement System
- Unit 1.4 Assist in Furniture Planning
- Unit 1.5 Understanding Wood
- Unit 1.6 Wood Cutting
- Unit 1.7 Consumables Required for Woodworking



Key Learning Outcomes



At the end of this module, you will be able to:

1. Evaluate importance of Carpentry
2. Evaluate an Assistant Carpenter and his/her Role in organisation
3. Analyze the Types of Furniture
4. Analyze the Measurement Systems
5. Analyze the Tools required for Wood Working
6. Analyze the various woods and their usage in furniture
7. Evaluate the process of wood Cutting
8. Analyze the Consumables used in wood Working

Unit 1.1 Introduction

Unit Objectives

At the end of this unit, you will be able to:

1. Evaluate Carpentry and its importance
2. Analyze the role of an Assistant Carpenter
3. Analyze the various activities carried out by Assistant Carpenter

1.1.1 Carpentry and its importance

Carpentry is a skill by which wood pieces are converted in various useful articles, like – Table, chair, bed, window, door, almirah etc. No home or office is complete without wooden furniture. Carpenter is the person who does this job. This is an age-old skill, which has now evolved in technology by introduction of various special tools and equipment. Wood is also replaced by artificial wood, which is good for environment and give feeling of real wood while using. Conversion of artificial wood is also done by same wood working methodology.



Fig.1.1.1.1: Wood cutting

1.1.2 Who is Assistant Carpenter?

In Carpentry, role of an Assistant Carpenter is very important. Since lot of activities in carpentry is done by hand and no special machinery is available to hold material (except in repetitive manufacturing), hence it is required support from an Assistant Carpenter.

Woodworking requires lot of teamwork and Carpenter and Assistant Carpenter makes a small team. Success of any Carpenter is depending on their teamwork and support received from Assistant Carpenter.

An Assistant Carpenter helps Carpenter in all of his/her activities, like – Measuring, Marking, Cutting and Assembly.



Fig.1.1.2.1: Wood sizing

1.1.3 What is the role of an Assistant Carpenter?

Following are the key roles and responsibilities of Assistant Carpenter –

1. To Load /unload material related to woodworking project
2. To Pack/unpack material related to woodworking project
3. To keep all material related to woodworking project
4. To assist Carpenter for Wood Measurement
5. To organise woodworking tools
6. To fetch woodworking tools whenever required by Carpenter
7. To verify that all woodworking tools are in working condition
8. To assist Carpenter in Cutting wooden sheets
9. To assist in Safe functioning of power tools
10. To assist Carpenter in assembly of furniture
11. To assist Carpenter in furniture Finishing
12. To clean the furniture
13. To clean the work place

Unit 1.2 Types of Furniture

Unit Objectives

At the end of this unit, you will be able to:

1. Recognize various types of furniture being made from Wood

1.2.1 Types of Furniture

Our daily life is not complete without use of some type of furniture. There are many types of furniture available today. We can split them broadly in below category –

For Seating-



Chair



Sofa



Stool



Bench

Fig. 1.2.1.1: Types of Seating furniture

For sleeping:



Double bed



Cot

Fig. 1.2.1.2: Types of sleeping furniture

For Game:



Chess Table



Billiard Table

Fig. 1.2.1.3: Types of gaming furniture

For Surface:



Writing Table



Coffee table



Dining table

Fig. 1.2.1.4: Desk type furniture



School Desk

For Storage:



Cabinet

Fig. 1.2.1.5: Cabinet type furniture



Book Shelf

For Building:



Doors

Fig. 1.2.1.6: Door & window



Window

Unit 1.3 Measurement System

Unit Objectives



At the end of this unit, you will be able to:

1. Evaluate Measurement
2. Analyze measurement systems being used in the world
3. Discuss various measurement tools
4. Analyze measuring woods in length, square meter and cubic meter
5. Discuss about wood marking tools

1.3.1 Measurement

Measurement is the process of obtaining the magnitude of a quantity relative to an agreed standard. Measurement of any quantity involves comparison with some precisely defined unit value of the quantity. Standard units of measure need to be identified and defined as accurately as possible.

The Accurate measurement is the basis of good engineering and crafting practice. The accuracy of any measuring device depends on the user as much as on the design of the tool. Measuring is not only checking the length, width or thickness of objects but also checking of the shape – things like the flatness, straightness, roundness or squareness. Measuring tools are also used for inspecting a finished or partly finished product.

Measurement is required for checking the accuracy of part made, as well as creating the sketch for making a part.

All measuring tools are precision tools. You must take good care of them to keep them in good shape to maintain accuracy.

1.3.2 Measurement Systems

There are two systems of measurement. The first one is traditional system used in Carpentry is based on the English imperial system of measure; this is called FPS (also known as foot pound system). The second is called the SI system (Also known as MKS System). The metric system is an international decimalized system of measurement, first adopted by France in 1791, that is the common system of measuring units used by most countries in the world. All measuring tools have metric or imperial graduations or a combination of both. One big advantage of the metric scale is that it eliminates the necessity for a range of fractional sizes. The markings on a metric rule are every millimeter with the figures marked at 10 millimeter intervals. Fractions are not used in the SI system.

FPS (British System): In this system, the scale of measuring length is inch, foot and Gaz (Yard). In this scale, there is a unit in every inch and after every 12 inch there is a footmark. An inch is divided into 8 parts. This is called an eighth of an inch ($1/8$ inch)

1 Soot = $1/8$ inch, 8 Soot = 1 inch, 12 inches = 1 foot, 3 feet = 1 Gaz (yard).

MKS (Metric System): In this system, the units of measurements are millimeter (millimeter), centimeter (Centimeter), meter (m) etc. The smallest unit in this system is the millimeter.

10 millimeter = 1 centimeter, 100 centimeter = 1 meter

Relation between the British System and Metric System

1 inch = 2.54 Centimeter or 25.4 millimeter

1 foot = 30.48 Centimeter or 304.8 millimeter

1 meter = 3.280 Foot = 39.370 inch

3 Foot = 1 Gaz (Yard)

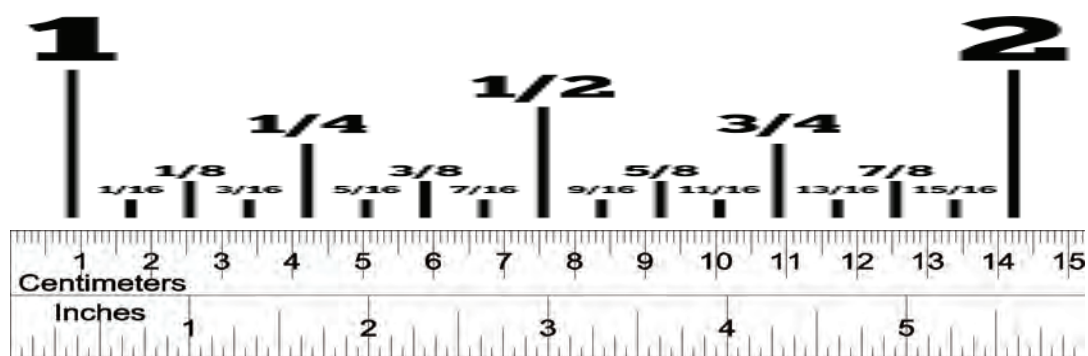
Table to convert Inch in to Millimeter

$1/16''$	=	1.6 Millimeter
$2/16''$	= $1/8''$	= 3.2 Millimeter
$3/16''$	=	4.8 Millimeter
$4/16''$	= $1/4''$	= 6.35 Millimeter
$5/16''$	=	8.0 Millimeter
$6/16''$	= $3/8''$	= 9.5 Millimeter
$7/16''$	=	11.1 Millimeter
$8/16''$	= $1/2''$	= 12.7 Millimeter
$9/16''$	=	14.3 Millimeter
$10/16''$	= $5/8''$	= 15.9 Millimeter
$11/16''$	=	17.5 Millimeter
$12/16''$	= $3/4''$	= 19.05 Millimeter
$13/16''$	=	20.6 Millimeter
$14/16''$	= $7/8''$	= 22.2 Millimeter
$15/16''$	=	23.8 Millimeter
$16/16''$	= $1''$	= 25.4 Millimeter

Fig. 1.3.2.1: Table to convert Inch in to Millimeter

1.3.3 Measuring Tools

Rule



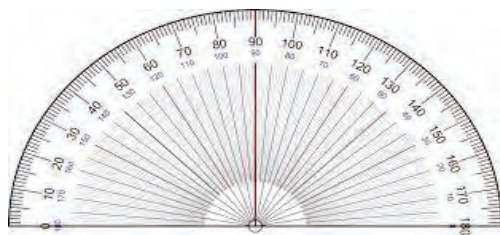
Rule

Fig. 1.3.3.1: Rule

Rule is the most common and the best-known piece of measuring equipment, for measuring linear distance. Least count for Rule is normally 1 millimeter and 1/8 inch (normally one side has Centimeters and other side has inch scale).

Protector

In geometry, a protractor is a circular or semicircular tool for measuring an angle or a circle.



Half Protector



Protector

Fig. 1.3.3.2: Half Protector and Protector

Measuring Tape



Fig. 1.3.3.3: Measuring Tape

The next important hand tool for the woodworker is an accurate **Measuring Tape**. We should have a retractable one that is at least 25 feet long. Any longer than that, and we will start having problems getting it to roll back up. Since measurements on large scale projects can be very susceptible to even the most minute measurement variations, We should make sure the “hook” or tab at the end of the is firmly attached, with no give. When they get loose, we’ll have as much as 1/8” variation in your measurements. This can add up to some severe accuracy problems in the long run.

Wing Compass

This is a two-legged tool and the ends of these legs are pointed. It is used to mark arcs and circles etc. It is made up of steel.



Fig. 1.3.3.4: wing Compass

This tool is required to take indirect measurements. Measurements taken by this tool is read on the steel rule or steel tape. They are of two types –

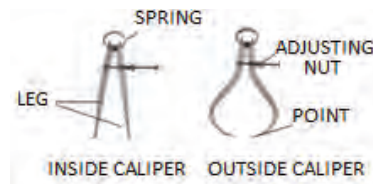


Fig. 1.3.3.5: Inside and outside of the caliper

a) Outside caliper: With this caliper, the outside measurement of wood or any object, such as the diameter of the round object, length and width etc. of the flat object is measured. It has rounded end points.

b) Inside caliper: With the help of this caliper, the internal measurements such as the diameter of the holes, slits etc. are taken. It has two legs, which are twisted outside.

Vernier caliper is a very handy measurement instrument for length measurement till 2 point of decimal. As an example, we will learn how to read 2.13 on vernier.

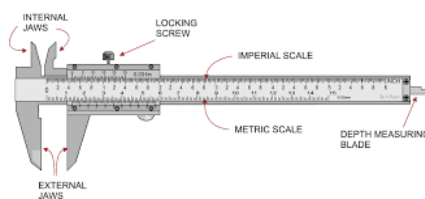


Fig. 1.3.3.6: Vernier caliper

The main scale contributes the main number and one decimal place to the reading (2.1 Centimeter)

The vernier scale contributes the second decimal place to the reading (0.03 Centimeter)

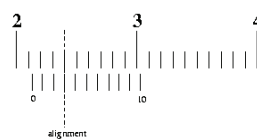


Fig. 1.3.3.7: Vernier scale

To obtain the main scale reading: Look at the image above. 2.1 Centimeter is to the immediate left of the zero on the vernier scale. Hence, the main scale reading is 2.1 Centimeter

Try Square

Try It is used to mark or check the right angle (90°) of the wood. It is in L-shaped. It is made of steel or wood It has only 2 main parts:- 1. Blade 2. Stock

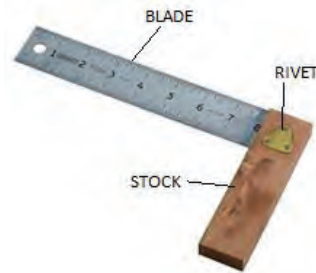


Fig. 1.3.3.8: Try Square

Miter Square

It looks like a Try Square but apart from 90° , the angles of 45° and 135° angle can also be measured from this.



Fig. 1.3.3.9: Miter Square (angles 45°)



Fig. 1.3.3.10: Miter Square (angles 90°)

Bevel square

Since it looks like alphabet T it is also called as T Square. It is used to check or move not only the right angle but also different angles, it is used to make the layout or move the angles of the dovetail, side rails of the chairs, the doors of the Louver, chamfer, etc.

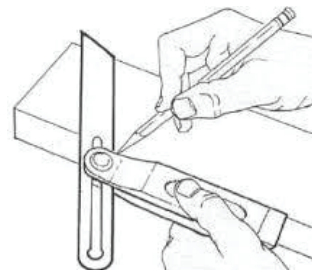
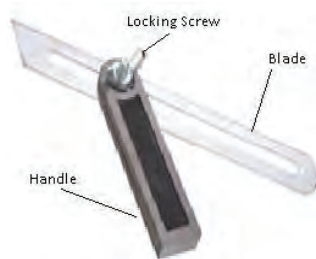


Fig. 1.3.3.11: Bevel Square

1.3.4 Methods of Measuring

There are three methods of measuring wood.

1. Running measurement - In this method, the breadth and thickness of the wooden block is not measured. Only the length is measured. The length of a wooden block measured in foot is called Running Foot and if measured in meter is called Running meter.

2. Square measurement - In this method, the length and breadth of the wooden block is multiplied. The thickness is not measured. The units of measurement in this method are square foot and square meter.

3. Cubic measurement - In this method, the length, breadth and thickness are multiplied together. The units of this method are cubic meter and cubic foot.

1.3.5 Running Meter/Running Foot

Example: - In a photo frame, there are two wooden strips; each has 50 Centimeter length and 30 Centimeter width. Calculate the length of the wooden strip used in the photo frame.

Calculation: -

Length of a strip = 50 centimeter

Length of two strips = $50 \times 2 = 100$

Width of a strip = 30 centimeter

Width of two strips = $30 \times 2 = 60$

Total length of the strips = 100 Centimeter

Total length of the strips = $\frac{160}{100} = 1.6$ meter

1.3.6 Square Meter/Square Foot

Example:- If the length and width of the wood is 210 centimeter and 120 centimeter respectively, then how much will be the sq. meter area of the door?

Calculation:-

You know that in the area of sq. meter, the length and width of the wood is considered and the thickness of the wood is ignored.

Height of the door = 210 centimeter

Width of the door = 120 centimeter

Area = Length × Width = Sq. area (Meter / foot)

Area in Centimeter = $210 \times 120 = 25200$ centimeter

Area in Meter = $\frac{210 \times 120}{100 \times 100} = 2.52$ square meters

1.3.7 Measurement of the cubic

Example: - If a wooden board's length is 2.5 merter and width is 50 Centimeter and thickness 3 Centimeter, then Calculate the total quantity of wood in Cubic meter?

Calculation: -

Length of the frame = 2.5 meter

Width of the frame = 50 Centimeter

. = $\frac{50}{100} = 0.50$ meter

Thickness of the frame = 3 Centimeter

. = $\frac{3}{100} = 0.03$ meter

Measurement of the wood = Length x Width x Thickness
= $2.50 \times 0.50 \times 0.03 = 0.0375$ cubic meter

1.3.8 Wood Calculation in FPS

$$\frac{\text{Inch x Foot x Foot}}{12} = \text{Square Foot}$$

$$\frac{\text{Inch x Inch x Foot}}{144} = \text{Square Foot}$$

$$\frac{\text{Inch x Inch x Inch}}{1728} = \text{Square Foot}$$

1.3.9 Marking Tools

Pencil - In India, carpenter normally use 4H Pencils, which are very hard and can write or mark almost on any surface.



Fig. 1.3.9.1: Pencil

Marking Gauge – It is used for marking parallel lines on wood. Stock and beam are its main parts. Stock is made of wood. It has a square hole in which wooden beam is sliding. Stock has hole at one end. A thumb screw is fitted in it which controls beam. There is a pin on one end of beam which makes marking on wood.

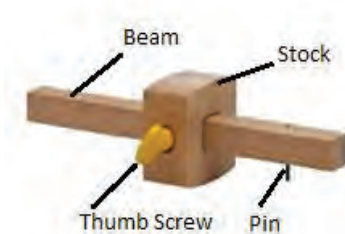


Fig. 1.3.9.2: Marking Gauge

Mortise Gauge -A Mortise gauge is made of a fence like support, which can be locked and moved on a beam for marking. It is a very common tool for marking on beam.



Fig. 1.3.9.3: Mortise Gauge

Scratch Awl - Scratch awl is a tool, which is used for layout and point making. It is used to scribe a line. This is basically a steel spike with its tip sharpened to a fine point. The tip of the spike is drawn across the timber, leaving a shallow groove. It is also used to mark a point by pressing the tip into the timber. Scratch awl is normally used while doing marking. It may also be used across the grain.



Fig. 1.3.9.4: Scratch Awl

Wing Compass - This is a two-legged tool and the ends of these legs are pointed. It is used to mark arcs and circles etc. It is made up of steel.

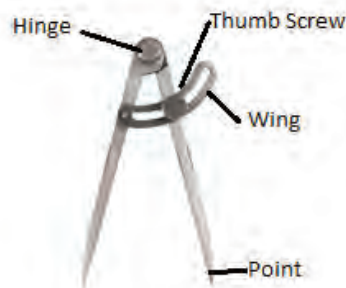


Fig. 1.3.9.4: Wing Compass

Trammel point - The Trammel point is used to draw big circles and to mark big arcs. It is a long thin wooden baton or steel rod on which there are two pointed sliding points, these pointed sliding points are tightened at the length according to the radius of the circle or arc by knurled screw. An arc or circle is drawn by one point keeping the other point at the center.



Fig. 1.3.9.5: Trammel point

Marking Knife - A good utility knife is another asset for the woodworker. There are many different kinds, but the kind that uses disposable blades is the most common. The blade retracts into the grip for safety. The woodworker will use the utility knife when cleaning out mortise joints or scribing wood, as well as many other uses.



Fig. 1.3.9.6: Marking Knife

Marking Thread or Chalk line - A chalk line or chalk box is a tool for marking long, straight lines on relatively flat surfaces, much farther than is practical by hand or with a straightedge.



Fig. 1.3.9.7: Marking Thread or Chalk line

Unit 1.4 Assist in Furniture Planning

Unit Objectives

At the end of this unit, you will be able to:

1. Describe the wood Planing tools
2. Describe the wood cutting tools
3. Describe the Round cutting Saws
4. Explain the Chipping Tools
5. Explain the Striking Tools
6. Explain the Holding or tightening Tools
7. Discuss about Support Equipment
8. Discuss about Boring and Drilling Equipment
9. Discuss about Testing Equipment
10. Describe the Miscellaneous wood working Tools
11. Evaluate Power tools

1.4.1 Toolplanning

Common Planers

This is a common type of planer and with the help of this planer only the surface of the wood is planed first, Its length varies from 14 inch to 18 inch and the width of its cutter blade is $1\frac{3}{4}$ inch to $2\frac{1}{4}$ inch and over the cutter blade, there is a cap iron which is fixed with a bolt. Cutter blade is fixed at an angle of 45° to 48° in the planer blade. This planer can also be made of steel or metal.



Fig. 1.4.1.1: Wooden Planner



Fig. 1.4.1.2: Steel Planner

It is also known as cleaning planer. All its parts are similar to those of jack planer. Its length is from 6 inches to 9 inches. The width of its cutter blade is from $1\frac{3}{4}$ inches to 2 inches. Its blade is set from 45° to 50° angle. It is used on the wood after jack planer has done planning. The wood looks neater after it is used for planning.

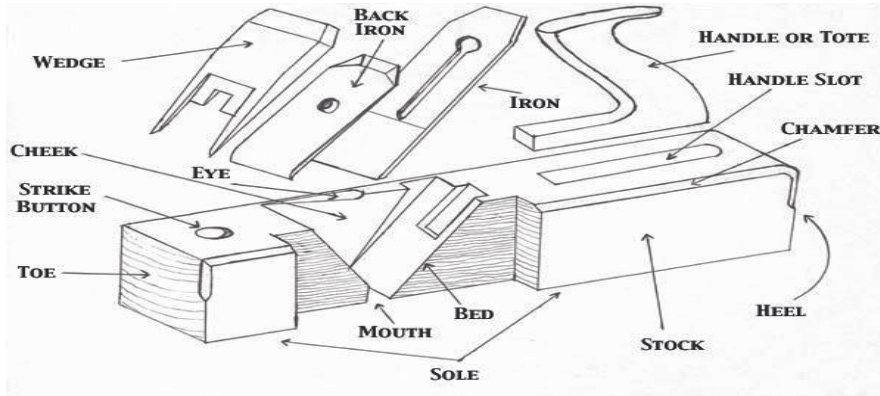


Fig.1.4.1.3: Parts of Wooden Plane

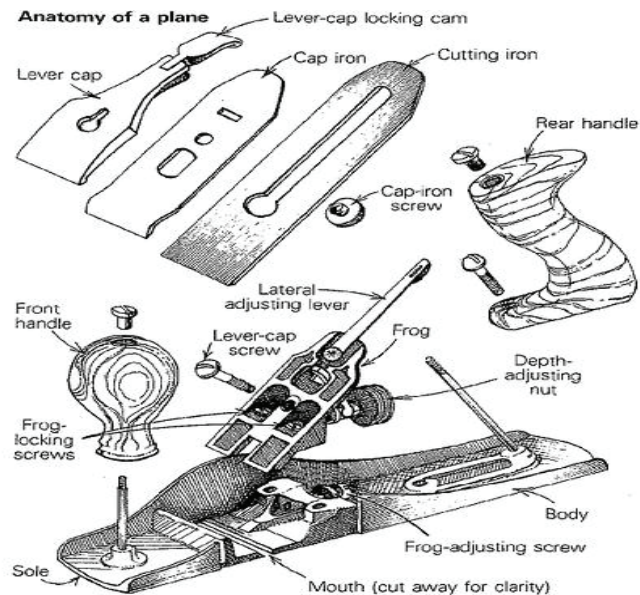


Fig.1.4.1.4: Parts of Steel Planer



Fig.1.4.1.5: Wooden Smothering Planer



Fig.1.4.1.6: Steel Smothering Planner

Trying plane

This planer is also known as the Jointer planer or the planer used to plain the edge of the long wood. Its length ranges from 20 inches to 28 inches. All of its parts are similar to those of Jack planer.



Fig.1.4.1.6: Trying plane

Plough plane

It is also known as grooving plane. Its length varies from 6 inches to 10 inches. The width of its cutter blade is from 1/8 inch to 5/8 inches, which can be adjusted according to the size of grooving. This planer is used to make a slot or grooving parallel to the wood. For example, to make a rebate (Patami) on doorframe that used to make a 1/2 inch deep slot and then with the help of Rebate (Patami) planer patami is made.



Fig.1.4.1.7: Plough plane

Special planer

Rebate Plane (Patami plane)

This planer is used to make Rebate (patami) on the wood. The length of this planer is from 7 inches to 9 inches, the width of cutter blade and Patami planer is from 1/2 inch to 1 1/2 inch. These Planers are mostly made up of wood but Patami planers made up of iron and metal are also found.

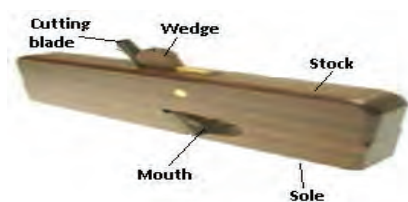


Fig.1.4.1.8: Special planer