

round chuck. If it is a single piece, it can be mounted centrally on the chuck. The table is made to rotate under the revolving wheel, both rotating in opposite directions. The vertical feed to the wheel is given by moving the wheel-head along a column and the crossfeed by the horizontal movement of the wheel spindle. A straight wheel is used on these machines, which cuts on its periphery. Some machines carry the provision to raise or lower the table also, and also to incline the same.

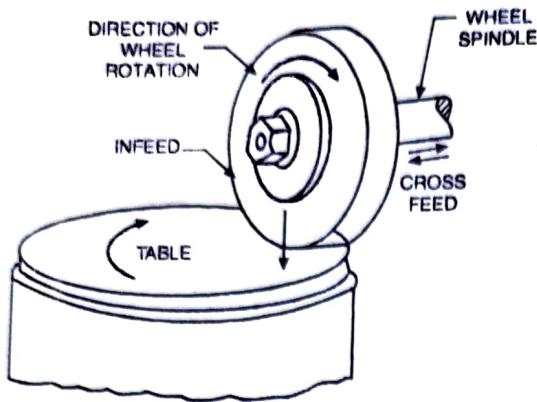


FIG. 1.40. RELATIVE MOVEMENTS OF DIFFERENT PARTS OF A HORIZONTAL SPINDLE ROTARY TABLE SURFACE GRINDER.

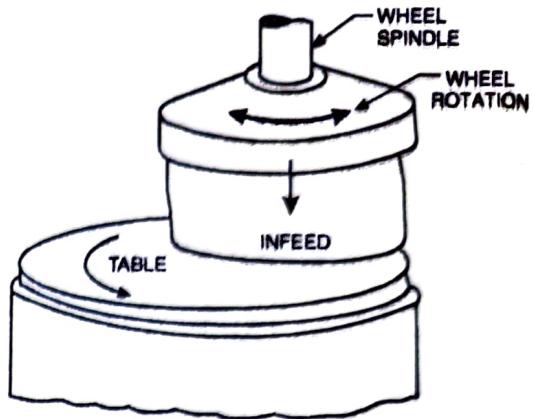


FIG. 1.41. RELATIVE MOVEMENTS OF DIFFERENT PARTS OF A VERTICAL SPINDLE ROTARY TABLE SURFACE GRINDER.

Some rotary table surface grinder are provided with two tables instead of one so that, while the workpieces are being ground on the table, the other table can be used for loading the fresh batch of workpieces.

Viva-Voce

Q 1. What are the various machine tools used in a machine shop?

Ans. (a) Planer (b) Milling machine (c) Lathe machine (d) Shaper (e) Power hack saw (f) drilling machine
(g) Tool and Cutter grinder

Q 2. Name the various types of lathes used in a machine shop?

Ans. (a) Engine lathe (b) Capstan and turret lathe (c) Speed lathe (d) Bench lathe (e) Special purpose lathe
(f) Bench lathe (g) Automatic lathe

Q 3. Name the principal part of a lathe.

Ans. (a) Head stock (b) Bed (c) Feed mechanism (d) Tail stock

Q 4. What is the difference between three jaw chuck and four jaw chuck ?

Ans. Three jaw chuck is a self-centred chuck. There is no need of centring in this chuck because all the jaws open and close equally. It is used for cylindrical jobs. Four-jaw chuck is an independent chuck because all the jaws are independent to each other. Centering is needed. It is used for prismatic parts.

Q 5. What are the various operations performed on a lathe?

Ans. (a) Drilling (b) Facing (c) Reaming (d) Plain turning (e) Threading
(f) Step turning (g) Knurling (h) Taper turning (i) Boring

Q 6. What is the difference between drilling, reaming and boring ?

Ans. **Drilling :** It is the operation of making a hole in a workpiece with the help of a drill. Workpiece is held in a chuck and drill is in the tailstock.

Reaming : It is the operation of finishing the previously drilled hole by reamer. Reamer is held in tailstock.

Boring : It is the operation of enlarging of a hole already made in a workpiece by a boring tool or a bit mounted on a rigid bar.

Q 18. What are the types of sawing machine?

Q 19. What do you know about machine tools?

Ans. A machine which performs the materials removal operation with tools, to produce desired shape and size of the work-piece is known as *machine tools*.

Q.20. What do you mean by grinding?

Ans. Grinding is the process of finishing or shaping a work-piece by using an abrasive wheel, rotating at very high speed, irrespective of the hardness of the work. The accuracy that can be obtained by grinding varies from 1.27mm – 0.25mm.

Q.21. What bonding material is used in a grinding wheel that holds the abrasive grains together?

Ans. Synthetic resins bond, Rubber bond, Shellac bond, Silicate bond vitrified bond and oxychloride bond

Q.22. For precision grinding how the work feed is given?

Ans. While feeding the work against the rotating grinding wheel for precision grinding the work feed may be obtained by wheel.

1. The work is rotating at its axis.
 2. The work may be given reciprocating motion.

Q.23. At what speed the grinding wheel should operate to give good result for different type of grinding operations :

Ans.

Type of grinding operation	Wheel speed in Metre/min
(i) Internal grinding	625-1825
(ii) Surface grinding	1200-1825
(iii) Tool and cutter grinding	1375-1825
(iv) Cylindrical grinding	1675-1975
(v) Cutting off wheels	2750-4875

The speeds give good result for high quality wheel. But in actual practice one should follow the manufacturer's recommended speed.

Material

M.S. round piece

Results

Job made and self inspected as per drawing.

Safety Precautions

1. Fix and tight the job and tool properly.
2. Tool should be properly ground.
3. After load scheduling, check the direction of rotation of job. If required, rectify with reversing switch.
4. Use proper speed, feed and depth of cut for efficient, economical and good machining.
5. For taper turning, use hand wheel of compound slide only.
6. Use safety goggles while machining.
7. Handle hot chips coming from material cutting carefully. Use cleaning brush or bent rod for this purpose.
8. After use, clean the machine and hand tools.

Viva-Voce

Q.1. What constitute a machine shop?

Ans. A machine shop consists of lathe, shaper, planer, milling, drilling and grinding machines.

Q.2. Give the names of operations that are generally done on the lathe machine.

Ans. Operations done on the lathe machine are facing, turning, taper turning, centering, parting-off, boring, drilling, threading and knurling etc.

Q.3. What do you understand by facing?

Ans. Facing is a lathe operation which is generally done on the end face of the work piece. In this operation, the tool tips penetrate about 0.5 mm in the centre of the work piece and feed is given along the radial direction to finish the end of the work piece or to maintain the length.

Q.4. What is taper turning?

Ans. It is an operation of producing an external conical surface on a workpiece.

Q.5. What is step turning?

Ans. It is also known as *shoulder turning*. It is a process of plane turning operation at different lengths with varied diameters on the same work piece.

Q.6. What do you mean by outside turning or plane turning?

Ans. It is an operation of removing excess amount of material from the surface of the cylindrical work piece.

Q.7. What is grooving or parting off?

Ans. It is a processing of reducing the diameter of work piece over a very narrow surface.

Q.8. State the principles of turning.

Ans. The work piece is rotated between the two centres of the lathe and the tool is moved parallel to the axis of the work piece, thus producing a cylindrical surface.

Q.9. Define cutting speed on lathe.

Ans. Cutting speed is the distance measured on the circumference of the job that passes the cutting edge of the tool in one minute.

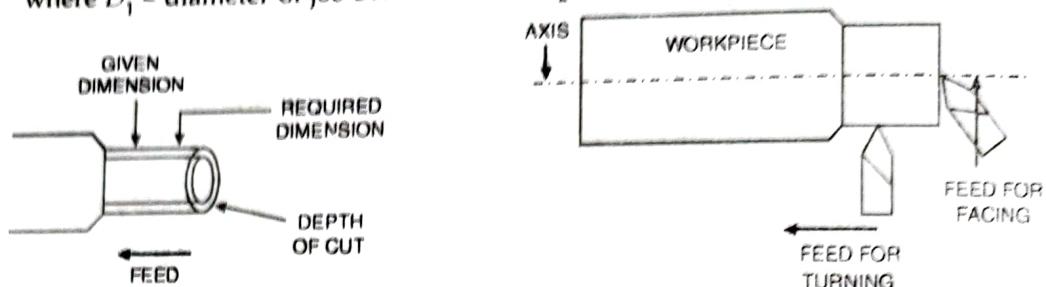
Q.10. What do you understand by the terms feed and depth of cut?

Ans. (a) **Feed :** It is a distance along the bed, traversed by the tool in one revolution of the work. It depends upon the depth of the cut and finish required of the job.

(b) Depth of cut : The depth of cut is the perpendicular distance measured from the machined surface to the uncut surface of the work piece. In a lathe the depth of cut is expressed as follows:

$$\text{Depth of cut} = |(D_1 - D_2) / 2|$$

where D_1 = diameter of job before cut and D_2 = diameter of job after cut.



Q.11. List some design considerations for tapping and drilling.

- Ans.** (i) Design should allow holes to be drilled on flat surface, perpendicular to drill motion.
(ii) Interrupted hole surfaces should be avoided or minimized.

Q.12. How lathe size is specified ?

Ans. The size of lathe is specified by two parameters (i) the swing (ii) the maximum distance between the centres.

Q.13. What is a steady rest?

Ans. It is also called a *centre rest* and is used to support the long shafts of smaller dia while turning, boring or threading. The use of steady rest prevents the slender work from springing away from the cutting tool.

Q.14. How is taper usually expressed?

Ans. Taper is usually expressed as 1:8 i.e., taper 1 mm over a length of 8 mm

Q.15. What are the different methods, by which taper can be obtained on a work?

Ans. The following methods are employed to obtain the required taper on the work :

(i) By using the taper turning attachment of the lathe.

(ii) By setting the compound slide to an angle and feeding through compound slide.

Q.16. How the tapering angle is calculated?

Ans. The tapering angle may be calculated as :

$$(i) \text{Tapering angle, } \tan \theta = \frac{D - d}{2L}$$

where, D is the major dia. of the taper

d is the minor dia. of the taper

L is the length of the taper

(ii) Tapering angle in degrees

$$= \frac{D - d}{L} \times \frac{200}{7}$$

This is a workman's method of calculating taper angle.

Viva-Voce

Q 1. What do you mean by fitting ?

Ans. Fitting is the assembling of parts together by filing, chipping, sawing, scrapping, tapping etc., necessary after the machining operation.

Q 2. How do you classify the tools used in a fitting shop ?

Ans. A fitting shop tools are classified as follows:

- | | | |
|-------------------------------|--------------------|---------------------|
| (a) Clamping tools | (b) Cutting tools | (c) Striking tools |
| (d) Measuring & marking tools | (e) Drilling tools | (f) Threading tools |

Q 18. What is the main use of flutes in drills?

Ans. The chips are driven out of the drilled holes through flutes.

Q 19. What is the function of Taps and die & die stock?

Ans. Taps are used for cutting internal threads and dies & die stocks are used for cutting external threads.

Q 20. What are the various types of callipers?

Ans. Outside calliper, inside calliper, spring calliper, odd leg calliper.

Q 21. What are the uses of a surface plate?

Ans. It is used for testing a try-square, testing the trueness of a finished surface.

Q 22. Write the specifications of a bench vice.

Ans. The bench vices are specified by following main dimensions :

Clamping size (Width) = 75 mm, 100 mm, 125 mm, 150 mm

Weight = 2.5 to 29.5 Kg.

Q 23. What is the function of a vice?

Ans. A vice is used to grip a job during operations such as filing, chiselling etc.

Q 24. Which materials are the files made of?

Ans. The files are made of hardened steel. They are attached to the wooden handle through the tang for ensuring safety and easier work ability.

Q 25. For what purposes are the files used?

Ans. Files are used to serve the following functions:

(i) To smoothen the rough surface by removing small amounts of metals.

(ii) To prepare surfaces having squareness or roundness for a proper fitting.

Q 26. Define the different types of hammers, their weight and applications.

Ans. Hammer is one of the most important striking tools used in fitting shop. The hammer is usually specified by its weight. Most commonly adopted hammers carry weight ranging between 200 grms to 500 grams. Various types of commonly used hammers (i) Ball-Peen Hammer, (ii) Straight-Peen Hammer, (iii) Cross-Peen Hammer.

Viva-Voce

Q 1. Define Welding ?

Ans. Welding is a process of joining two or more, same or different materials with the help of heat. Pressure or filler metal may or may not be applied.

Q 2. Classify the Welding process ?

Ans. Pressure and non-pressure welding. Resistance welding is a pressure welding. Electric Arc welding is a non-pressure welding.

Q 3. What are the types of Electric Arc welding ?

- Ans.** (a) Carbon Arc welding. (b) Flux shielded metal Arc welding.
(c) Tungsten Inert gas (TIG) welding. (d) Metal Inert gas (MIG) welding.
(e) Submerged Arc welding. (f) Electroslag welding.
(g) Electrogas welding.

Q 4. What are the types of Resistance welding ?

- Ans.** (a) Spot welding. (b) Seam welding.
(c) Flash butt welding. (d) Upset butt welding.
(e) Projection welding. (f) Percussion welding.

Q 5. Name the gases used in the gas-welding process ?

Ans. Oxygen and acetylene.

Q 6. How many types of flames are used in a welding shop ?

- Ans.** (a) Oxidising flame (oxygen is more than acetylene)
(b) Reducing flame (Acetylene is more than oxygen)
(c) Neutral flame (Oxygen and acetylene are in equal proportionate)

Q 7. Name different types of welding joints used in a welding shop.

- Ans.** (a) Butt Joint. (b) Lap Joint.
(c) T Joint. (d) Corner Joint.
(e) Edge Joint.

Q 8. Name different welding positions used in welding.

- Ans.** (a) Flat position. (b) Horizontal position.
(c) Vertical position. (d) Inclined position.
(e) Overhead position.

Q 9. Name the equipments used for Arc welding.

Ans. Transformer, Holder, Electrode, Chipping hammer, Connectors, Brush, etc.

Q 10. Name the equipments used for gas (oxy acetylene) welding.

Ans. Gas cylinders, regulators, hose, torch, tip, goggles, etc.

Q 11. What is the function of a flux ?

Ans. Flux prevents oxidation. It reacts with impurities and forms a slag.

Q 12. What is flux on an electrode?

Ans. Covering on the electrode is called flux.

Q 13. What do you mean by polarity in welding ?

Ans. Polarity means providing electrical terminals to the job and the electrode. In straight polarity, the electrode is made negative terminal and job is made positive terminal. In reverse polarity, electrode is positive terminal and job is negative terminal.

Q 14. On which terminal more heat is generated ?

Ans. Positive terminal (about 2/3 of the total heat)

Q 15. Which type of welding is most commonly used in workshops ?

Ans. Shielded Metal Arc welding.

Q 16. What is the difference between TIG and MIG.

Ans.	Tungsten Inert gas welding (TIG)	Metal Inert Gas welding, (MIG)
	(a) Electrode is made of tungsten. (b) Electrode is non-consumable in the form of rod.	(a) Electrode is having similar composition as that of job. (b) Electrode is consumable in the form of wire.

Q 17. Name different Inert gases used in TIG and MIG.

Ans. Argon, Helium.

Q 18. Compare A.C. and D.C. arc welding.

Ans.	A.C. (Alternating current) welding	D.C. (Direct current) Welding
	(a) In A.C. welding transformer is used (b) A.C. is more dangerous (c) Transformer costs less.	(a) In D.C. welding generator is used. (b) D.C. is comparatively less dangerous. (c) Generator costs more.

Q 19. Name any five welding defects.

- Ans. ▼ Spatter
- ▼ Porosity
- ▼ Cracks
- ▼ Slag Inclusion
- ▼ Distortion

Q 20. What is the principle of resistance welding ?

Ans. It works on the principle that when current flows through a conductor, heat is generated due to the flow of current as

$$\text{Heat generated} = I^2RT, \text{ where } I = \text{Current}, R = \text{Resistance}, T = \text{Welding Time}$$

The heat produced is used to melt the metal in the joint.

Q 21. What is the principle of Electric Arc welding ?

Ans. When the electrode touches the job, current starts flowing. When we create the gap between the electrode and the job, the path between them gets ionized because of high resistance in the path and current can even pass through the gap.

Q 22. What is the effect of moisture on the flux-coated electrode ?

Ans. At a high temperature on the electric arc welding, water gets dissociated into hydrogen and oxygen gases. Due to liberation of H_2 gas it increases the porosity defect and reduces the maximum attainable temperature.

Q 23. What is spot-welding?

Ans. Spot-welding consists of clamping two or more pieces of metal between two copper electrodes, applying pressure and then passing sufficient current through the metal to make the weld.

Q 24. How much temperature can be achieved with the help of a gas-welding torch?

Ans. Up to $3000^\circ C$.

Q 25. What is edge preparation?

Ans. Before welding the two metal pieces, their adjacent edges are made in a particular shape, it is called edge preparation.

Q 26. What is projection-welding?

Ans. Projection welding is a modification of spot-welding in which the current and pressure are localized at the weld section by the use of embossed, machined or projections on one or both of the pieces.

3. Planing should be parallel to the grains of wood.
 4. You must be concentrate on the job.
 5. Use sharp edge chisel on the job.

Viva-Voce

- Q 1. What do you mean by seasoning ?**
Ans. The process of removing moisture from the freshly cut down trees is known as seasoning.

Q 2. Name the various types of seasoning method.
Ans. Natural seasoning, Kiln seasoning, Water seasoning, Chemical seasoning.

Q 3. What is the commonly used material for patterns?
Ans. Timber.

Q 15. Name the various type of chisels used in a pattern-making shop.

Ans. (a) Firmir chisels (b) Mortise chisels (c) Gauge chisels.

Q 16. Name the various striking tools used in a pattern-making shop.

Ans. (a) Cross peen hammer (b) Claw hammer (c) Mallet.

Q 17. Name the various drilling and boring tools used in a pattern-making shop.

Ans. (a) Hand drill (b) Ratchet Brace (c) Gimlet drill.

Q 18. What is the carpenter's vice?

Ans. It is used to hold a work-piece.

Q 19. What is the pitch of saw?

Ans. It is the distance between the two adjacent teeth.

Q 20. Name any three wood-working machines.

Ans. Lathe, Planer and Circular saw.

Q 21. What is the function of a rebate plane?

Ans. To make recesses.

Q 22. How can you classify the various saws used in a carpantry shop?

Ans. (a) Tenon saw (b) Bow saw (c) Rip saw (d) Cross cut saw
(e) Compass saw (f) Keyhole saw

Q 23. Define the various types of planes used in a carpantry shop.

Ans. (a) Smoothing plane (b) Trying plane (c) Wooden Jack plane (d) Spoke Sheave
(e) Iron Jack plane (f) Rebate plane

Q 24. What are the various types of striking tools used in a carpentry shop?

Ans. (a) Mallet (b) Cross pean hammer (c) Claw hammer

Q 25. What do meant by the various holding devices used in a carpantry shop?

Ans. (a) C-clamp (b) Bench hook (c) T-Clamp (d) Clamping vice
