

**RALALAKSHMI ENGINEERING COLLEGE
THANDALAM**

DEPARTMENT OF AUTOMOBILE ENGINEERING

AT 2206

MANUFACTURING TECHNOLOGY LAB

LIST OF EXPERIMENTS

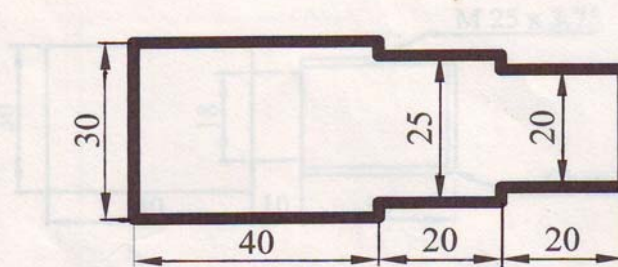
1. FACING, PLAIN TURNING AND STEP TURNING
2. TAPER TURNING USING COMPOUND REST
3. THREAD CUTTING AND KNURLING
4. MAKING A V- SHAPE USING SHAPER
5. MAKING A KEY WAY USING SLOTTING MACHINE
6. DRILLING HOLES ON PCD ON THE WORKPIECE
7. DRILLING AND TAPPING
8. SPUR GEAR MILLING

Exercise No. 1

Facing, Plain Turning and Step Turning.

Aim :

To perform facing, turning and step turning in the given workpiece to the dimensions as shown in the figure using lathe.



Tools Required :

Tools Required :

Lathe, Turning Tool, Vernier Caliper.

Procedure :

1. The given workpiece is measured for its initial dimensions.
2. Facing is done to machine the end face of the workpiece.
3. Turning is done to reduce the diameter as shown in the figure.
4. Step Turning is again done to reduce the diameter at particular position for particular distance.
5. The workpiece is now checked for final dimensions.

Result :

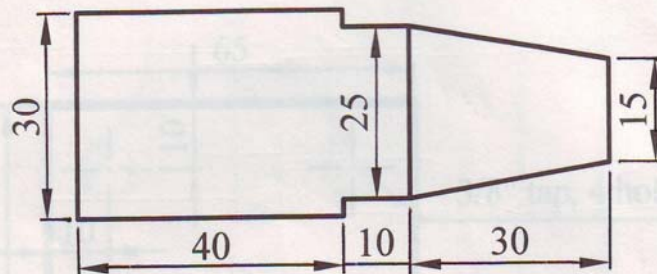
Thus, facing, turning and step turning is performed in the given workpiece to the dimensions as shown in the figure using lathe.

Exercise No. 2

Taper Turning

Aim :

To perform Taper Turning operation in the given workpiece to the dimensions as shown in the figure using lathe.



Tools Required :

Lathe, Turning Tool, Vernier Caliper.

Procedure :

1. The given workpiece is measured for its initial dimensions.
2. Facing is done to machine the end face of the workpiece.
3. Turning is done to reduce the diameter as shown in the figure.
4. Step Turning is again done to reduce the diameter for particular distance.
5. Taper turning is performed by swiveling the compound rest of the lathe. The swivel angle is determined by using the formula

$$\tan \alpha = \frac{D - d}{2l}$$

where, D = Bigger taper diameter
d = Smaller taper diameter
l = Length of the taper

6. The workpiece is now checked for final dimensions.

Result :

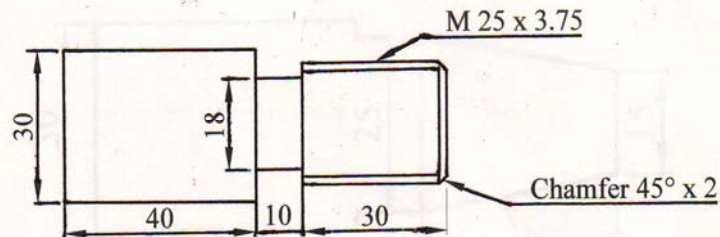
Thus, the Taper Turning operation is performed in the given workpiece to the dimensions as shown in the figure using lathe.

Exercise No.3

Thread Cutting

Aim :

To perform Thread Cutting operation in the given workpiece to the dimensions as shown in the figure using lathe.



Tools Required :

Lathe, Turning Tool, Parting Tool, Threading Tool, Vernier Caliper.

Procedure :

1. The given workpiece is measured for its initial dimensions.
2. Facing is done to machine the end face of the workpiece.
3. Turning is done to reduce the diameter as shown in the figure.
4. Step Turning is again done to reduce the diameter for particular distance.
5. Chamfering is done at the end of the workpiece for making a slope at the extreme end of the workpiece.
6. Parting is done to reduce the diameter at particular position for particular distance so that we get a groove in the workpiece.
7. Thread cutting is done using thread cutting tool. This thread cutting operation is performed using tumbler gear arrangement.
8. The workpiece is now checked for final dimensions.

Result :

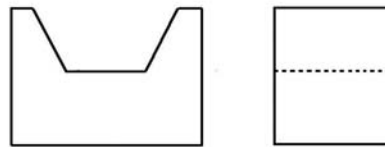
Thus, the Thread Cutting operation is performed in the given workpiece to the dimensions as shown in the figure using lathe.

Exercise No.4

Making a V - Shape using Shaping Machine

Aim :

To make a **V - Shape** in the given workpiece to the dimensions as shown in the figure using Shaping Machine.



Tools Required :

Shaping Machine, Scriber, Divider, Steel Rule, Chalk piece, Bevel Protractor.

Procedure :

1. The given workpiece is measured for its initial dimensions.
2. With the help of scriber, mark the **V - Shape** dimensions in the workpiece.
3. Fix the workpiece in the vice of the shaping machine.
4. After fixing the workpiece and the shaping tool, allow the ram to reciprocate.
5. Start the shaping process by giving the required depth by lowering the tool.
6. Slowly increase the depth of cut and repeat the procedure to make the **V - Shape** shape.
7. The workpiece is now checked for final dimensions.

Result :

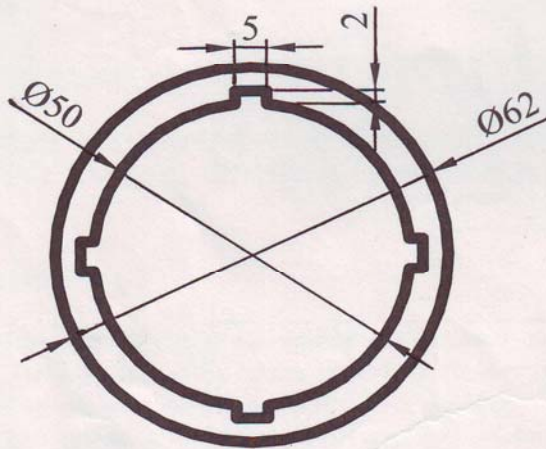
Thus, a **V - Shape** is made in the given workpiece to the dimensions as shown in the figure using shaper machine

Exercise No.5

Making a Keyway using Slotting Machine

Aim :

To make a keyway in the given workpiece to the dimensions as shown in the figure using Slotting Machine.



Tools Required :

Slotting Machine, Scriber, Divider, Steel Rule.

Procedure :

1. The given workpiece is measured for its initial dimensions.
2. With the help of scriber mark the keyway dimensions in the workpiece.
3. Fix the workpiece in the vice of the slotting machine.
4. After fixing the workpiece and the slotting tool, allow the ram to vertically reciprocate.
5. Start the slotting process by giving the required depth by horizontally moving the vice.
6. Slowly increase the depth of cut and repeat the procedure to make the required shape.
7. The workpiece is now checked for final dimensions.

Result :

Thus, keyway is made in the given workpiece to the dimensions as shown in the figure using Slotting Machine.

Exercise No.6

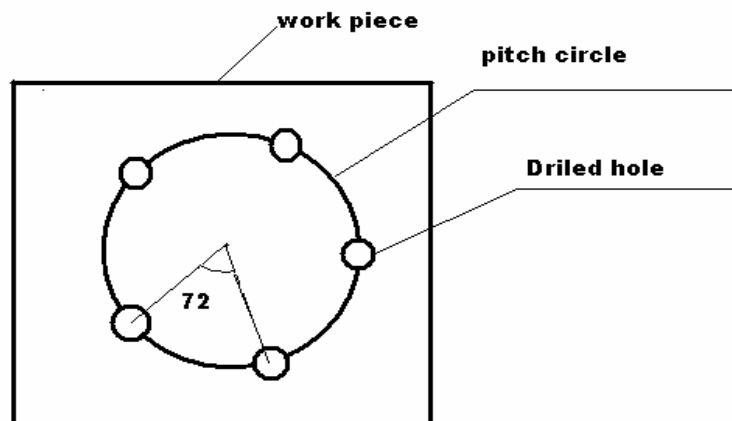
DRILLING HOLES ON PITCH CIRCLE

AIM:

Aim of this practice is to machine holes on pitch circle drawn on a given work piece.

TOOLS AND EQUIPMENTS REQUIRED:

Radial Drilling machine, Drill bit, Dot punch, Tap, Chalk piece and Hammer, Compass.



PROCEDURE:

1. Draw A pitch circle on the given work piece using a compass.
2. Separate its circumference by the number of holes to be cut.
3. Each interval has to be drilled on this pitch circle.
4. A punch is made to identify the place to be drilled.
5. Work piece is fixed on the radial drilling machine and holes are made.

RESULT:

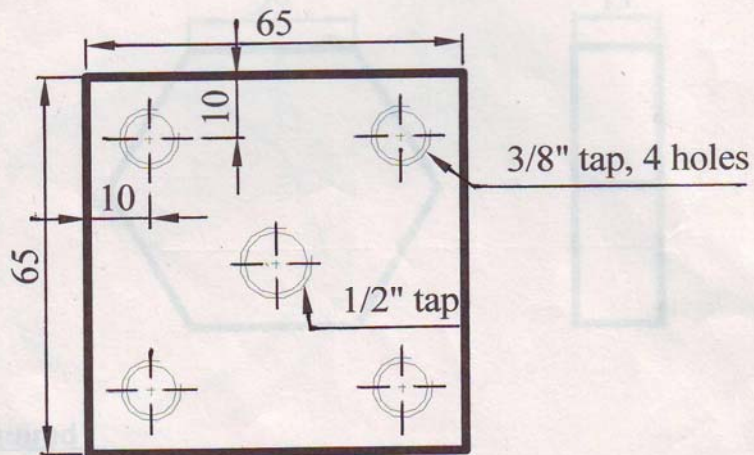
Thus drilling operation is performed on the PCD Drawn on the work piece.

Exercise No.7

Drilling and Tapping

Aim :

To perform Drilling and Tapping operation in the given workpiece to the dimensions as shown in the figure using Radial Drilling Machine.



Tools Required :

Radial Drilling Machine, Drill Bit, Dot Punch, Steel Rule, 1/2" tap, 3/8" tap, Chalk piece, Hammer.

Procedure :

1. The given workpiece is measured for its initial dimensions.
2. Apply chalk powder on the workpiece.
3. Mark the center of the circles to the dimensions as shown in the figure.
4. By using the dot punch, mark the center of the circles.
5. Drill holes in the workpiece as per the marks made using radial drilling machine.
6. Perform the tapping operation on all the five holes using the respective tap.
7. The workpiece is now checked for final dimensions.

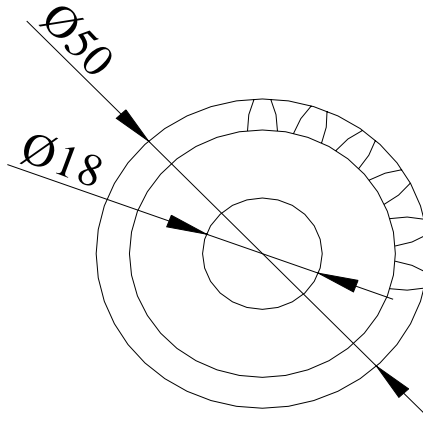
Result :

Thus, Drilling and Tapping operation is performed in the given workpiece to the dimensions as shown in the figure using Radial Drilling Machine.

Exercise - 8 SPUR GEAR MILLING

AIM:

Aim of this practice is to machine gear to the given module and number of teeth in the given work piece.



TOOLS AND EQUIPMENTS REQUIRED:

Milling machine, Vernier caliper and Mandrel.

PROCEDURE:

1. Calculate the gear tooth proportions.

$$\begin{aligned}\text{Blank diameter} &= (Z + 2) m \\ \text{Tooth depth} &= 2.25 m \\ \text{Tooth width} &= 1.5708 m\end{aligned}$$

Where,

$$\begin{aligned}Z &= \text{Number of teeth required} \\ m &= \text{module}\end{aligned}$$

2. Indexing calculation
Index crank movement = $40 / Z$
3. The dividing head and the tail stock are bolted on the machine table. Their axis must be set parallel to the machine table.
4. The gear blank is held between the dividing head and tailstock using a mandrel. The mandrel is connected with the spindle of dividing head by a carrier and catch plate.
5. The cutter is mounted on the arbor. The cutter is centered accurately with the gear blank.

6. Set the speed and feed for machining.
7. For giving depth of cut, the table is raised till the periphery of the gear blank just touches the cutter.
8. The micrometer dial of vertical feed screw is set to zero in this position.
9. Then the table is raised further to give the required depth of cut.
10. The machine is started and feed is given to the table to cut the first groove of the blank.
11. After the cut, the table is brought back to the starting position.
12. Then the gear blank is indexed for the next tooth space.
13. This is continued till all the gear teeth are cut.

CALCULATION:

$$Z = \text{No. of teeth} = 23$$

$$m = \text{module} = 2 \text{ mm}$$

$$\begin{aligned} \text{Blank Diameter} &= (Z + 2) * m \\ &= (23 + 2) * 2 \\ &= 50 \text{ mm} \end{aligned}$$

$$\begin{aligned} \text{Tooth Depth} &= 2.25 m \\ &= 2.25 * 2 \\ &= 4.5 \text{ mm} \end{aligned}$$

$$\begin{aligned} \text{Indexing Calculation} &= 40 / Z \\ &= 40 / 23 \\ &= 1 \frac{17}{23} \end{aligned}$$

RESULT:

Thus the required gear is machined using the milling machine to the required number of teeth.