FITTING SHOP
FITTING SHOP

Fitting is the process of assembling various parts manufactured in the machine shop

Tools used in Fitting shop

1. Holding tools
2. Cutting tools
3. Striking tools
4. Marking and measuring tools
Work bench
CROSS SECTION OF BENCH VICE
PIPE VICE

Fig. 3.3. PIPE VICE
HAND VICE

(a) Hand Vice

(b) Use of Hand Vice

Fig. 3.4
PIN VICE
TOOL MAKERS VICE

Fig. 3.6 TOOL MAKER'S VICE
HACK SAW

- BASIC HAND TOOL USED TO CUTTING UNWANTED MATERIAL
- USED TO CUTTING SLOTS AND CONTOURS

PARTS OF HACK SAW
1. METAL FRAME
2. BLADE
3. HANDLE
4. WING NUT
5. SCREW

TYPES OF SAWS
1. SOLID (FIXED) FRAME
2. ADJUSTABLE (FLEXIBLE) FRAME
Solid frame Hack Saw
Adjustable frame Hack saw
# Specifications of Blades

<table>
<thead>
<tr>
<th>Material</th>
<th>Solid metal</th>
<th>Tube and thin sheets</th>
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</thead>
<tbody>
<tr>
<td>Iron and steel</td>
<td>6-7 teeth/cm</td>
<td>12 teeth/cm</td>
</tr>
<tr>
<td>Non ferrous metals</td>
<td>5-6 teeth/cm</td>
<td>8-10 teeth/cm</td>
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</tbody>
</table>
Parts of File

Fig. 3.10 PARTS OF FILE
Specifications of File

Files are specified according to their

• Length
• Shape
• Teeth pattern
• Grade

Ex. 200mm, half round, single cut bastard file
Length of file

- Length is measured from heel to point
- Files are available from 100mm to 450mm
- Common sizes are 100mm, 150mm, 200mm, 250mm, and 300mm.
Grade

• Depending on fineness and or pitch of teeth, they are graded as

(a) Rough --- 8 teeth per cm, rough work
(b) Bastard – 12 teeth per cm, cuts smaller amounts than Rough file
(c) Second cut – 16 teeth per cm, better finish than Bastard
(d) Smooth – 20 to 24 teeth per cm
(e) Dead smooth – 25 to 40 teeth per cm
Teeth pattern of File

Files are classified as
(a) Single cut files, and
Angle from 45° to 60° from edge
(a) double cut files
70° to 80° from opposite side
Fig. 3.11 TEETH PATTERN

(a) Single Cut

(b) Double Cut
Types of files

(a) Flat File

(b) Hand File

(c) Square File
TYPES OF FILES

(d) Round File

(e) Half Round File

(f) Triangular File
TYPES OF FILES

(g) Warding File

(h) Knife Edge File

(i) Pillar File

(j) Needle File
CHISELS

- Chisels are made from high carbon steel or chrome–vanadium steel
- It consists of the following parts:
  1. Head
  2. Body or shank
  3. Point or cutting edge
(a) Cutting Angle for Cold Chisel

(b) Effect of Angle on Chipping

Fig. 3.16
<table>
<thead>
<tr>
<th>Metal being cut</th>
<th>Point angle</th>
<th>Angle of inclination</th>
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</thead>
<tbody>
<tr>
<td>Aluminium</td>
<td>$30^\circ$</td>
<td>$22^\circ$</td>
</tr>
<tr>
<td>Copper</td>
<td>$45^\circ$</td>
<td>$29.5^\circ$</td>
</tr>
<tr>
<td>Brass</td>
<td>$50^\circ$</td>
<td>$32^\circ$</td>
</tr>
<tr>
<td>Mild steel</td>
<td>$55^\circ$</td>
<td>$34.5^\circ$</td>
</tr>
<tr>
<td>Cast iron</td>
<td>$60^\circ$</td>
<td>$37^\circ$</td>
</tr>
<tr>
<td>High carbon steel</td>
<td>$65^\circ$</td>
<td>$39.5^\circ$</td>
</tr>
<tr>
<td>Cast steel</td>
<td>$70^\circ$</td>
<td>$42^\circ$</td>
</tr>
</tbody>
</table>
Types of chisels

The most commonly used chisels are

1. Flat chisel
2. Cross cut chisel
3. Half-round chisel
4. Diamond point chisel
5. Side chisel
(a) Flat Chisel
(b) Cross-cut Chisel
(c) Half-round Chisel
(d) Diamond-point chisel
(e) Side Chisel
DRILLS

Drills are used to make circular holes.
These are made up of high-speed steel, chromium steel and carbon tool steel.

It has the following parts:
1. Body
2. Neck
3. Shank
4. Tang
Fig. 3.20 PARTS OF TWIST DRILL
Types of Drills

The following types of drills are more commonly used

1. Flat drill
2. Straight fluted drill
3. Twist drill
Reamer

After drilling a hole, Reamer is used to finish the drilled hole.

It consists of Body and Shank
Fig. 3.23 TYPES OF REAMERS

(a) Hand Reamer

(b) Machine Reamer

(c) Expanding Reamer
Taps

Taps are used to make internal threads in drilled holes

Fig. 3.24 PARTS OF HAND TAP
Types of Taps

Taps are available in following three types

1. Taper or first tap (rough)
2. Plug or second tap (semi-finish tap)
3. Bottoming tap (finish tap)
(a) Taper Tap

(b) Plug Tap

(c) Bottoming Tap

Fig. 3.25 TYPES OF HAND TAPS
DIES

• The die is a cutting tool used to cut external threads on cylindrical parts

• It is a circular disc of hardened tool steel having a threaded hole and flutes which forms cutting edges

Types of Dies
1. Solid die
2. Adjustable split die
3. Adjustable two-plate die
(a) Split - Die

(b) Two-Plate Die
Striking Tools

These are used for striking purposes like punching, chipping, marking, bending, straightening and riveting

Hammer is basic striking tool

Parts of hammer

1. Peen
2. Face
3. Eye hole
4. Handle
5. head
Fig. 3.28.1 TYPES OF HAND HAMMERS
Fig. 3.29 SOFT HAMMER
Marking Tools

Marking is the process of layout of sizes on work piece. The following tools are used in marking out operations.

1. Scriber
2. divider
3. Jenny caliper
4. scribing block
5. Angle plate
6. V-block
7. Punch
8. Try square
9. Surface plate
10. Straight edge
Scriber

(i) Single Point Scriber

(ii) Double Point Scriber

(iii) Use of Scriber

Fig. 3.30 (a) SCRIBER AND ITS USE
Devider & jenny caliper
Angle plate & V-Block
Punch

(i) Prick Punch

(ii) Centre Punch

(iii) Use of Punch

Fig. 3.30 (g)
Try square
Surface plate
Straight edge

• The straight is made up of cast iron or carbon steel and finished to high degree of accuracy.

• It is used to check the straightness or flatness of surfaces

• It is also used for testing alignment of machines
Measuring Tools

The most commonly used measuring tools are described below:

1. Steel rule
2. Caliper
3. Depth gauge
4. Micrometer
5. Vernier caliper
6. Micrometer
7. Vernier caliper
Steel rule
caliper

![Diagram of calipers showing firm joint and spring joint with an adjusting nut.](image-url)
Depth Gauge

Fig. 3.36 DEPTH GAUGE
Vernier caliper

Fig. 3.37 VERNIER CALIPER

Fig. 3.38 READING OF A VERNIER SCALE
Vernier height gauge

Fig. 3.39 VERNIER HEIGHT GAUGE
Vernier depth gauge
Gear Tooth Vernier

Fig. 3.41 GEAR TOOTH VERNIER CALIPER
Micro meter

• Micrometer is precision tool used to measure upto an accuracy of 0.01mm.
• Used to measure outside diameter, inside diameter and thickness of objects

Types of micrometers
1. Out side micrometer
2. Inside micrometer
3. Depth micrometer
Micro meter

![Micro meter diagram](image-url)
Inside micrometer
Depth micrometer