Department of Mechanical Engineering
GENERAL SIR JOHN KOTELAWALA DEFENCE UNIVERSITY

Bench Work and Fitting

Workshop Technology

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Bench Work & Fitting

- To complete & Finish a job to the desired accuracy
- Bench work – production of our article by hand on the bench
- Fitting – assembling together of parts & removing metals to secure the necessary fit

The main operations commonly performed in bench and fitting work may be classified as,

1. Chipping
2. Filing
3. Scrapping
4. Grinding
5. Sawing
6. Marking
7. Drilling
8. Reaming
9. Tapping
10. Dieing

BENCH FITTING OPERATIONS

1. **Sawing:** Hack sawing is the quickest method of servings, shaping, slotting cold metal
2. **Chipping:** Removing of thick layers of metal by means of cold chisel from the job.
3. **Filing:** It serves to remove the burr from cuts and clean the face of the cuts and to finish the final shape of work piece.
4. **Scraping:** Scraping is used for obtaining a truer flat surface than that can be produced by machining and filing.
5. **Grinding:** Removing of metal usually 0.25 to 0.50 mm in most operations by the use of a grinding wheels.

BENCH FITTING OPERATIONS

6. **Marking:** Marking out of consist marking on the job a series of definite lines or positions.
7. **Drilling**: It of producing circular hole in a metal pieces.
8. **Reaming:** When an accurate hole with a smooth finish is required a reamer is used to remove a little metal from the hole and to bring to correct size.
9. **Tapping:** Tapping is the process in which we makes internal thread at job.
10. **Dieing:** By this process external threads are made.

TOOLS USED

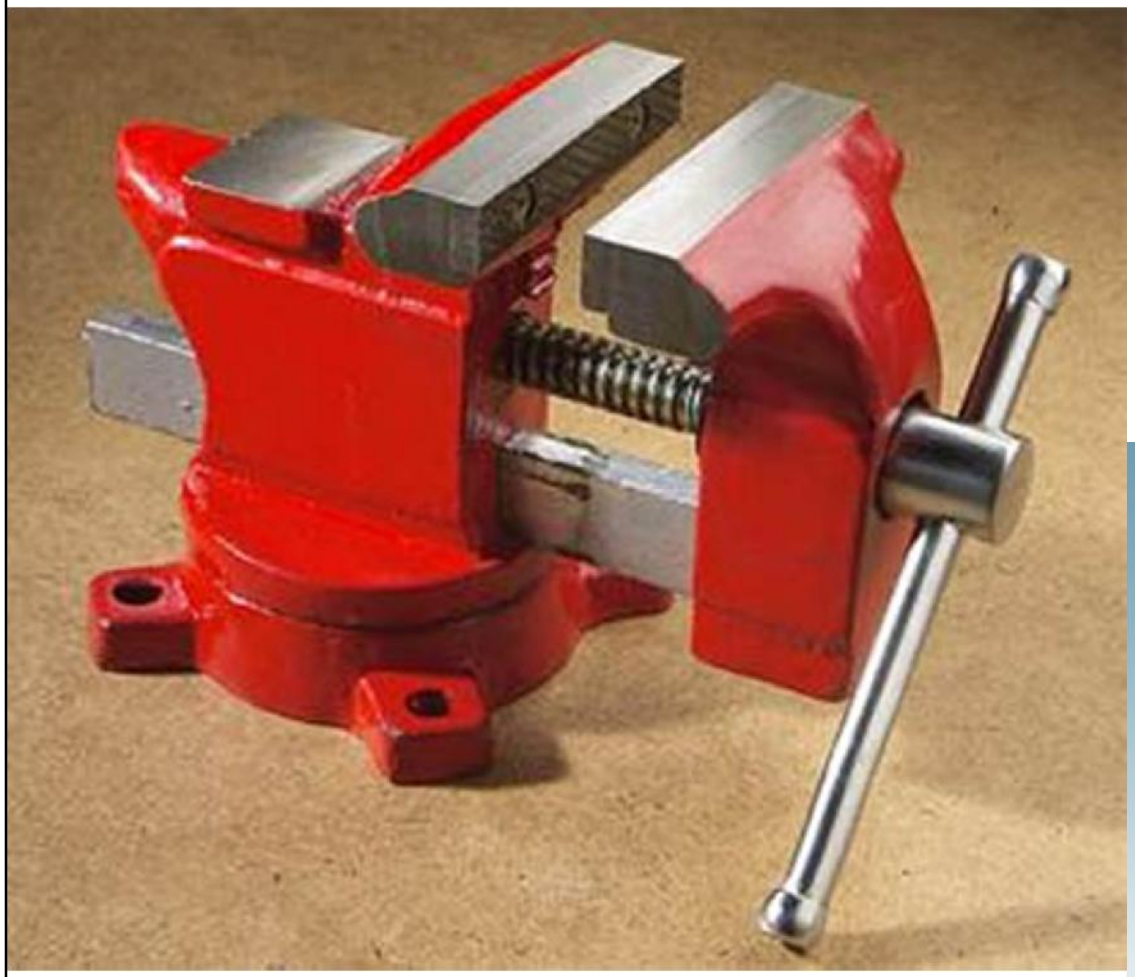
Vices

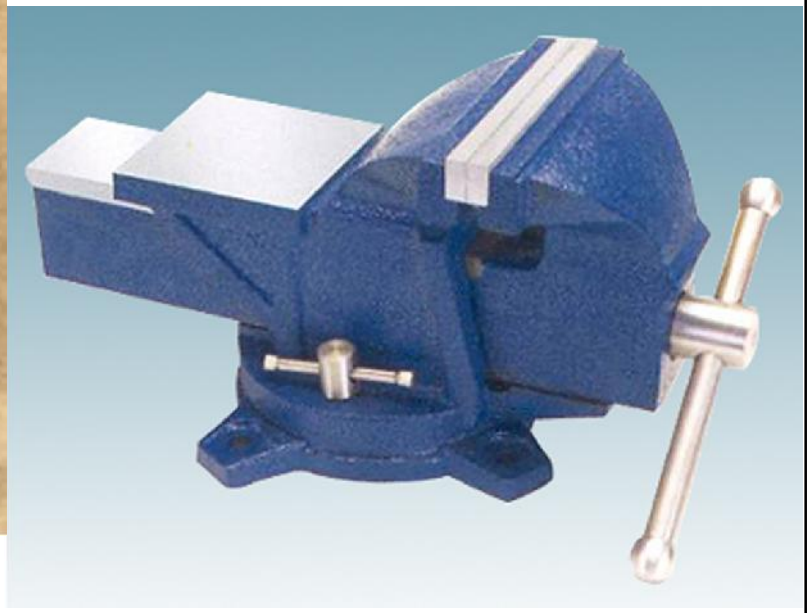
- The vice is the most common tool for holding work. Various types of vices are used for various purposes.
- bench vice, leg vice, pipe vice, hand vice, pin vice and toolmaker's vice.

Vice

- Used to hold or fix a workpiece
- Basic parts are,a cast iron body, a fixed jaw (cast iron), a handle, a square headed screw, and a nut (made of mild steel)
- Has hardned inserted Jaws or Soft metal inserted jaws to provide Protective grips or clamps which can be made of lead, copper, fibre-tin plate, etc.
- The width suitable for common work varies from 80 to maximum opening 180 mm.

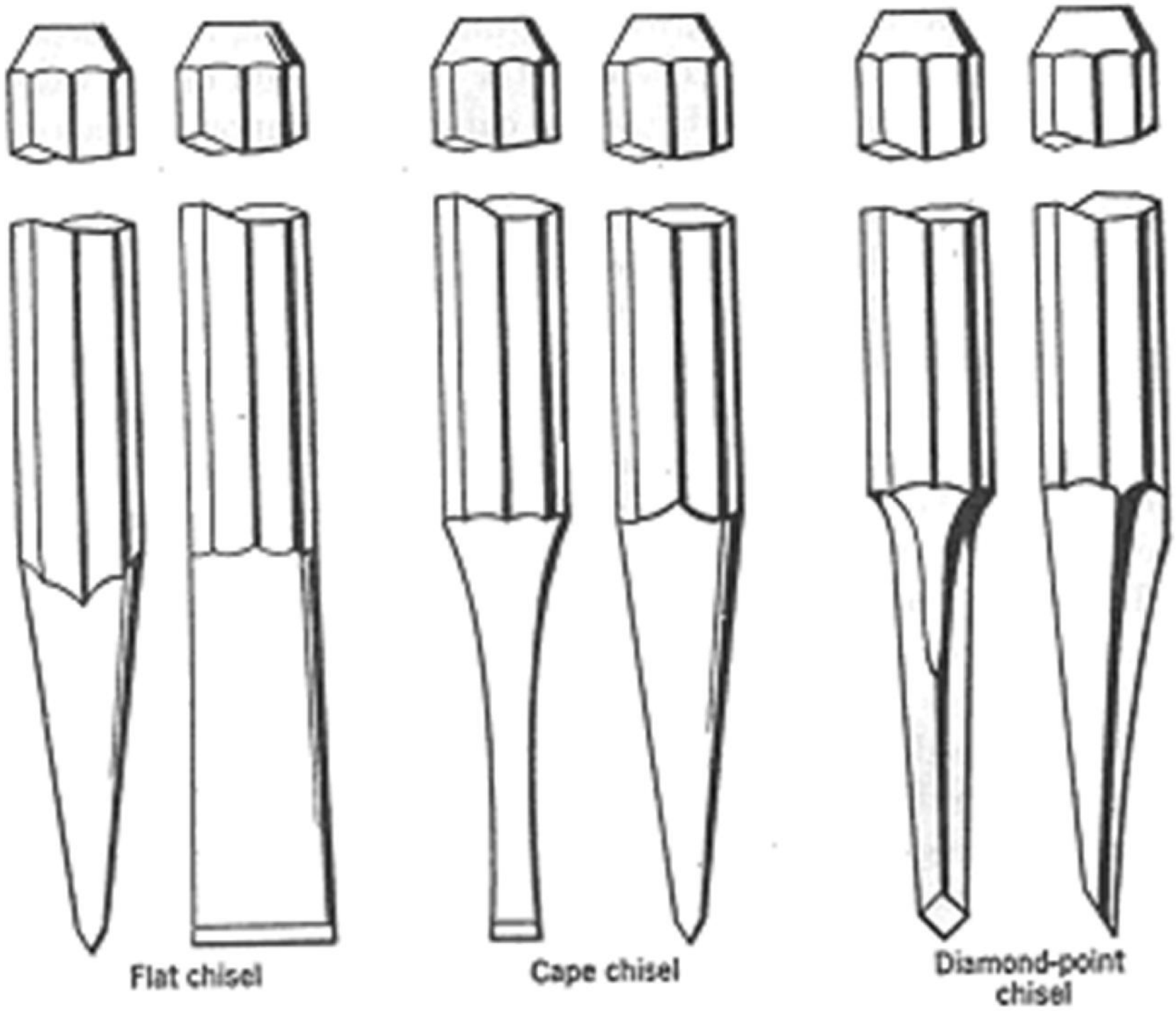
Bench Vice





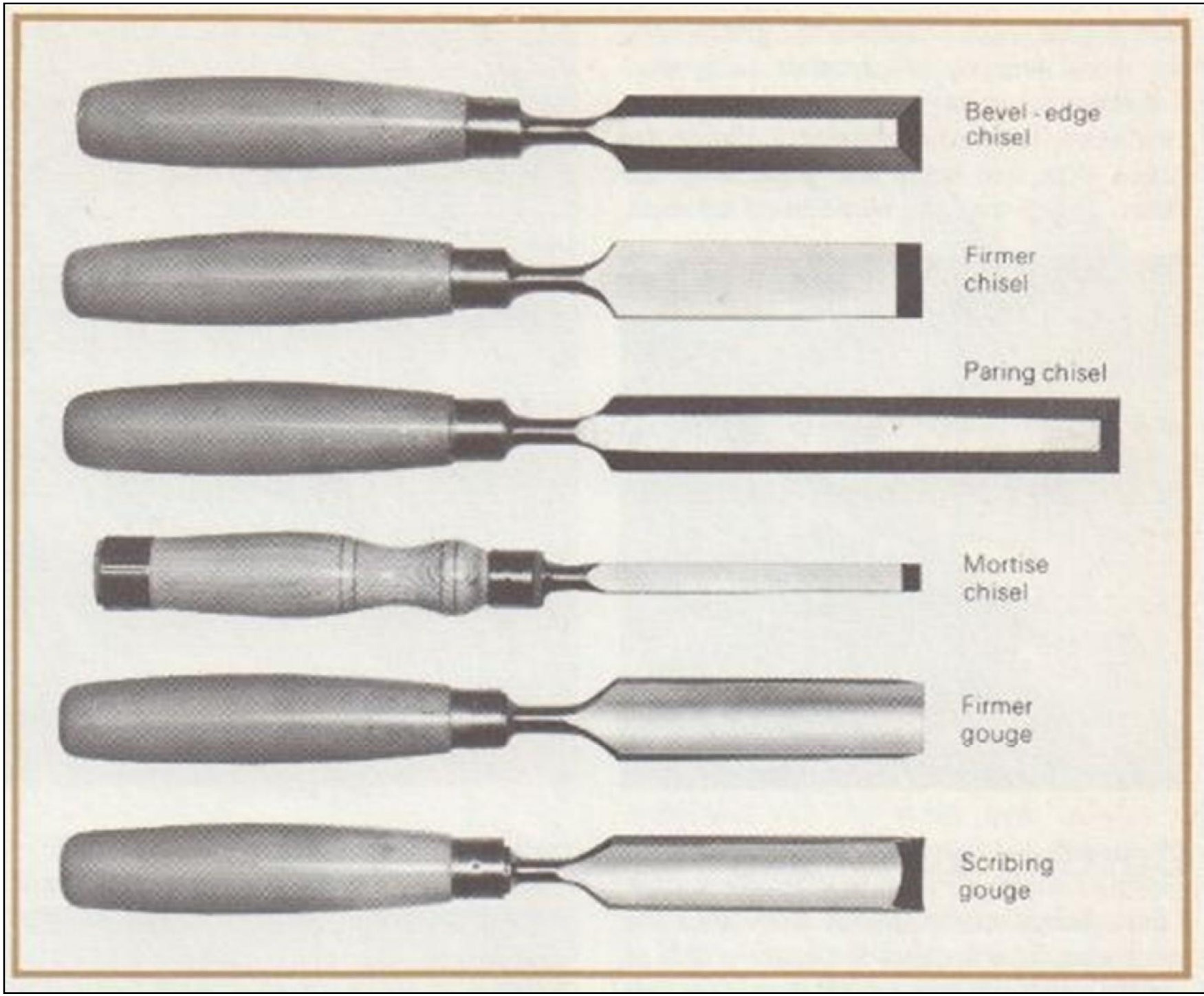
CHISELS

- Chisels are used to cut and remove metal from the jobs
- These are made of high carbon steel
- They are hardened and tempered at the cutting edge
- Cutting angle vary from 35^{o} to 70^{o}


Flat chisel
Cape chisel
Diamond-point chisel

TYPES OF CHISELS

- Flat type- used for gen purpose of removing/cutting the metal from the work place
- Half round- used fro cutting oil ways or grooves in bearing
- Diamond point- used for cutting ‘v’ grooves, clearing corners and squaring small holes
- Cape chisel- used for cutting grooves in large surfaces, key ways in wheels and shafts
- Firmer Gouge- used for cutting ‘u’ grooves or oval shape grooves


Bevel - edge chisel
Firmer chisel
Paring chisel
Mortise chisel
Firmer gouge
Scribing gouge

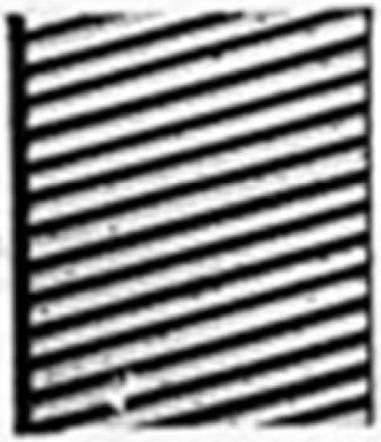
FILES

- Files are used to remove metal from the work to fit the metal parts to give smooth surface to an accuracy of 0.05 mm
- Uses of files
  - Rough cut files: used on soft metals
  - Bastard cut: std file used for gen purpose
  - Second cut: Ex for harder metal to give good finish
  - Smooth or other cuts: Are used to give a high degree of accuracy with a very degree of finish

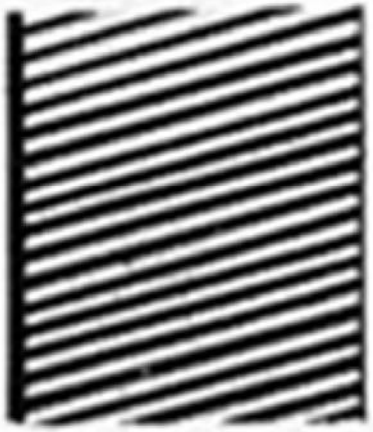
SINGLE-CUT FILE.

DOUBLE-CUT FILE.

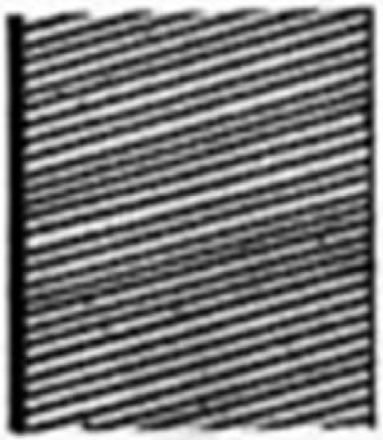
SINGLE CUT



BASTARD



SECONDCUT



SMOOTH

BASTARD

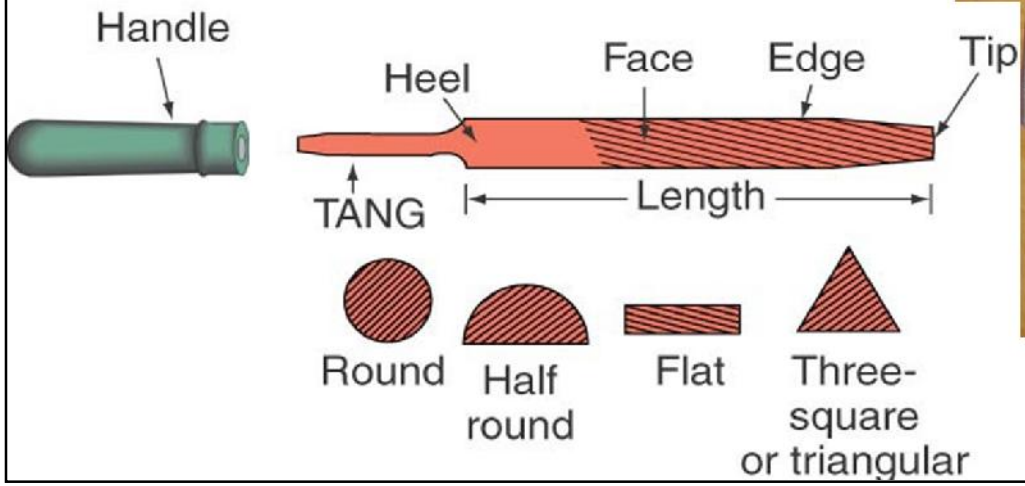
SECONDCUT

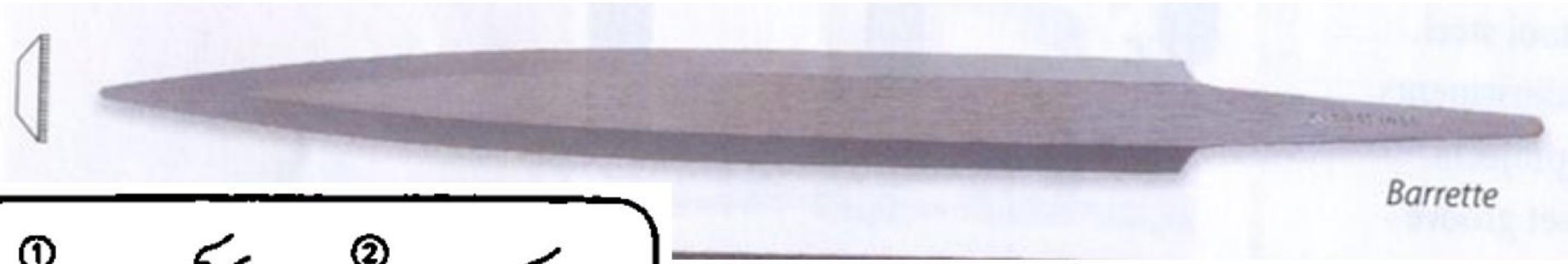
SMOOTH

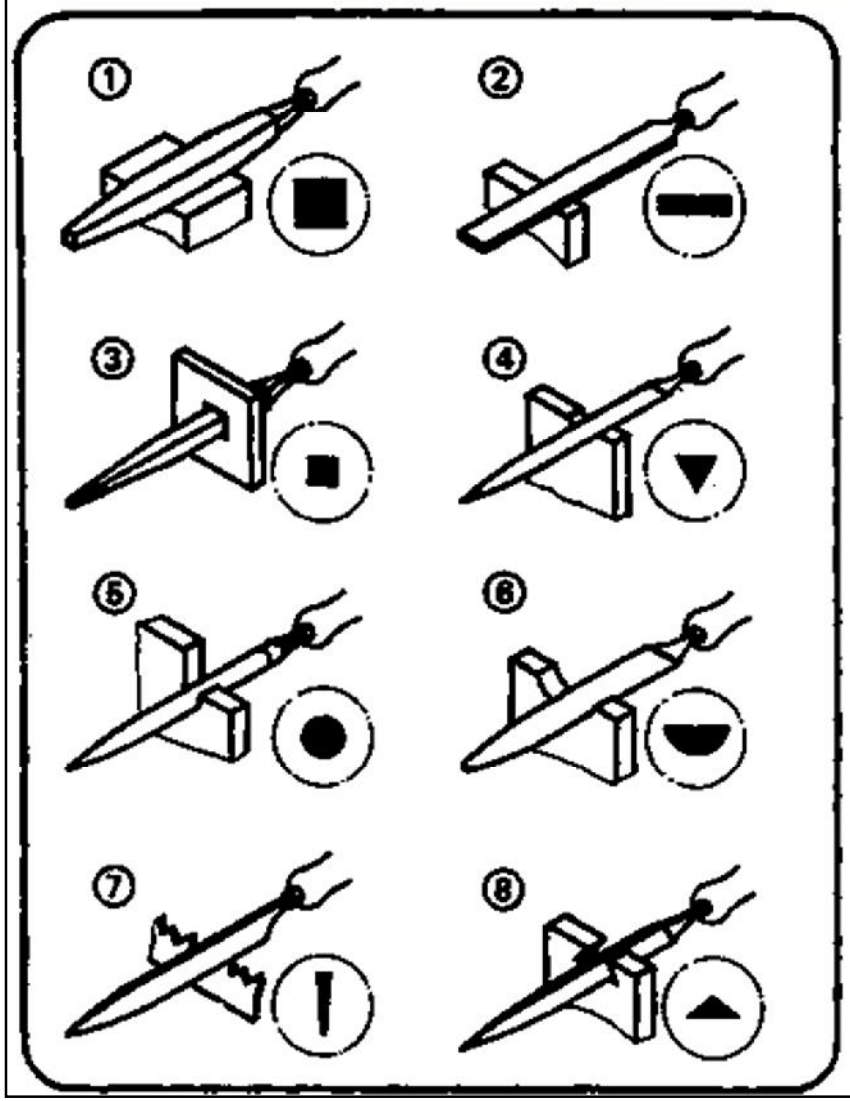
DOUBLE CUT

FILES

- Flat file
- Square file
- Half round file
- Round file
- Triangular file
- Knife edge file
- Barrette




Barrette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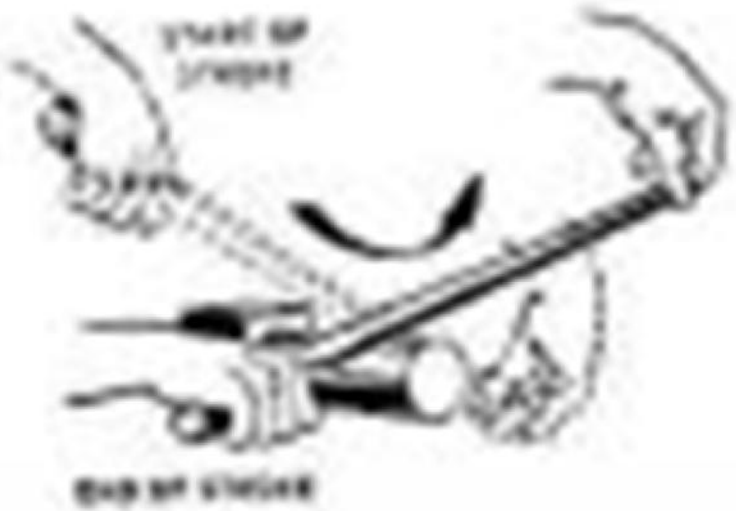
METHODS OF FILING

- Straight filing:
  - The file is moved at fwd and backward strokes on the job
  - Used for long and narrow jobs whose width is less than that of the file
- Cross filing:
  - The file is moved at an angle to the job
  - Used on the jobs whose surface area to be file is more than the file width
- Draw filing:
  - In this method the file is held in both the hands horizontal to the blade of the file
  - The file is moved up or down the length of the job, thumb giving the grip
  - Used for giving final finish to the job

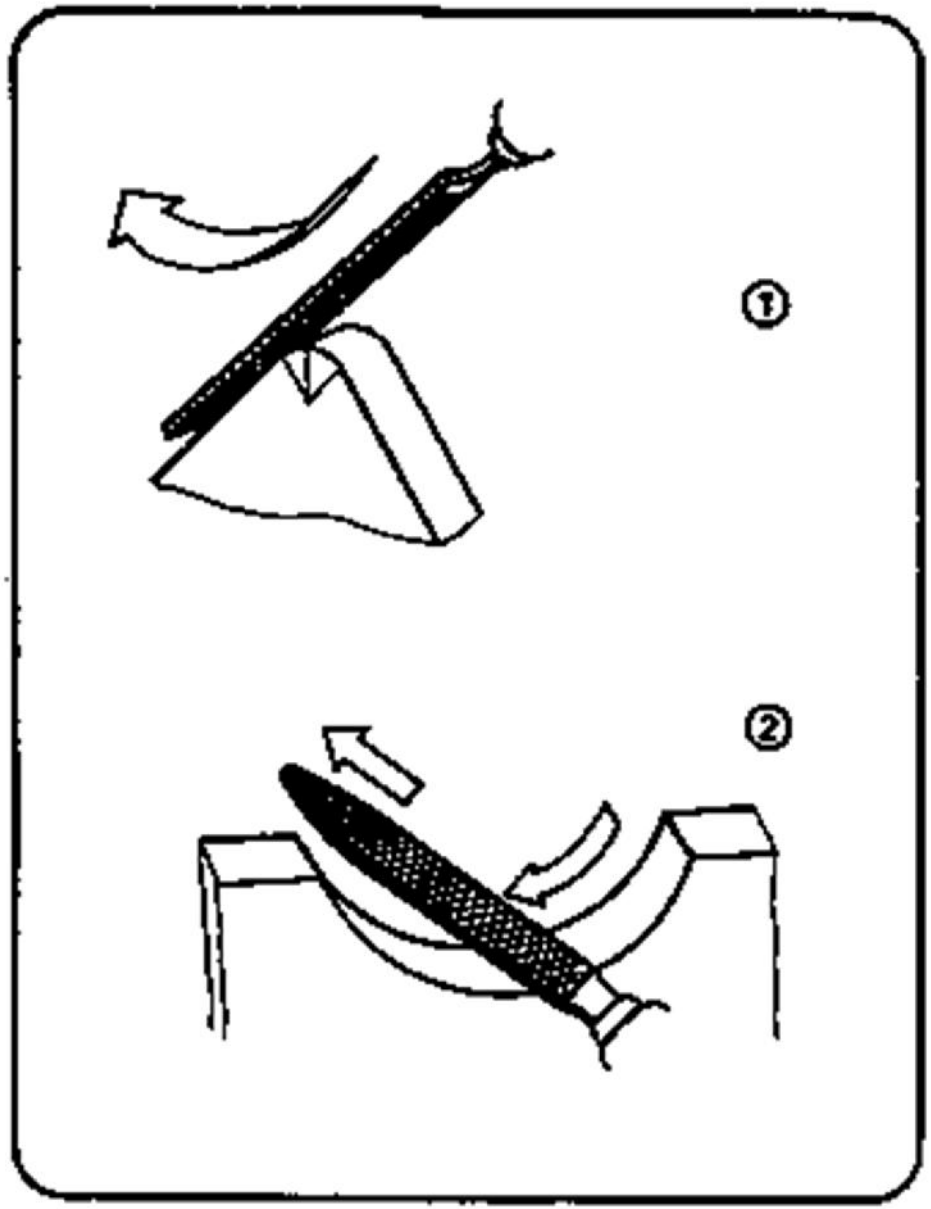
A. CROSSFILING A PIECE OF MILD STEEL

C. POLISHING ROUND METAL STOCK

B. ALTERNATING POSITIONS WHEN FILING



D. FILING ROUND METAL STOCK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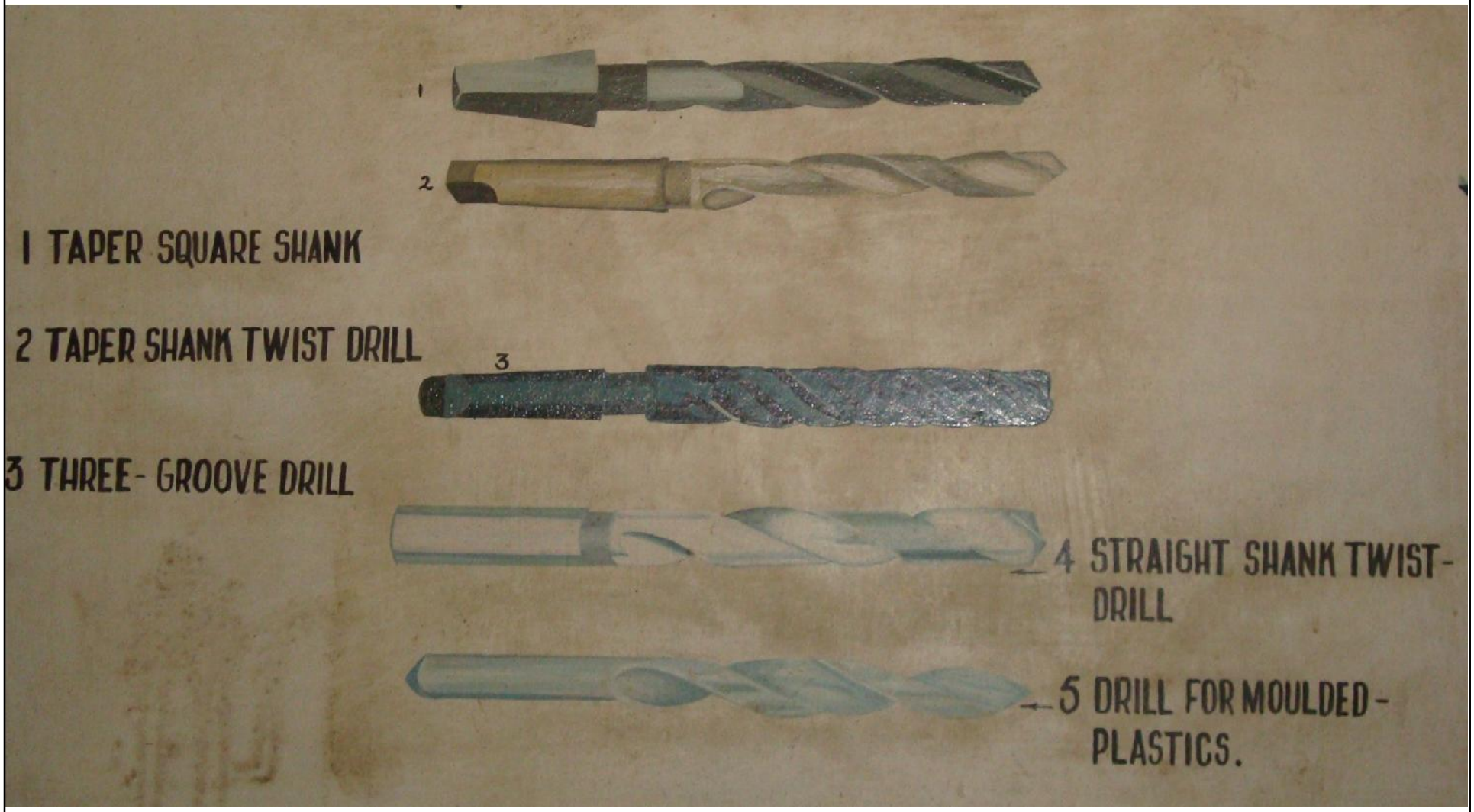
DRILLING

- Drilling is an op of producing holes with the help of a tool known as twist drill.
- Twist drills are of two types:
  - Parallel shank
  - Taper shank
- Parallel shank drills are held in an drill chuck which fits into the spindle of the drilling machine.
- The size vary from 1 mm- 40 mm
- Tapered shank drills can be fitted direct into the spindle of the drilling machine.

Types of Drills

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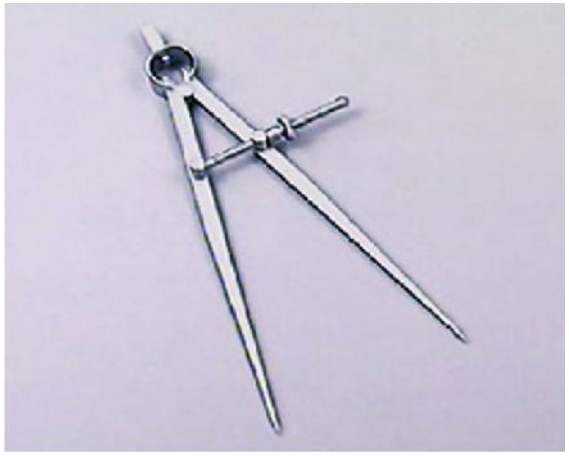
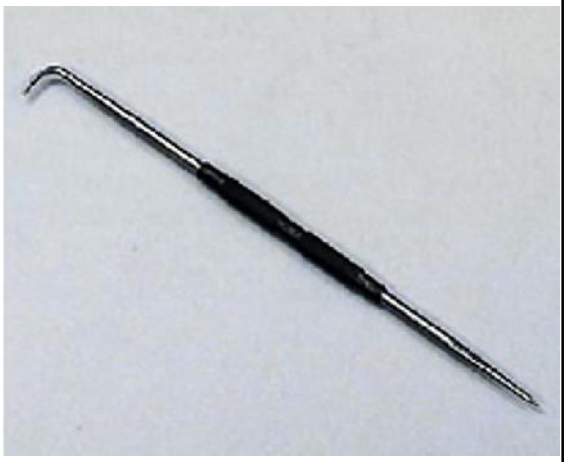
Marking

- Marking is the process of transferring the dimension from the drawing or sample into the workpiece by use of marking tools.
- It consists of drawing a series of definite lines or portions
- These lines act as guides to the fitter for further ops.

Marking tools

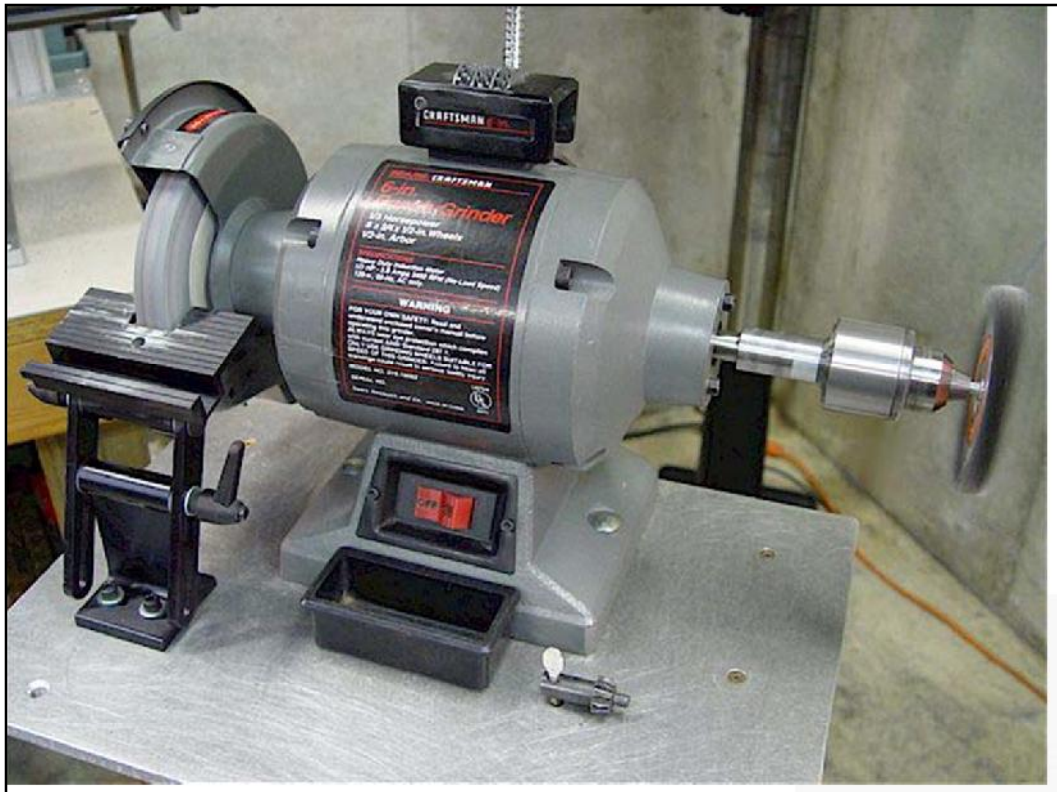
- Scriber
- Centre punch
- Divider





Grinding

- It is a process of removing metal usually up to 0.25 mm by use of a grinding wheel
- It can be used for finishing almost any surface of hard metal which cannot be done by some other method
- The job for grinding is held pressed against a rotating wheel which revolves at a high speed and the metal gets removed by abrasion
- Can do polishing and Buffing with soft grinding wheels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