Basic Workshop Practice (Cutting, Filing, Drilling and Tapping)

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Fitting work

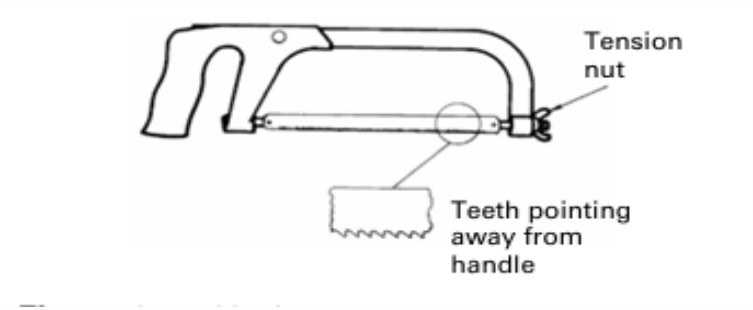
- Working on components with hand tools and instruments, mostly on work benches is generally referred to as 'Fitting work'.
- The hand operations in fitting shop include marking, filing, sawing, scraping, drilling, tapping, grinding, etc.,using hand tools or power operated portable tools.
- Measuring and inspection of components and maintenance of equipment is also considered as important work of fitting shop technicians.

Hand processes

- Hand tools are used to remove small amounts of material, usually from small areas of the workpiece.
- This may be done because
  - No machine is available
  - Workpiece is too large to go on a machine
  - Shape is too intricate
  - Simply that it would be too expensive to set up a machine to do the work.

Cutting-Using Hacksaw

- Used to cut metal
- Hacksaw blade fits into a hacksaw frame on two holding pins
  - One of which pin is adjustable in order to tension the blade
- Hacksaw frame should be
  - Rigid
  - Hold the blade in correct alignment
  - Tension the blade easily
  - Have a comfortable grip



- The teeth of a hacksaw blade should point away from the handle when fitted to the frame.
  - This is because the blade is designed to cut on the forward stroke, or push, rather than the backward stroke, or pull
- A loose blade will twist or buckle and not cut straight, while an overtightened blade could pull out the ends of the blade.

Cutting-Using Hacksaw Cont.

- Standard Hack saw blade
  - Long- 300 mm
  - Wide-13 mm
  - Thickness- 0.65 mm
- Available with 14,18, 24 and 32 teeth per 25 mm,
  - Every 25 mm length of blade there are 14 teeth, 18 teeth and so on.
- A hacksaw blade should be chosen to suit the
  - Type of material being cut-whether hard or soft
  - Nature of the cut-whether thick section or thin
- Soft material- Least number of teeth per length

  Hard material-Largest number of teeth per length
- When cutting thin sections such as plate, at least three consecutive teeth must always be in contact.

Cutting-Using Hacksaw Cont.

- Selection of the hacksaw blades

Material thickness (mm)	No. of teeth per 25 mm	
	Hard materials	Soft materials
Up to 3	32	32
3 to 6	24	24
6 to 13	24	18
13 to 25	18	14

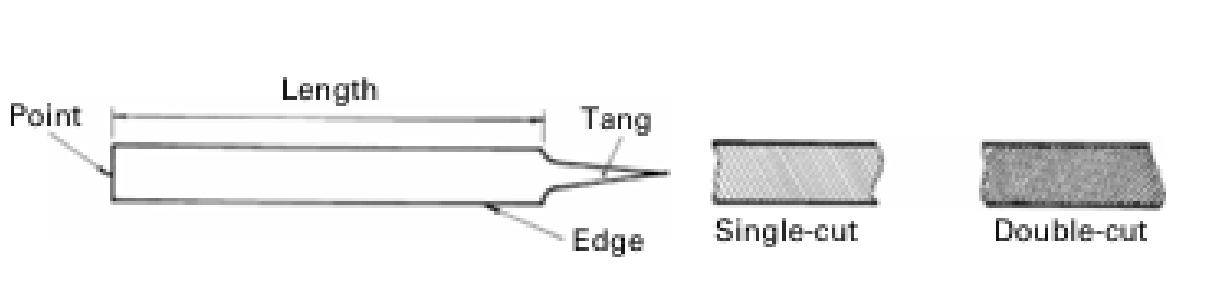
Question

When cutting 7 mm thickness of Aluminium plate ,which of the TPI(Teeth per inch(25mm)) will you select as per the data given above?

Filing

- Why?
  - Files are used to perform a wide variety of tasks, from simple removal of sharp edges to producing intricate shapes where the use of a machine is impracticable
  - They can be obtained in a variety of shapes and in lengths from 150 mm to 350 mm

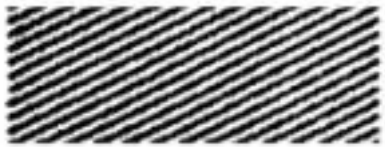
- Single-cut and Double-cut
  - When a file has a single series of teeth cut across its face it is known as single-cut file, and with two sets of teeth cut across its face it is known as double-cut file,



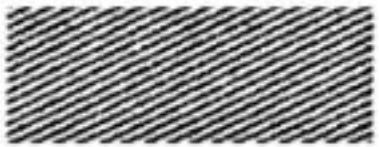
Filing Cont.

- Three standard grades of cut in common use
  - Bastard cut -Use for rough filing to remove the most material in the shortest time
  - Second cut - Bring the work close to finished size
  - Smooth cut -Give a good finish to the surface while removing the smallest amount of material.

Bastard Cut



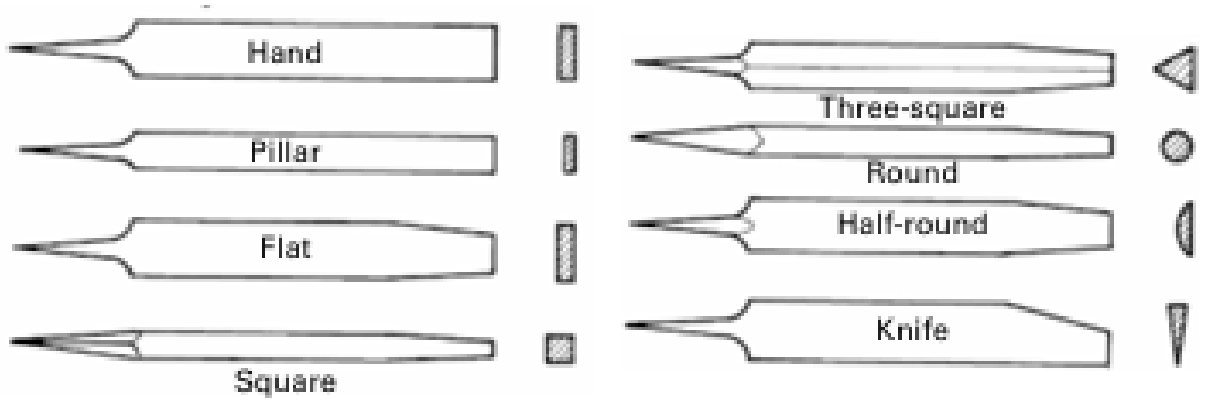
Second Cut



Smooth Cut

Types of files

- Files are identified
  - by their general shape
    - hand
    - flat
    - pillar
  - by their cross-section
    - square
    - three-square
    - round
    - half-round
    - knife



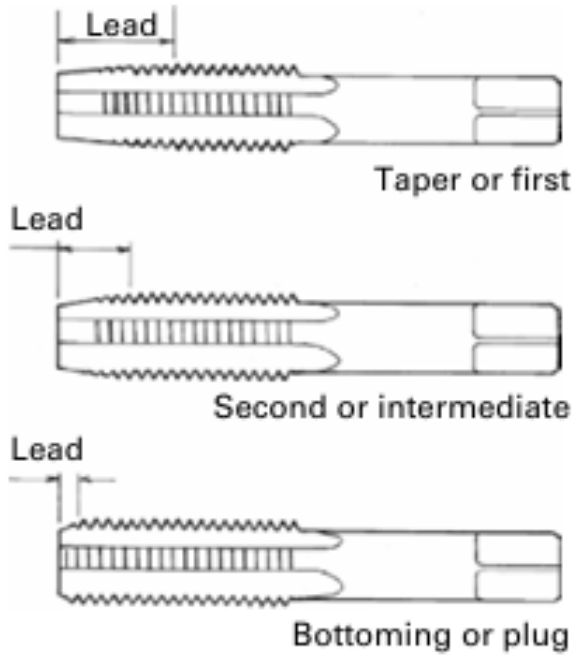
Tapping

- Tapping is the operation of cutting an internal thread by means of a cutting tool as a tap
- When tapping by hand, straight-flute hand taps are used
- These are made from hardened high-speed steel and are supplied in sets of three

Tapping Cont.

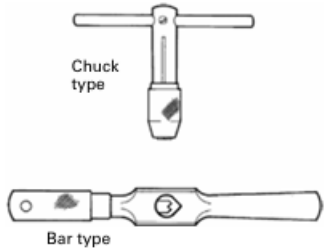
The three taps differ in the length of chamfer at the point, known as the lead.

- The one with the longest lead is referred to as the taper or first tap,
- the next as the second or intermediate tap
- the third, which has a very short lead, as the bottoming or plug tap



Tapping Cont.

- A square is provided at one end so that the tap can be easily rotated by holding it in a tap wrench.
- The chuck type of wrench is used for the smaller tap sizes.

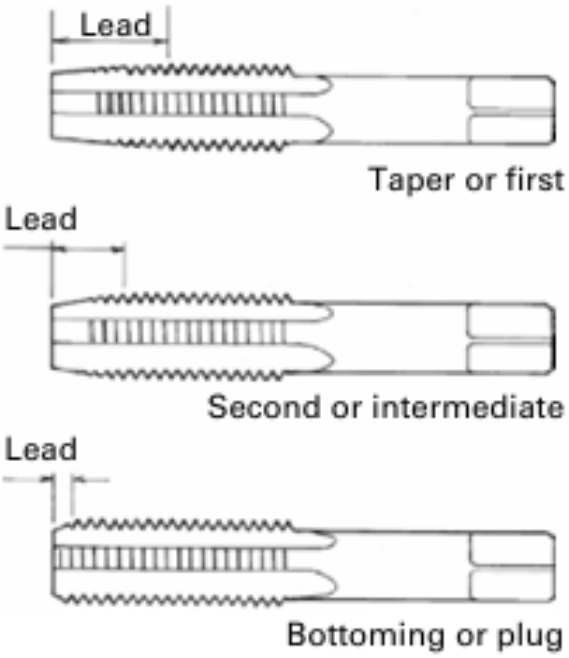


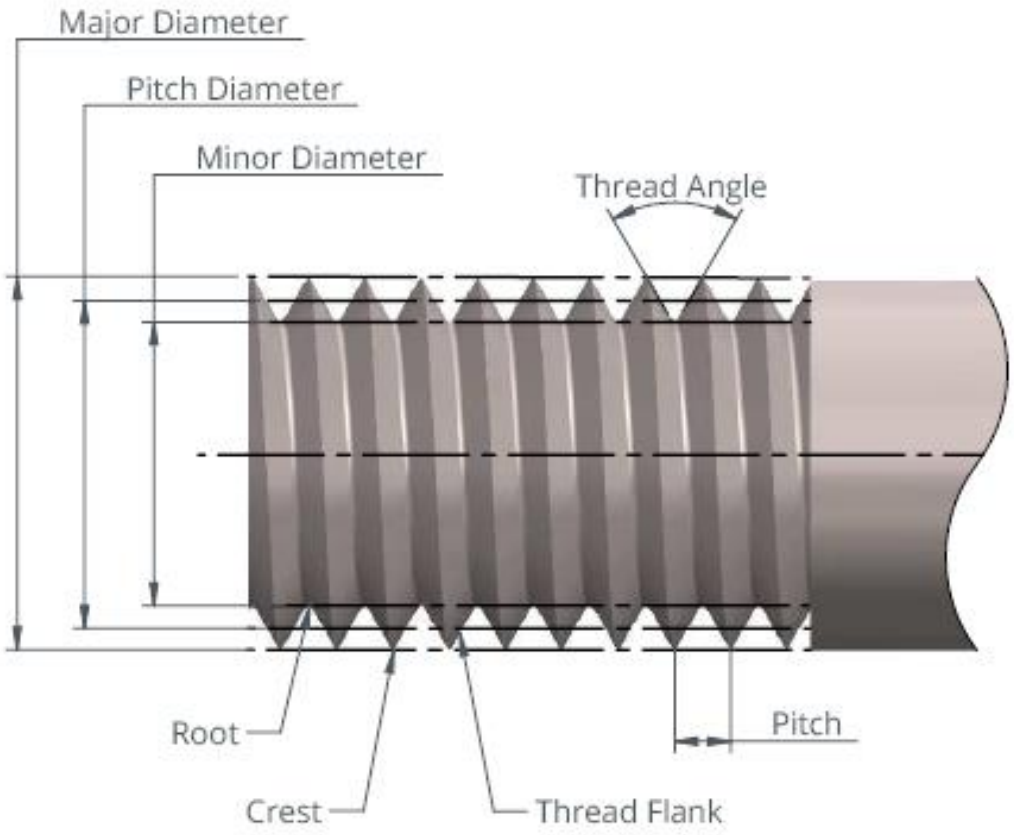
- Table shows the tapping sizes for ISO metric threads.

Thread diameter and pitch (mm)	Drill diameter for tapping (mm)
1.6×0.35	1.25
2×0.4	1.6
2.5×0.45	2.05
3×0.5	2.5
4×0.7	3.3
5×0.8	4.2
6×1.0	5.0
8×1.25	6.8
10×1.5	8.5
12×1.75	10.2

Tapping Cont.

- Tapping Procedure
  - The first stage in tapping is to drill a hole of the correct size. This is known as the tapping size and is normally slightly larger than the root diameter of the thread.
  - Tapping is then started using the taper or first tap securely held in a tap wrench. The long lead enables it to follow the drilled hole and keep square.
  - The tap is rotated, applying downward pressure until cutting starts.
  - If the hole being tapped passes through the component, it is only necessary to repeat the operation using the second or intermediate tap.
  - Where the hole does not pass through – known as a blind hole – it is necessary to use the plug or bottoming tap. This tap has a short lead and therefore forms threads very close to the bottom of the hole.





Drilling

- Do a poster presentation
  - Group task
  - Collect all type information and present as a poster