

Simple scrapers and scraping

Objectives: At the end of this lesson you shall be able to

- state the necessity of scraping surfaces
- state what is high spots
- state what is bearing surface
- list the types of scrapers used, material and size
- hold the scraper at correct angle/position.

Necessity of scraping surface: Scrapers are used to correct slight errors on all flat or curved surfaces that must be finished more decorately.

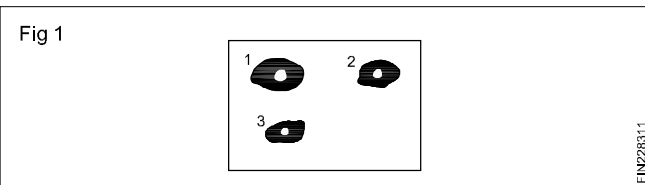
Scraping is used to produce a high degree of fit between two flat or two curved surfaces particularly where the surfaces can rub together in use.

After a surface is filed or machined as accurately as possible, it can be further improved by rough scraping after which finish scraping is employed. Finish scraping is used to remove minute amount of material.

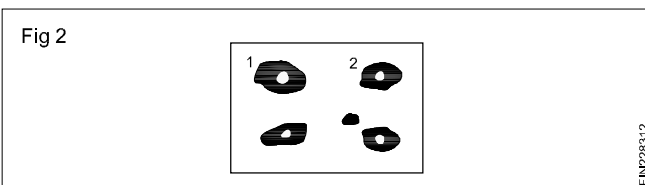
High spots and bearing surfaces: On the surface plate apply the coating of Prussian blue or red lead mixed with oil or apply used carbon. Placing the job to be scraped, move the job under light downward pressure keeping all edges of the job within the limits of surface. Carefully lift off the job in a perpendicular direction.

Study the patches of marking compound before you begin scraping.

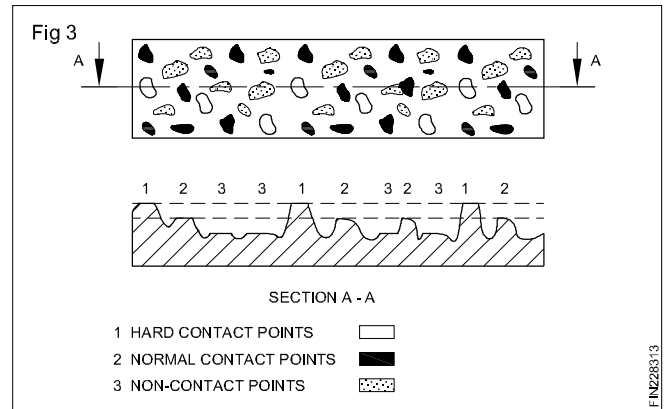
- First test having 3 shiny patches. Only patch 3 would be scraped (high spots) (Fig 1)



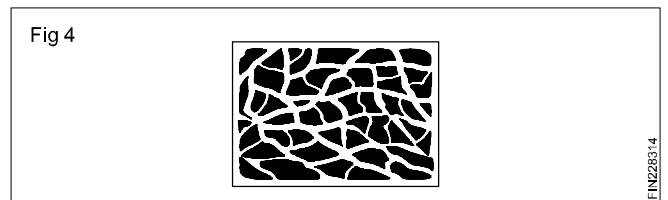
- Second test having even distribution of marking compound. (High spots) (Fig 2)



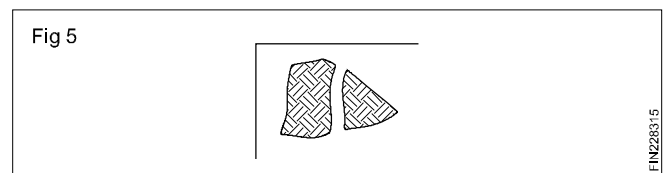
- Types of bearing contact obtained (Fig 3)
- 1 Metal contact with the surface plate. The points have been rubbed shiny.
 - 2 They have been conduct with the marking compound and coloured by it. This portion is called normal contact point.



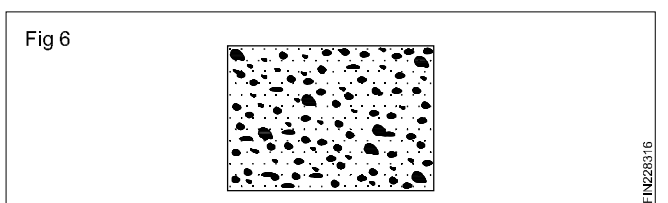
- 3 Non-contact point, have not been in contact with the marking compound.
- After third scraping completed and testing the shining shows the shiny spots are more than those coloured with marking compound. The patches are greater in number in size more evenly distributed. (High spots) (Fig 4)



- The enlarged view of the pattern of scraping marks on the small patches shown in Fig 5.



- Further testing, scraping would produce a more even distribution of larger number of smaller sized patches (bearing spots). (Fig 6)



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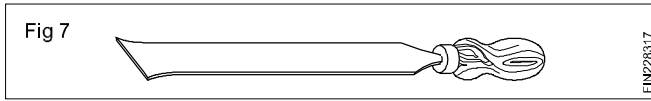
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In 25 mm SQ = 25 bearing parts.

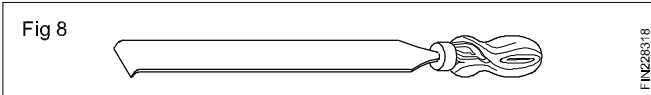
Types and uses of scraper: For scraping flat surfaces

- Flat scrapers with rectangular blades. (Fig 7)



Used for scraping large flat surfaces. The working edge is not thicker than 3 mm.

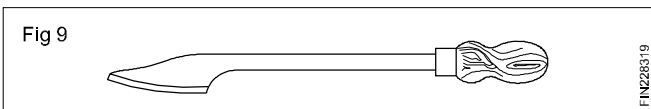
- Hook scrapers with rectangular blades. (Fig 8)



Hook scrapers are used for scraping the center portion of large flat surface where it is not convenient to use of flat scraper.

For scraping curved surfaces

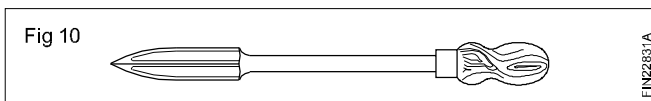
- Half round scraper is curved slightly towards the curved surfaces. (Fig 9)



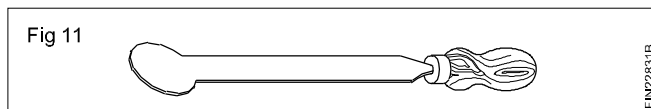
It is used to scrape bearing blocks or brasses, pressure is applied in radial direction and cutting edge moved at right angles to its length. So that scraping marks are circumferential.

- Three square or triangular scraper

Each of the three faces are hallow ground Fig 10. It is used for scraping small diameter holes and deburring edges of accurate holes. The cutting edge is moved at right angles to its length.



- Bull-nose scraper is forged to a disc like end. (Fig 11) It is used for scraping large bearings. It can be used two ways either with the circumferential movement of a flat scraper or with the longitudinal movement of flat scraper.

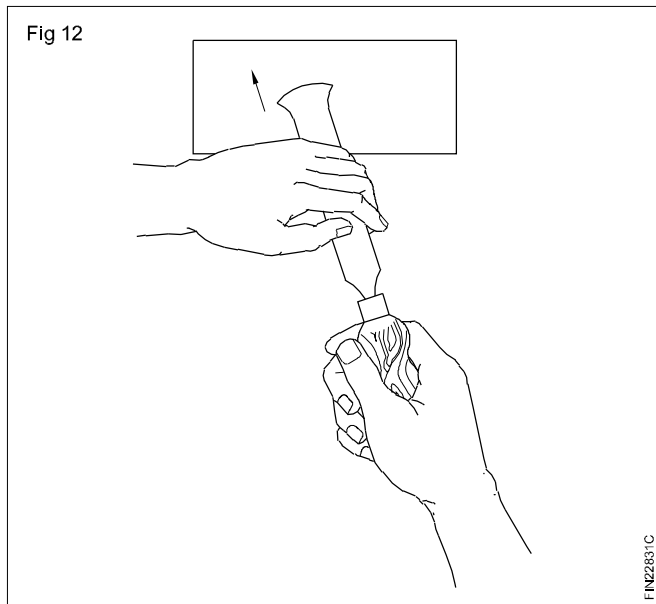


Scraper material: High grade tool steel or special alloy steel and tungsten carbide tipped tool.

Specification: The overall length of blade and handle may range from 150 to about 500 mm.

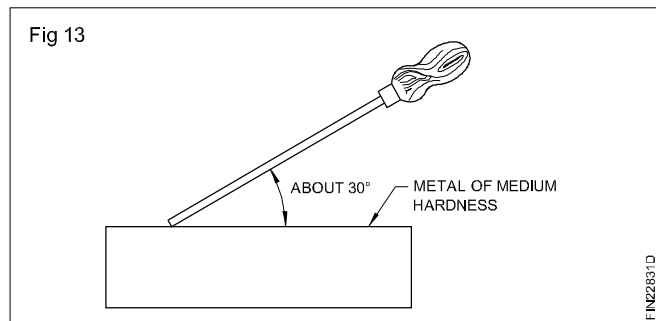
Holding position of flat scraper: The handle of the scraper is held and pushed by right hand. Hold the right elbow out of from the body when beginning forward cutting stroke. As you finish the short cutting stroke bring the elbow into the body.

The blade is guided and pressed down by the left hand. Grasp the blade with the root of the little finger above the blade and about 40 mm to 50 mm from the cutting edge. (Fig 12)

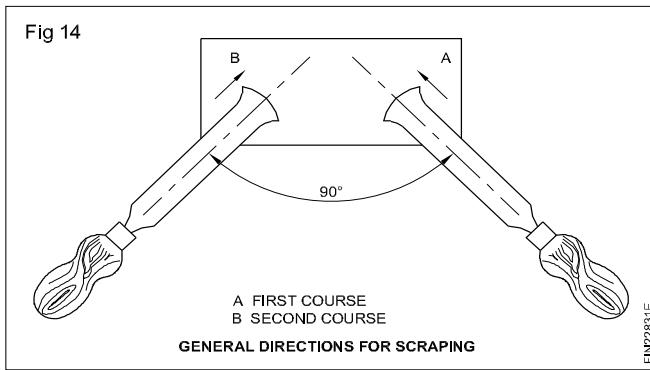


Curl the little finger and second finger lightly around the blade. The first finger lies loosely around the blade and thumb lies on top of the blade and at right angle to it.

For work of average hardness blade of scraper is held at an angle about 30° to surface. For very hard work the angle may be greater, while for softer metals this angle may be decreased to about 20°. (Fig 13)



After scraping in one general direction and testing in the surface plate. Change the general direction of scraping by about 90°. (Fig 14)



Care and maintenance of scrapers

- Scrapers must be sharp and kept with good condition to handle.
- Cover the cutting edge with rubber or leather sheath.
- After use apply grease on cutting edge to avoid corroding.
- Scraper should not fall down from the bench.
- Don't mix with other tool.

Originating true flat surfaces by three-plate method (Whitworth principle)

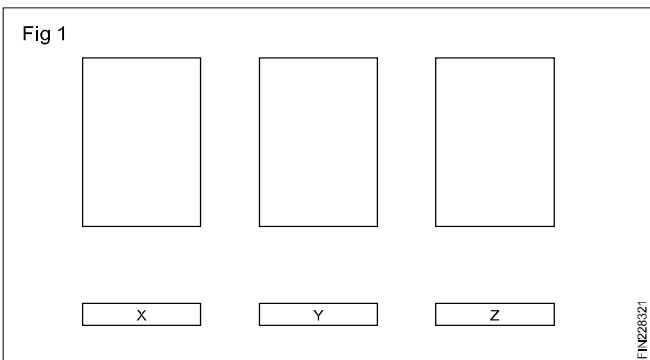
Objective: At the end of this lesson you shall be able to

- originate flat scraped surfaces by the three-plate method.

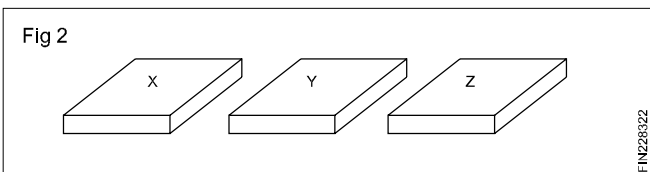
How does one obtain a flat surface?

It is easy to say that it is scraped but how does one know where to take off the high points.

If three plates are compared with one another in alternate pairs, they will only mate perfectly in all positions when they are absolutely flat. (Fig 1)



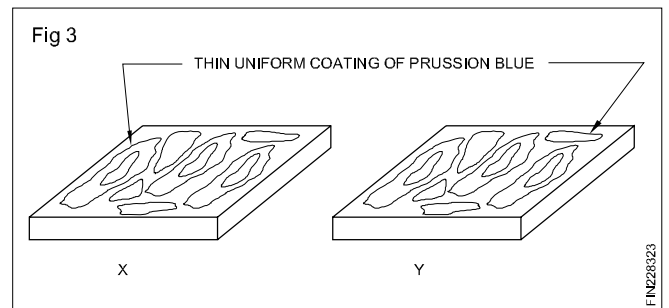
File and ensure that all the three plates are finished to size and square. (Fig 2)



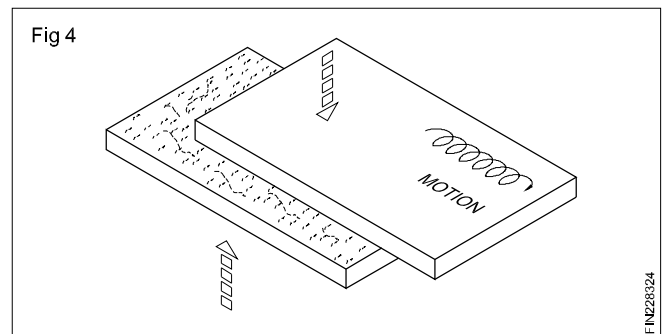
Check the level with the knife edge/straight edge

Stamp the plates X, Y and Z with a letter punch.

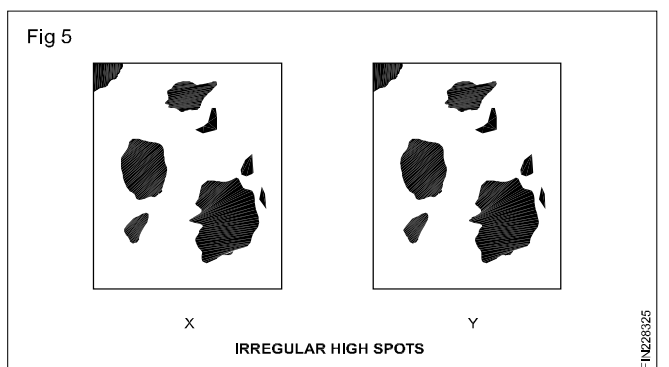
Apply a very thin uniform coating of Prussion blue on the faces of plates X and Y which are to be scrapped. (Fig 3)



Keep both the pieces together and rub the plates back and forth against each other. (Fig 4)



Observe the high spots on the plates X and Y remove by scraping. (Fig 5)



Clean the faces with knitted cotton cloth.

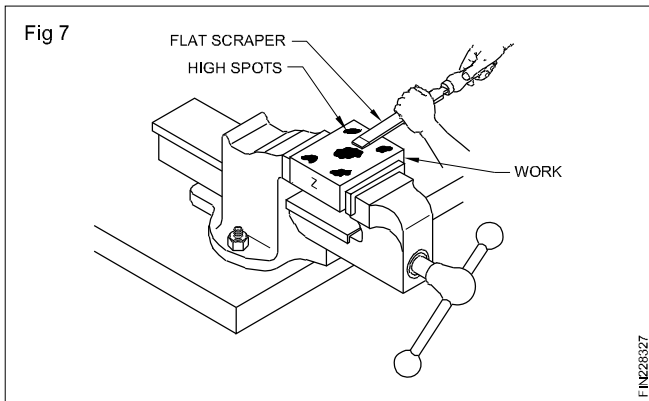
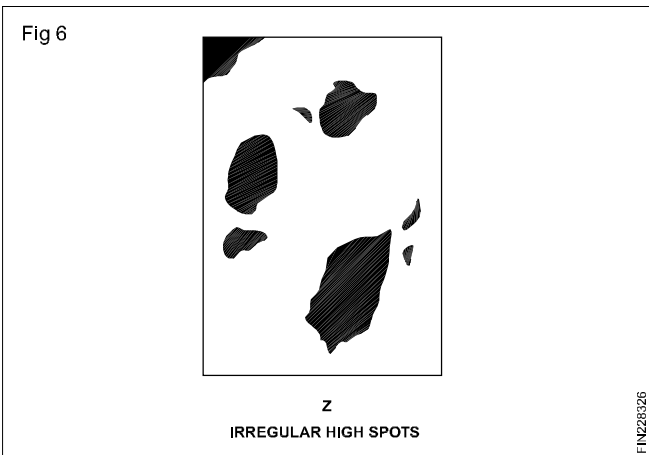
Rub with an oilstone gently to remove the burrs and again clean with knitted cotton cloth.

Repeat the same procedure till both the faces are mating with good bearing surfaces.

Apply a very thin uniform coating of Prussion blue on the face of the plate Z which is to be scraped.

Keep the faces of the plates X and Z together and rub the plates back and forth against each other.

Observe the high spots on the plate Z and remove by scraping (Figs 6 and 7)



Do not scrape plate X. This is taken as a reference surface.

Repeat the same procedure till both the faces of the plates X and Z are mating with good

Repeat the procedure till the faces of plates Y and Z are mating with good bearing surfaces.

Now one cycle of operation is completed.

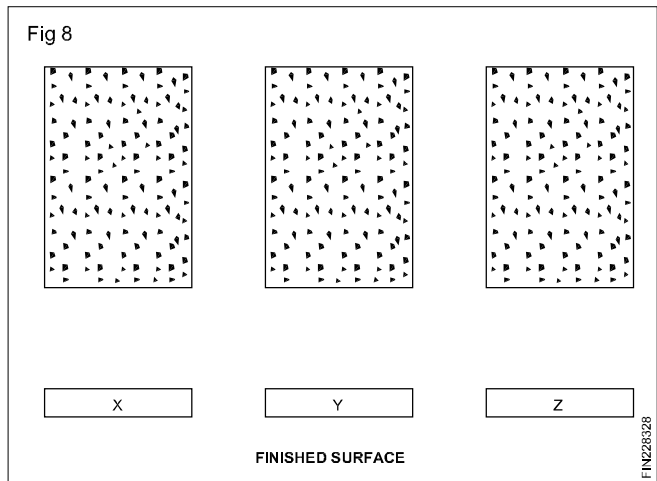
Note: Plate X will mate with plates Y and Z but Y and Z will not mate. All the three plates mate only when all the three are flat.

Repeat the cycle a number of times till interchangeable, flat, good bearing surfaces are achieved.

Clean all the plates with kerosene.

Use knitted cotton cloth for cleaning.

A good bearing surface is achieved when 5 to 10 points are visible and uniform distributed per cm² on the workpiece surfaces after finishing. (Fig 8)



Three trainees will work in a group for this exercise.

Each trainee will be given one plate for scraping.

Each trainee will compare his plate with those of the other trainees as per the above procedure and generate flat surfaces by the three-plate method.

Scraping curved surfaces

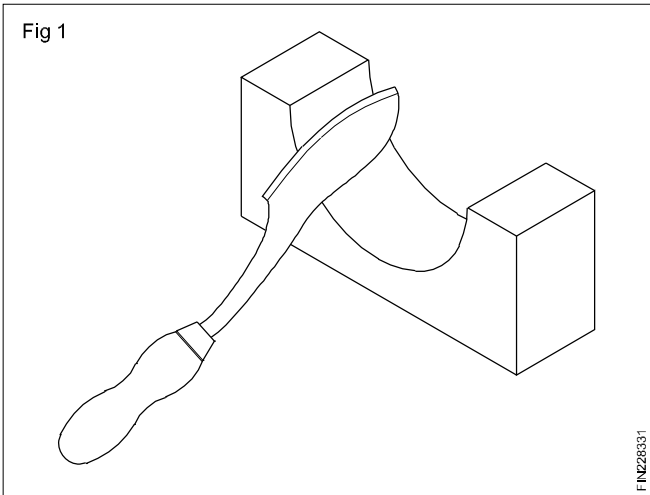
Objective: At the end of this lesson you shall be able to

- **scrape and test curved surfaces.**

A half round scraper is the most suitable scraper for scraping curved surfaces. This method of scraping differs from that of flat scraping.

Method

For scraping curved surfaces the handle is held by hand in such a way as to facilitate the movement of the scraper in the required direction. (Fig 1)

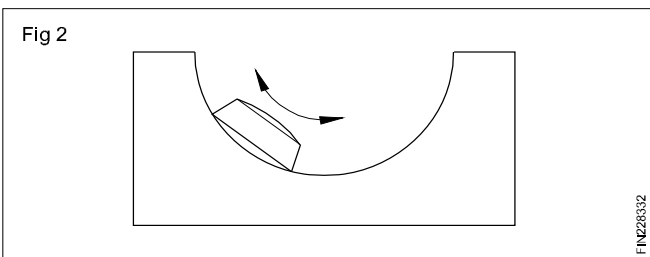


Pressure is exerted with other hand on the shank for cutting.

Rough scraping will need excessive pressure with longer strokes.

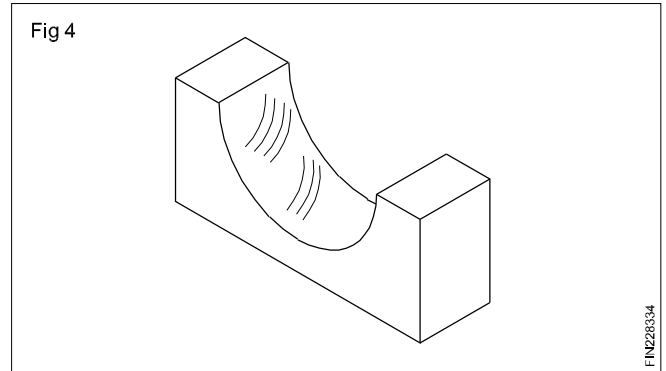
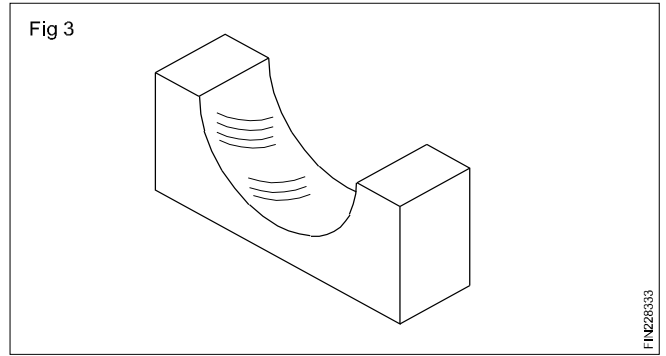
For fine scraping, pressure is reduced and the stroke length also becomes shorter.

Cutting action takes place both on forward and return strokes. (Fig 2)

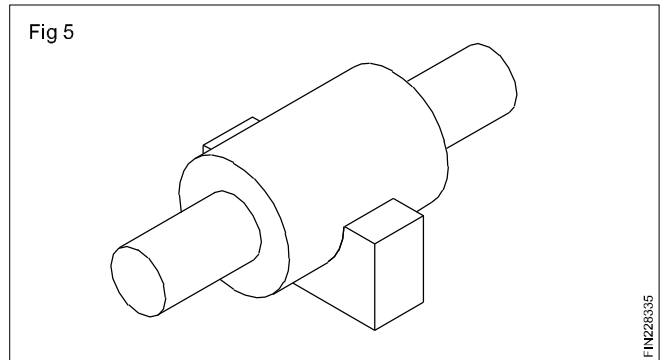


During the forward movement one cutting edge acts, and on the return stroke, the other cutting edge acts.

After each pass, change the direction of cutting. This ensures a uniform surface. (Figs 3 & 4)



Use a master bar to check the correctness of the surface being scraped. (Fig 5)



Apply a thin coating of Prussian blue on the master bar to locate the high spots.
