

Marking media

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

- state the purpose of marking media
- name the common types of marking media
- select the correct marking medium for different applications.

Purpose of marking media

In marking off/Layout, the surface of the job/workpiece is coated with a medium to show the marked lines clear and visible. To get clear and thin lines, the best layout medium is to be selected.

Different marking media

The different marking media are Whitewash, Marking blue, Prussian Blue, Copper Sulphate and Cellulose Lacquer.

Whitewash

Whitewash is prepared in many ways.

Chalk powder mixed with water

Chalk mixed with methylated spirit

White lead powder mixed with turpentine

Whitewash is applied to rough forgings and castings with oxidised surface. (Fig 1)

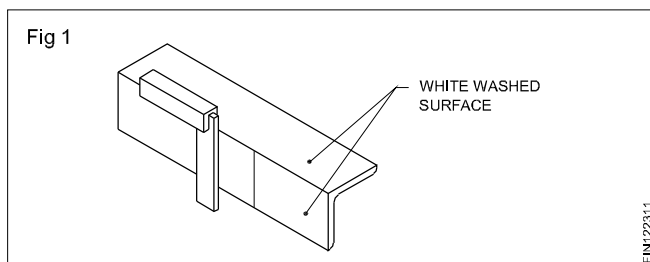
Whitewash is not recommended for workpieces of high accuracy.

Marking blue

A Chemical dye, blue based colour mixed with methylated spirit used for marking on workpieces which are reasonably machined surface.

Prussian blue

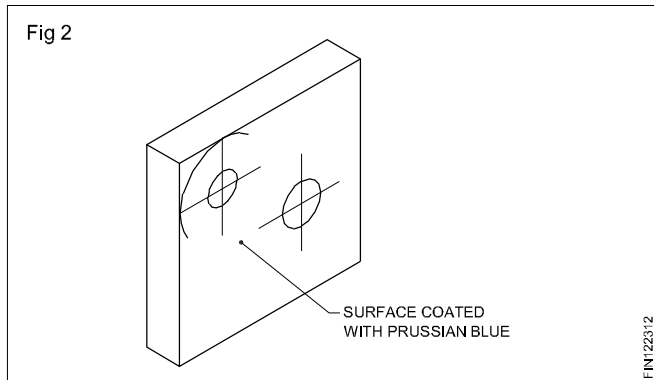
This is used on filed or machine-finished surfaces. This will give very clear lines but takes more time for drying than the other marking media. (Fig 2)



Copper sulphated

The solution is prepared by mixing copper sulphate water and a few drops of nitric acid. The copper sulphate is used on filed or machine-finished surfaces. Copper sulphate sticks to the finished surfaces well.

Copper sulphate needs to be handled carefully as it is poisonous. Copper sulphate coating should be dried before commencing marking, as otherwise, the solution may



stick on the instruments used for marking.

Cellulose lacquer: This is a commercially available marking medium. It is made in different colours and dries very quickly.

The selection of marking medium for a particular job depends on the surface finish and the accuracy of the workpiece.

In present days, marking media used are readily available in aerosol container, which can be applied by spraying on to any surface, which needs marking.

Readymade solutions of marking dye/ink which are quick drying and thin layer to mark precise dimensions and clear visible lines. Also permanent marker pens are available in different colours, which are quick drying and used for smaller workpieces of metal, wood and plastics.

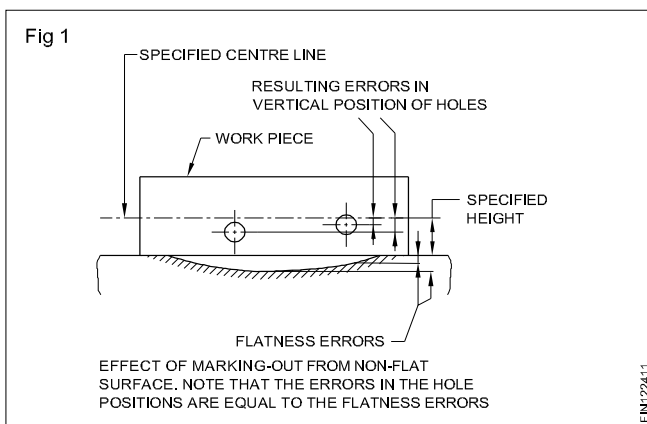
Surface plates

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

- state the necessity of surface plate
- state the material of surface plate
- state the specification of surface plate.

Surface plates - their necessity

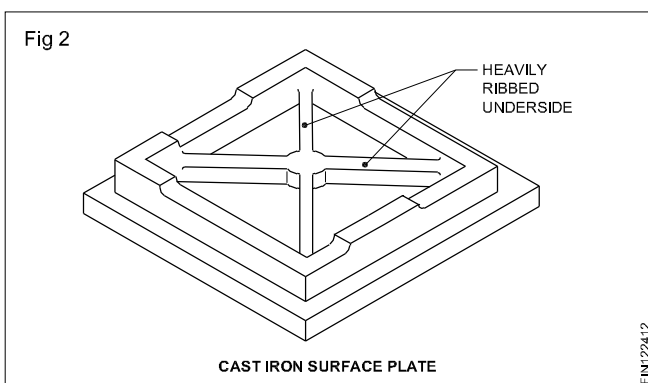
When accurate dimensional features are to be marked, it is essential to have a datum plane with a perfectly flat surface. Marking using datum surfaces which are not perfectly flat will result in dimensional inaccuracies. (Fig.1) The most widely used datum surfaces in machine shop work are the surface plates and marking tables.



Materials and construction

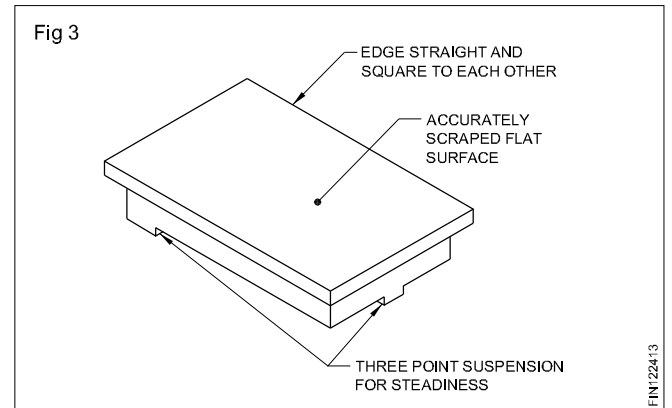
Surface plates are generally made of good quality cast iron which are stress-relieved to prevent distortion.

The work-surface is machined and scraped. The underside is heavily ribbed to provide rigidity. (Fig 2)



For the purpose of steadiness and convenience in levelling, a three point suspension is given. (Fig 3)

Smaller surface plates are placed on benches while the larger surface plates are placed on stands.



Other materials used

Granite is also used for manufacturing surface plates. Granite is a dense and stable material. Surface plates made of granite retain their accuracy, even if the surface is scratched. Burrs are not formed on these surfaces.

Classification and uses

Surface plates used for machine shop work are available in three grades - Grades 1, 2 and 3. The grade 1 surface plate is more acceptable than the other two grades.

Specifications

Cast iron surface plates are designated by their length, breadth, grade and the Indian Standard number.

Example

Cast iron surface plate 2000 x 1000 Gr1. I.S. 2285.

Care & maintenance

- Clean before and after use.
- Do not keep job on the surface plate.
- Don't keep any cutting tool on the table.

Angle plates

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

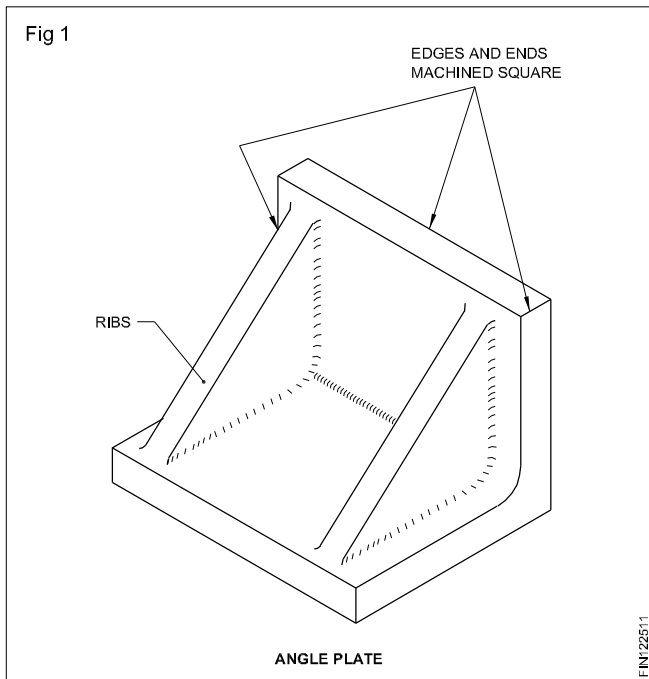
- state the constructional features of different types of angle plates
- name the types of angle plates
- state the uses of different types of angle plates
- state the grades of angle plates.
- specify angle plates.

Constructional features

Angle plates have two plane surfaces, machined perfectly flat and at right angles. Generally these are made of closely grained cast iron or steel. The edges and ends are also machined square. They have ribs on the unmachined part for good rigidity and to prevent distortion.

Types of angle plates

Plain solid angle plate (Fig 1)

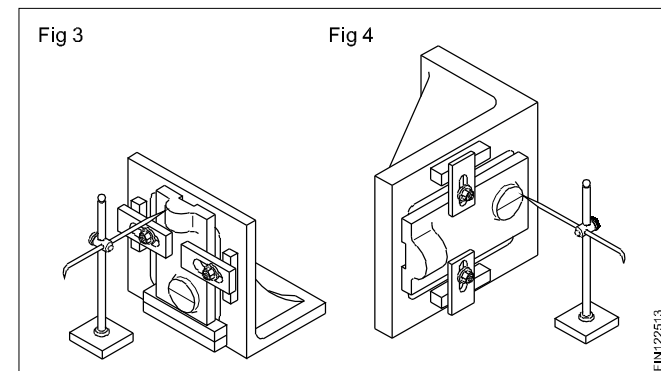
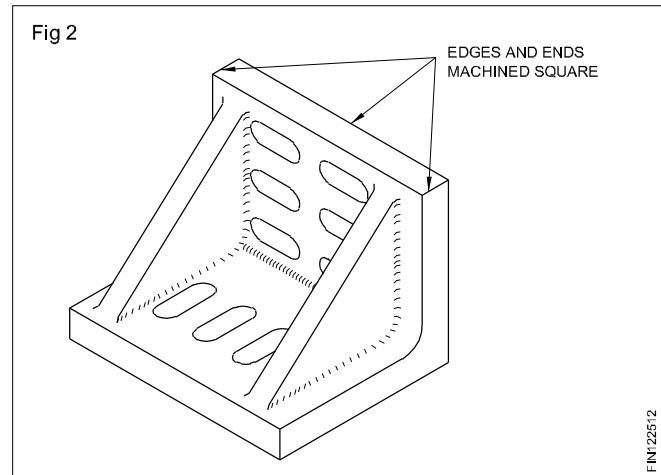


Among the three types of angle plates normally used, the plain solid angle plate is the most common. It has the two plane surfaces perfectly machined at 90° to each other. Such angle plates are suitable for supporting work-pieces during layout work. They are comparatively smaller in size.

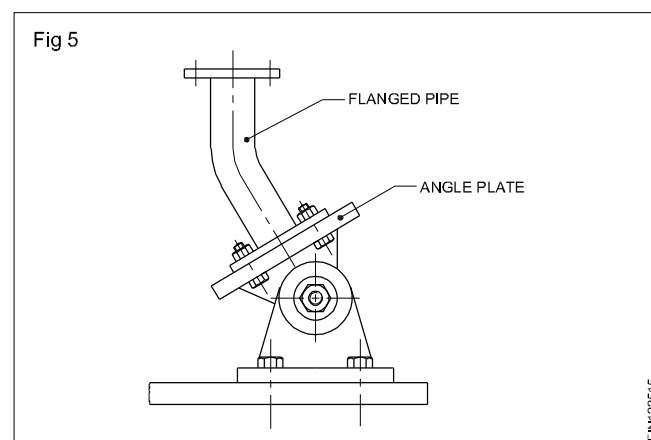
Slotted type angle plate (Fig 2)

The two plane surfaces of this type of angle plate have slots milled. It is comparatively bigger in size than the plain solid angle plate.

The slots are machined on the top plane surfaces for accommodating clamping bolts. This type of angle plate can be tilted 90° along with the work for marking or machining. (Figs 3 and 4)



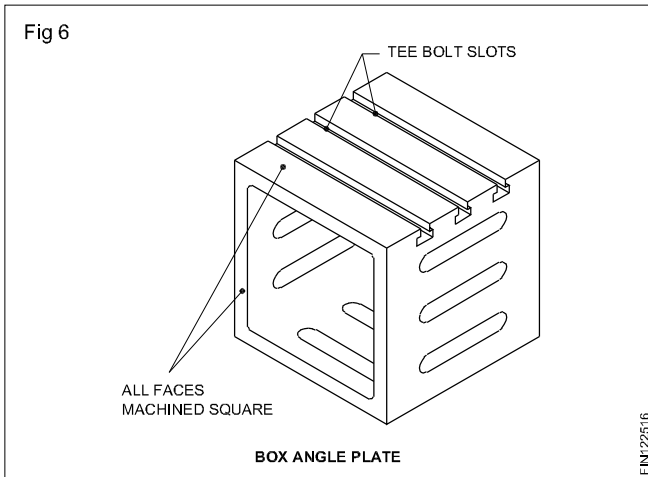
Swivel type angle plate (Fig 5)



This is adjustable so that the two surfaces can be kept at an angle. The two machined surfaces are on two separate pieces which are assembled. Graduations are marked on one to indicate the angle of tilt with respect to the other. When both zeros coincide, the two plane surfaces are at 90° to each other. A bolt and nut are provided for locking in position.

Box angle plate (Fig 6)

They have applications similar to those of other angle plates. After setting, the work can be turned over with the box enabling further marking out or machining. This is a significant advantage. This has all the faces machined square to each other.



Grades

Angle plates are available in two grades - Grade 1 and Grade 2. The Grade 1 angle plates are more accurate and are used for very accurate tool room type of work. The Grade 2 angle plates are used for general machine shop work. In addition to the above two grades of angle plates, precision angle plates are also available for inspection work.

Parallel blocks

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

- name the types of parallels
- state the constructional features of parallel blocks
- specify parallel blocks as per BIS recommended
- state the uses of parallel blocks.

Parallel blocks of different types are used for setting workpieces for machining. The commonly used are of two types.

- Solid Parallels
- Adjustable Parallels

Solid parallels (Solid parallel blocks) (Fig 1)

This is the type of parallel which is very much used in machine shop work. They are made of steel pieces of rectangular cross section, and are available in different lengths and cross sectional sizes.

Sizes

Angle plates are available in different sizes. The sizes are indicated by numbers. Table 1 gives the number of the sizes and the corresponding size proportions of the angle plates.

Specification of angle plates

a) Size 6 Grade 1

Box plate will be designated as - box angle plate 6 Gr 1 IS 623.

b) Size 2 - Grade 2 angle plate will be designated as

Angle plate 2 Gr 2 I.S 623.

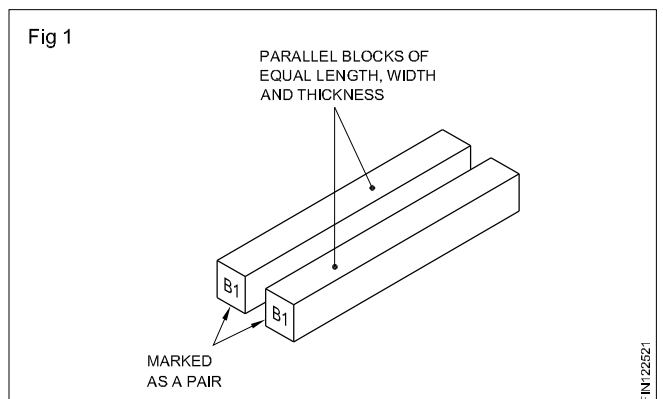
TABLE 1

Size No.	L	B	H
1	125	75	100
2	175	100	125
3	250	150	175
4	350	200	250
5	450	300	350
6	600	400	450
7	700	420	700
8	600	600	1000
9	1500	900	1500
10	2800	900	2200

Grade 2 only

Care & Maintenance

- Clean before and after use.
- Apply oil after the use.



They are hardened and ground, and, sometimes, finished by lapping.

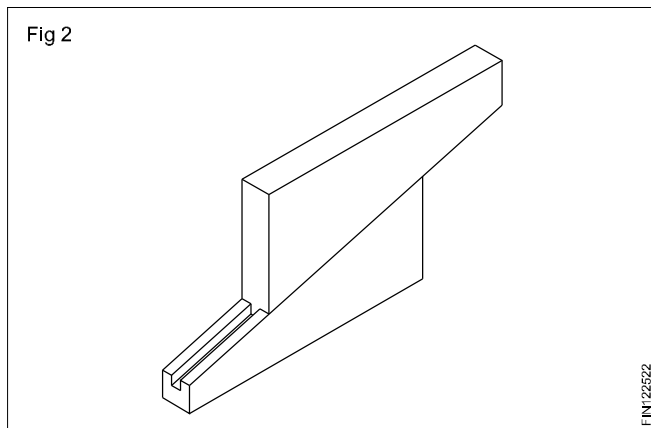
Parallels are machined to close limits, and are perfectly flat, square, and parallel throughout the length. These are made in pairs of identical dimensions.

Grades

Parallels are made in two grades - Grade A and Grade B. Grade A is meant for fine toolroom type of work, and Grade B for general machine shop work.

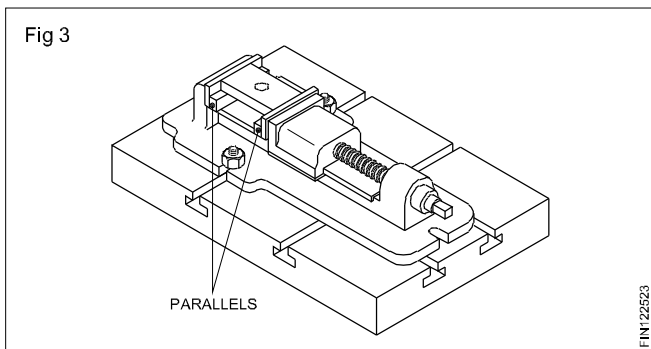
Adjustable parallels (Fig 2)

These consist of two tapered blocks sliding one over the other in a tongue and groove assembly. These types of parallels can be adjusted and set to different heights.



Uses

Solid and adjustable parallels are used for parallel setting of workpieces while machining. They are also useful for raising the workpieces held in vices or machine tables to provide better observation of the machining process. (Fig 3)



Parallels are made in pairs and should be used in matching pairs to ensure accuracy in set-up.

Care and maintenance

- Clean before and after the use.
- Apply oil after use
- Do not use as a hammer.

Sizes of parallels

These are given in TABLE 1 and TABLE 2.

Designation of parallels

Parallels are designated by the type, grade (for solid parallels only) size, and the number of the standard. Fig 4

Examples

Solid parallel A5 x 10 x 100 IS: 4241

Adjustable parallel 10 x 13 IS:4241

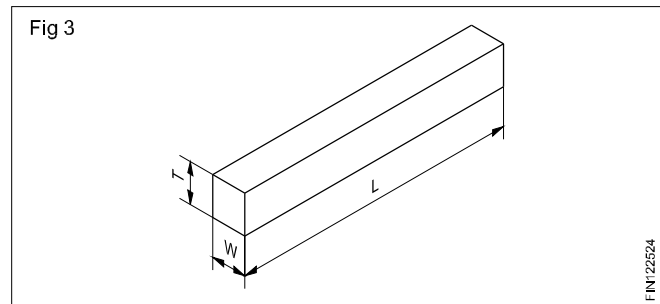


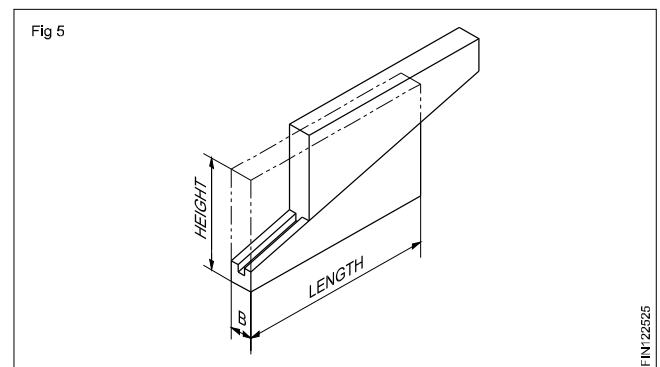
Table 1

Sizes of solid parallels

Grade	Size T.W.L.
A & B	5 x 10 x 100
A & B	10 x 20 x 150
A & B	15 x 25 x 150
A & B	20 x 35 x 200
A & B	25 x 45 x 250
A & B	30 x 60 x 250
A & B	35 x 70 x 300
B	40 x 80 x 350
B	50 x 100 x 400

Table 2

Range and size of Adjustable Parallels



Height Range	Length
10 - 13	40
13 - 16	50
16 - 20	60
20 - 25	65
25 - 30	70
30 - 40	85
40 - 50	100