Driving plate and face plate

Objectives : At the end of this lesson you shall be able to
- **name the parts of a driving plate**
- **distinguish between the different driving plates**
- **state the uses of the different driving plates**
- **name the parts of a face plate**
- **distinguish between different face plates.**
- **list out the accessories used along with the face plates.**

Driving plates

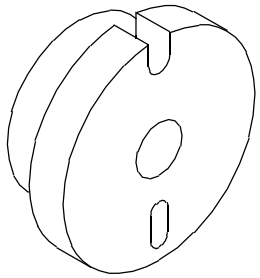
When turning a work in between the centres, the driving plate is used for transmitting the drive to the work.

They are grouped as catch plates and driving plates and safety driving plates.

Catch plate

It is designed with a 'u' slot and an elliptical slot to accommodate the bent tail of the lathe carrier. (Fig 1)

Fig 1



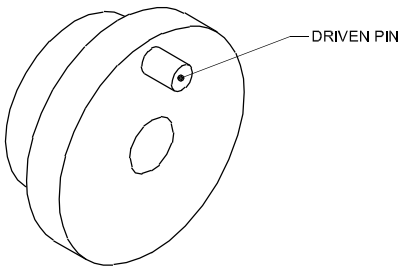
CATCH PLATE

TUN134211

Driving plate

It is designed with a projected pin which locates the straight tail of the lathe carrier. (Fig 2)

Fig 2



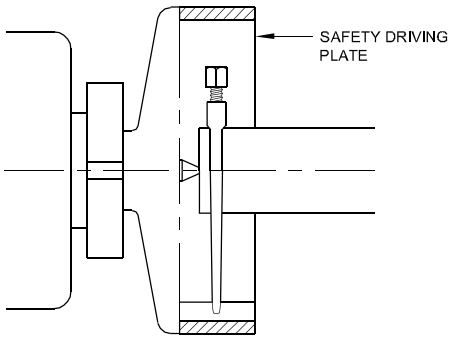
DRIVE PLATE

TUN134212

Safety driving plate

It is similar in construction to a driving plate but equipped with a cover to protect the operator from any injuries. (Fig 3)

Fig 3



TUN134213

The safety driving plates are made of cast steel and are machined to have their face perfectly at right angles to the bore. They are provided with a stepped collar at the back. The bore is designed to suit the spindle nose to which the plate has to be mounted.

The driving plate with a straight tail carrier provides a positive drive for the workpiece.

A catch plate with a bent tail carrier uses a minimum clamping length of the workpiece for clamping purposes.

A safety driving plate prevents likely injuries to the operator.

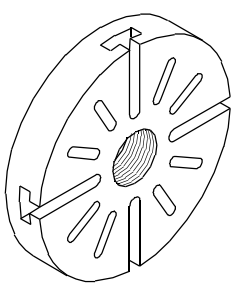
Face plates

They are similar in shape to the lathe catch plates but are larger in diameter.

The different types of face plates are:

- face plates with elongated slots and 'T' slots (Fig 4)

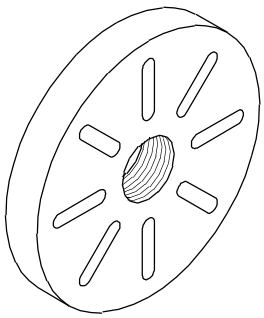
Fig 4



TUN134214

- face plates with only elongated radial slots (Fig 5)

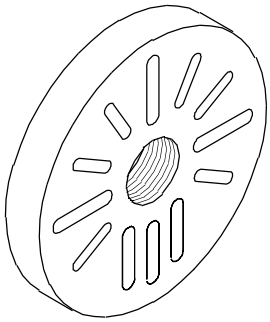
Fig 5



TUN1342'15

- face plates with elongated radial slots and additional parallel slots (Fig 6)

Fig 6

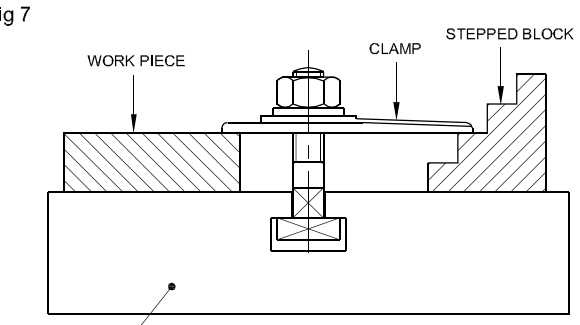


TUN1342'16

Face plates are used along with the following accessories when in use. The accessories are listed here.

- Clamps,'T' bolts and stepped block (Fig 7)

Fig 7



CORRECT CLAMPING SETUP

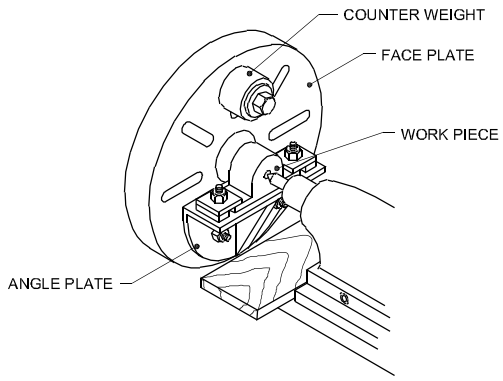
TUN1342'17

- Angle plate and counterweight (Fig 8)
- Parallels (Fig 9)

Uses

Large, flat, irregular shaped workpieces, castings, jigs and fixtures may be firmly clamped to a face plate for various turning operations .

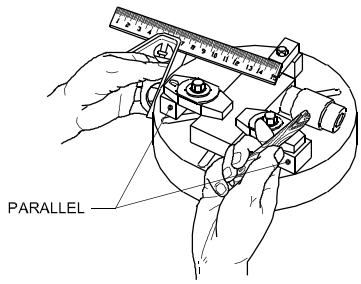
Fig 8



WORK HELD BY AN ANGLE PLATE

TUN1342'18

Fig 9



LOCATING WORK ON A FACE PLATE

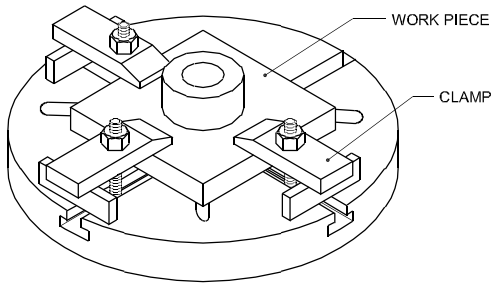
TUN1342'19

The work can be mounted on a face plate while the face plate is on the lathe spindle or on the workbench. If the workpiece is heavy or irregular to hold, the workpiece is mounted while the face plate is on the workbench. Before mounting the face plate set up to the spindle, it is advantageous to locate the workpiece on the face plate and centre the workpiece with reference to the centre punch mark or hole approximately on the face plate. This makes it easier to true the work after the face plate is mounted on to the spindle.

The position of the bolts and clamps is very important, if a workpiece is to be clamped effectively.

If a number of duplicate pieces are to be machined, the face plate itself can be set up as a fixture, using parallel strips and stop blocks.

Fig 10



WORK CLAMPED DIRECTLY TO FACE PLATE

TUN1342'1A

Fixed, travelling steadies, transfer caliper & its construction, uses

Objectives : At the end of this lesson you shall be able to
- **state what is a steady rest**
- **identify and name the various types of steady rests**
- **distinguish between a fixed steady rest and a follower steady rest**
- **state the uses of a steady rest**
- **identify the cat head and its use.**

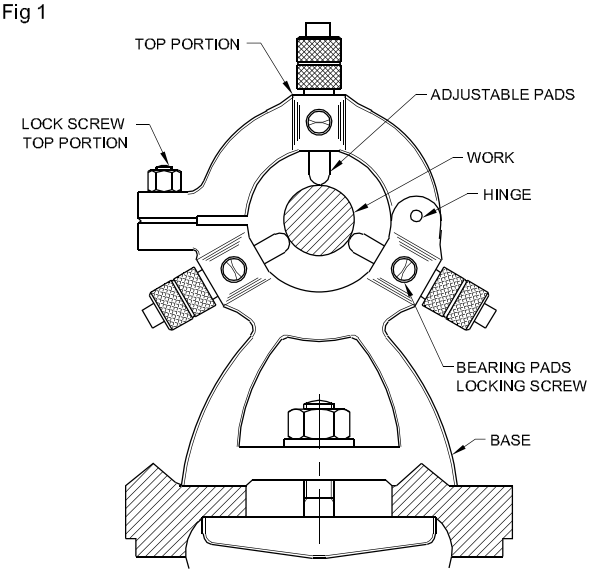
A steady rest is a lathe accessory used to give extra support for a long slender workpiece in addition to the centre support during turning.

The most common types of steady rests are :

- Fixed steady rest.
- Followed steady rest (travelling steady)

Fixed steady rest (Fig 1)

Fig 1



LATHE BED CLAMP

The figure shows the parts of a fixed steady rest.

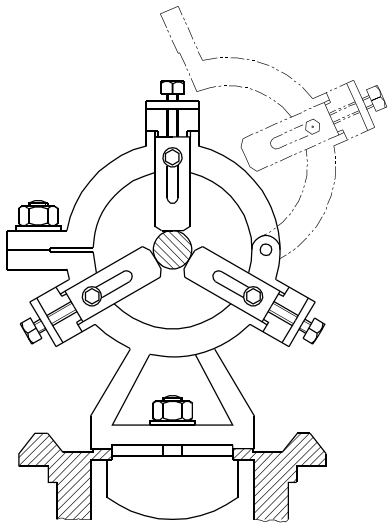
A fixed steady rest is fixed to the lathe bed and it is stationary. It gives support at one fixed place only.

It consists of a frame containing three adjustable pads.

The base of the frame is machined to suit the inside ways of the lathe bed. The top portion is hinged at the back to permit the top to be lifted or assembled to the bottom half for allowing the work to be mounted or removed. A fixed steady can be clamped at any desired position on the lathe bed by the base clamping screw. (Fig 2)

The three adjustable pads can be moved radially in or out by means of adjusting screws. The three pads are adjusted on a trued cylindrical face of the workpiece.

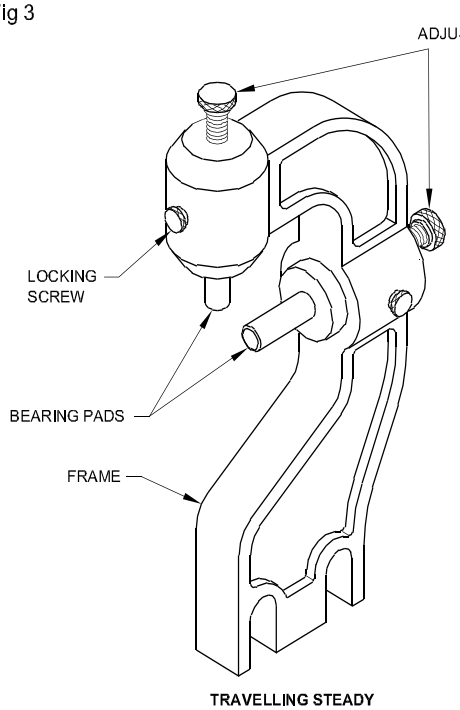
Fig 2



A follower steady is fixed to the saddle of the lathe. As it follows the tool, it gives support where cutting actually takes place. In the follower steady, the support is continuous to the entire length of cutting.

Follower steady rest (Fig 3)

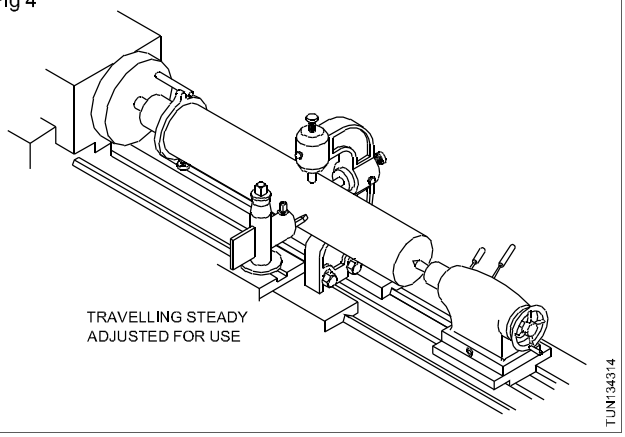
Fig 3



TRAVELLING STEADY

The follower steady rest has usually two pads. One pad is located opposite to the cutting tool and the other pad bears the top of the workpiece to prevent it from springing up. The figure shows a travelling steady rest in action. (Fig 4)

Fig 4

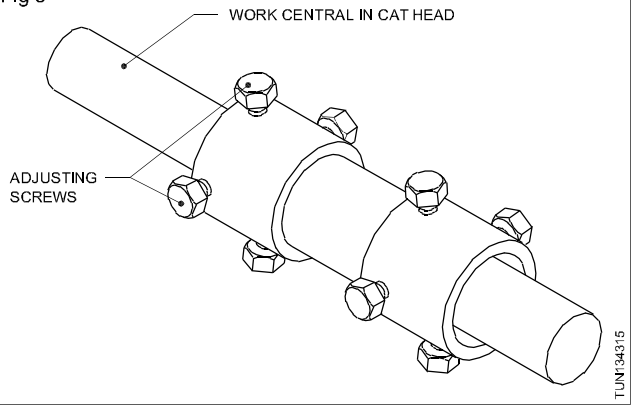


Cat head

If the job shape is not round or where we cannot turn a true cylindrical surface on the job, it is not possible to support the job, by a fixed steady rest. For those types of jobs, a device called cat head is fixed on the workpiece.

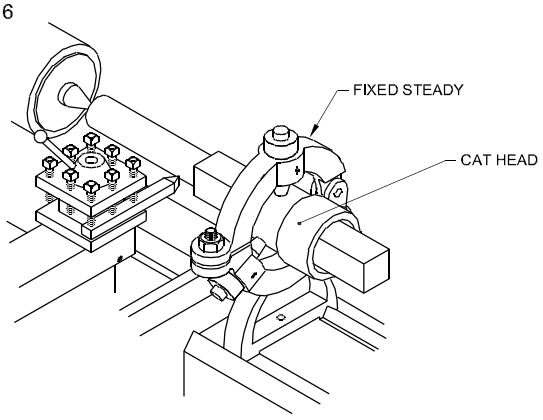
The cat head is a type of bush, its external surface is round. Fig 5 shows a cat head. The middle portion is cylindrical and free to rotate. The two ends have the adjusting screws

Fig 5



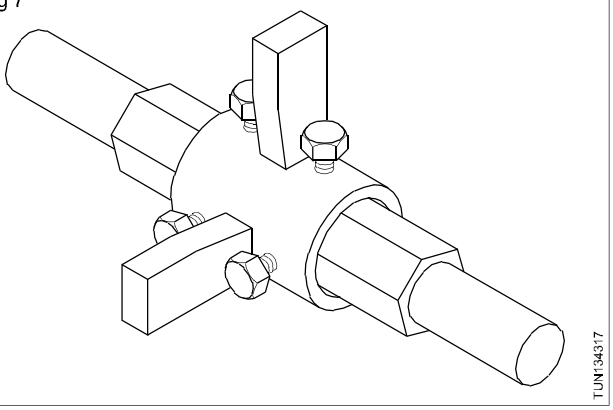
for holding and centering the work. After centering the work the fixed steady is positioned, and pads are adjusted to hold the cat head's centre portion. When the lathe is running the work revolves along with the ends of the cat head whereas the centre portion is stationary. (Fig 6) Another type of cat head, shown in Fig 7, is a single piece and it rotates along with the job.

Fig 6



USING CAT HEAD AND FIXED STEADY REST

Fig 7



Transfer Caliper

Objectives : At the end of this lesson you shall be able to
- **Identify the parts of an transfer caliper**
- **State the function of the transfer caliper**
- **Read transfer caliper mesurment.**

Transfer Caliper

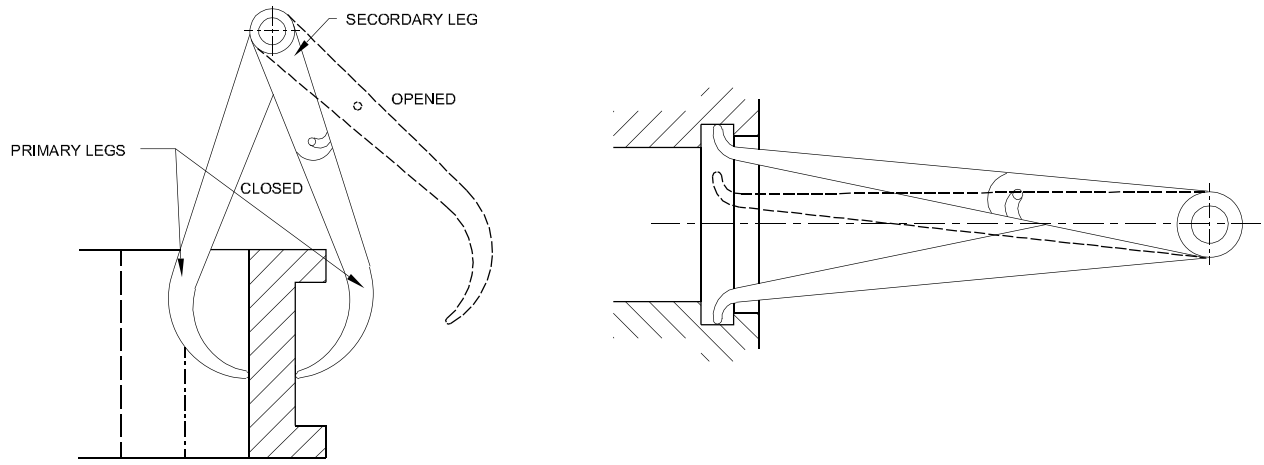
This type of caliper (outside or inside) used where caliper cannot be access directly due steps, projections, grooves etc.

The construction is similar to ordinary (Pivoted or with Thumb nut) firm joint caliper with additional secondary leg at the top of one of the primary legs with or without lock met facility.

In this type the primary legs are made to touch the surface to be measured and then the secondary leg brought to position till the pin in primary leg coincides through the slot. New the position of secondary leg unchanged and primary leg with stopper pin in relieved of from measured surface.

Once caliper taken out, the primary leg which was relieved in to the position to secondary leg position. Then the dimension measure with the help of measuring instrument.

Fig 1



TUN134321

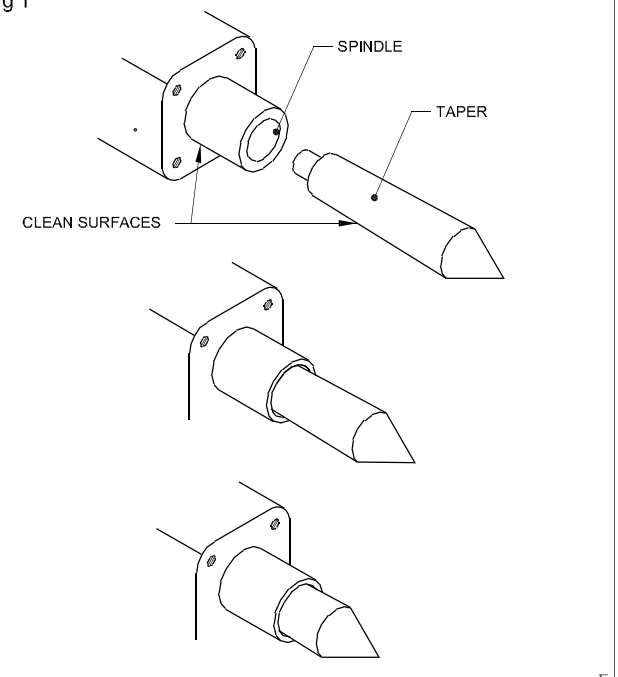
Lathe centre and types & their uses

Objectives : At the end of this lesson you shall be able to
- **state what is a lathe centre**
- **distinguish between a live centre and a dead centre**
- **state the purpose of lathe centres**
- **identify and name the different types of centres**
- **indicate the specific uses of each type of centre.**

Lathe centre

It is a lathe accessory. It is used to support a lengthy work to carry out lathe operations. When a work is held in a chuck, the centre is assembled to the tailstock, and it supports the overhanging end of the work. The work is to be provided with a centre drilled hole on the face of the overhanging end. When the job is held in between centres to carry out the operation, it functions together with a driving plate and a suitable lathe carrier.

Fig 1



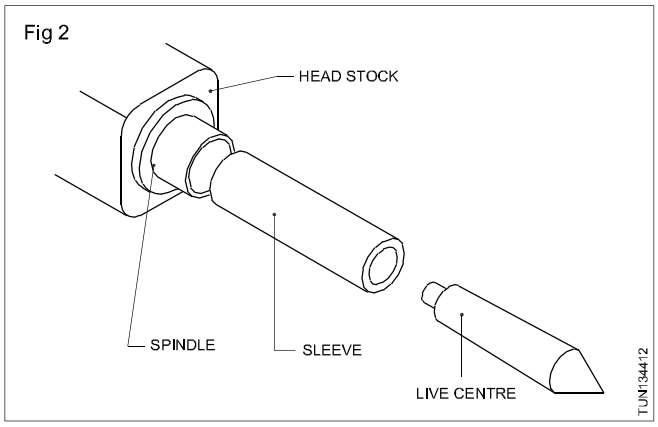
The centre, which is accommodated in the main spindle sleeve, is known as a 'live centre' and the centre fixed in the tailstock spindle is known as a dead centre. In construction, both centres are identical, made as one unit that consists of a conical point of 60° included angle, a body provided with a Morse taper shank and a tang.

The dead centre is made out of high carbon steel, hardened and around whereas the live centre need not have its conical tip hardened as it revolves with the work. A good lubricant should be used for the dead centre.

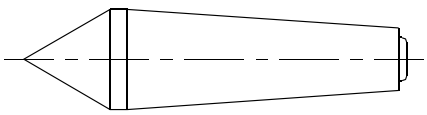
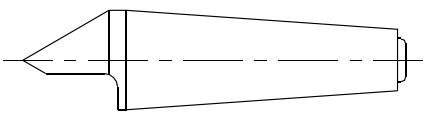
Types of centres and their uses

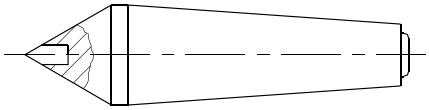
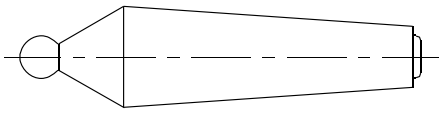
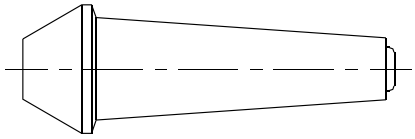
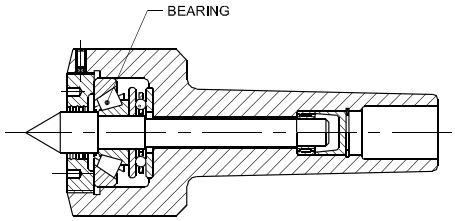
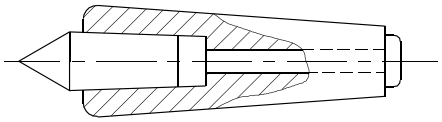
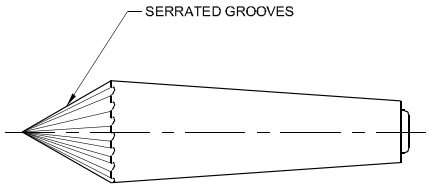
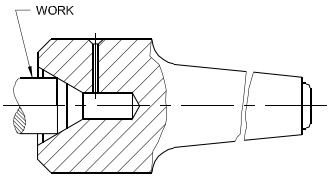
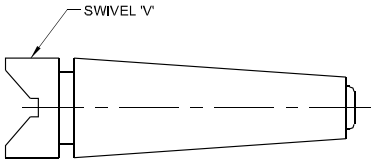
The following table gives the names of the most widely used types of lathe centres, their illustrations and their specific uses. (Fig 2)

Fig 2



Various Types of Lathe Centres

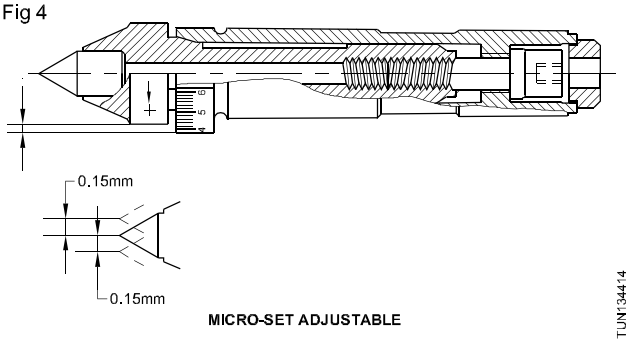
1	Ordinary centre-common type		Used for general purpose.
2	Half centre		Though it is termed as half centre, little less than half is relieved at the tip portion. eved at the tip portion. Used while facing the job without disturbing the setting.

3	Tipped centre		A carbide or a hard alloy tip is brazed into an ordinary steel shank. The hard tip is wear- resistant.
4	Ball centre		Minimum wear and strain. Particularly suitable for taper turning.
5	Pipe centre		Used for supporting pipes, shells and hollow end jobs.
6	Revolving centre		Frictionless. Used for supporting heavy jobs and jobs revolving with high speeds. A high-speed steel inserted centre is supported by two bearings housed in a body. It is also called the revolving dead centre.
7	Insert-type centre		Economical. Only the small high-speed steel insert is replaced.
8	Self-driving live centre		Usually mounted on the head-stock spindle. Used while machining the entire length of the job in one setting. Grooves cut around the circumference of the centre point provide for good gripping of the job and for getting the drive. This centre can be used for only soft jobs and not for hardened jobs.
9	Female centre		This centre is used to support the end of the job where no countersink hole is permitted.
10	Swivel 'V' centre		This centre is used to support a job in the `V' portion and to drill holes across the round job by using a drill bit in the head-stock spindle.

A micro-set adjustable centre fitted into the tailstock spindle provides a fast and accurate method of aligning lathe centres.(Fig 3)

Some of these centres contain an eccentric, others contain a dovetail slide which permits slight adjustment of the centre itself to correct alignment.

Fig 4



MICRO-SET ADJUSTABLE

TUN134414

Lathe carrier - Function, types of carrier and uses

Objectives : At the end of this lesson you shall be able to
- **name the types of lathe carrier**
- **state the use of each type of lathe carriers.**

The purpose a lathe carrier is mainly to hold the work and provide rotation by transfering the power from the spindle using special attachment.

Accessories used for in-between centre work

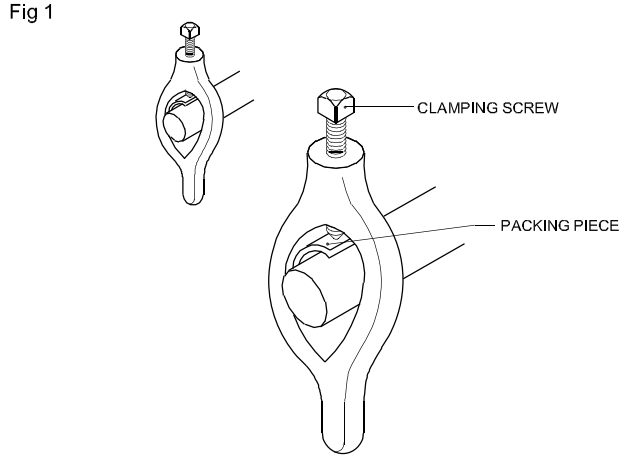
The accessories used during turning work held in between centres are as follows.

Live centre, Dead centre, Catch plate, Driving plate, Lathe spindle sleeve and Lathe carriers.

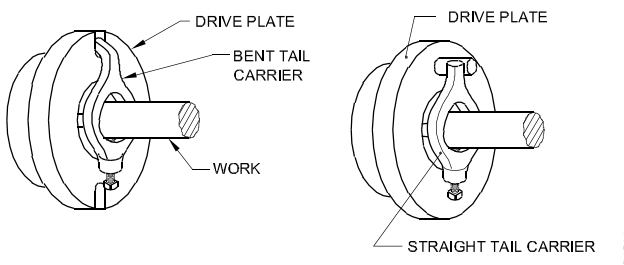
Lathe carriers

They are also called lathe dogs. They are used to drive the work during turning between centres. The work is clamped firmly in the lathe carrier. It consists of a cast iron or forged steel body and a clamping screw. It is designed with a straight or bent tail. It is available in a set of 10, capable of accommodating work of a wide range of diameters. The tails of the carriers are meant to locate and drive the workpiece for turning. (Fig 1) To protect the finished surface from damages, a soft metal packing piece is used under the clamping screw.

Fig 1



FITTING CARRIER TO WORK



METHOD OF DRIVING WORK

TUN134511

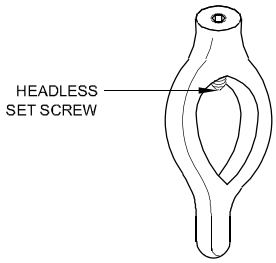
Types of Lathe carriers

The following are the four types of lathe carriers.

Straight tail carrier, Bent tail carrier, Clamp type carrier and Safety clamp type carrier.

A straight tailed carrier locates against the driving pin of the driving plate and provides a positive drive for the workpiece. (Fig 2)

Fig 2

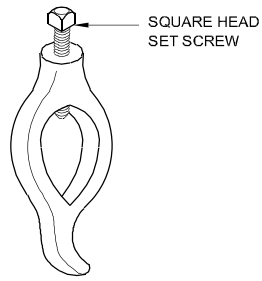


STRAIGHT TAIL

TUN134512

A bent tailed lathe carrier engages into a ‘u’ slot of the catch plate and drives the workpiece. (Fig 3).

Fig 3



BENT TAIL

TUN134513

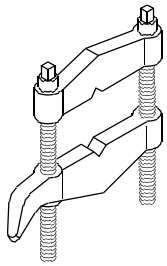
The clamp type lathe carrier is designed with a clamping plate and adjustable screws. It holds a wide range of diameters of work because it is provided with a ‘V’ groove and adjustable bolts and nuts. This carrier may be used to hold square and rectangular sectioned rods also. They are also useful to hold small diameter jobs because of the provision of the ‘V’ groove. (Fig 4)

Safety clamp lathe carriers are desinged with safety - top and bottom clamping plates. These plates provide a positive grip of the work during turning. (Fig 5)

Uses of Carrier

- Hold component/workpiece and held between centres to carry out truning operation.
- It can also be used for tapper turning and threading.

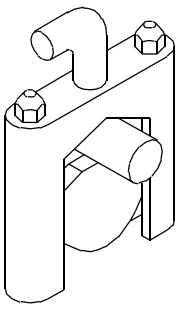
Fig 4



CLAMP TYPE

TUN1345I4

Fig 5



SAFETY CLAMP

TUN1345I5

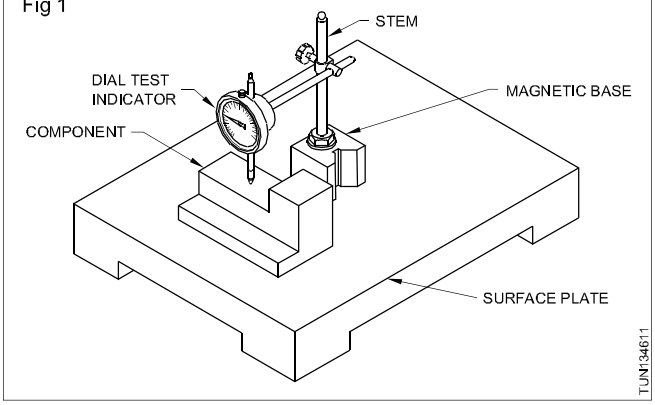
Magnetic stand dial indicator its uses and care

Objectives : At the end of this lesson you shall be able to
- **state the working principle of a dial test indicator**
- **identify the parts of a dial test indicator**
- **state the important features of a dial test indicator**
- **state the functions of a dial test indicator**
- **identify different types of stands.**

What are dial test indicators

Dial test indicators are fine precision type of instruments used for comparing and determining the variation in the sizes of components. (Fig 1)

Fig 1



These instruments cannot give the direct reading of the sizes like micrometers and vernier calipers. A dial test indicator magnifies small variations in sizes by means of a pointer on a graduated dial. This direct reading of the deviations gives an accurate picture of the conditions of the parts being tested.

Principle of working

The principle of a dial test indicator is the magnification of a small movement of the plunger by converting it into rotary motion of a pointer on a circular scale. (Fig 2)

For converting linear motion of the plunger into rotary motion of the pointer, a rack and pinion mechanism is used.

Types

Two types of dial test indicators are in use according to the method of magnification.

- Plunger type (Fig 3)
- Lever type (Fig 4)

Important features of a dial test indicator

An important feature of the dial test indicator is that the scale can be rotated by a ring bezel, enabling it to be readily set to zero.

Fig 2

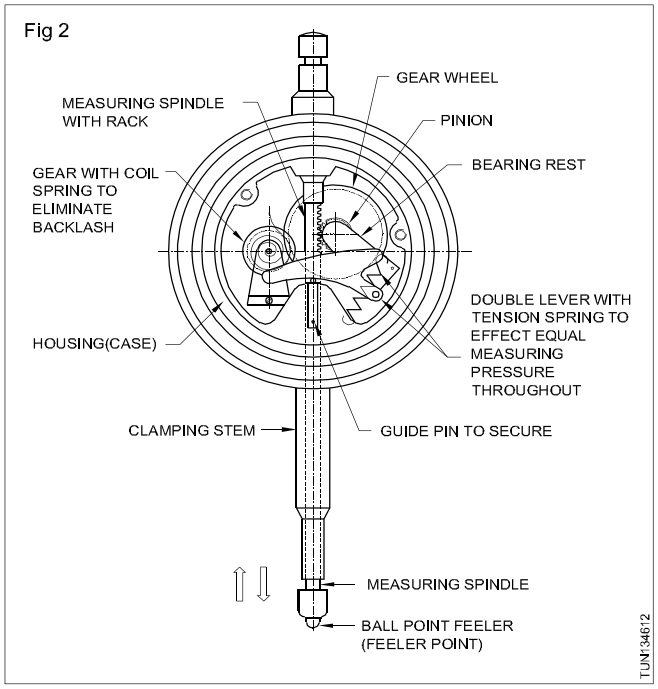


Fig 3

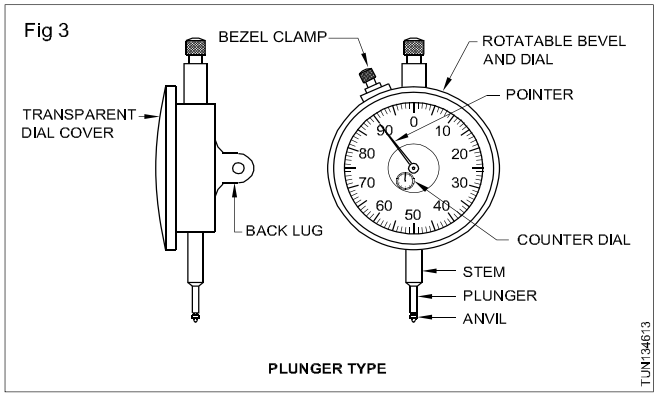
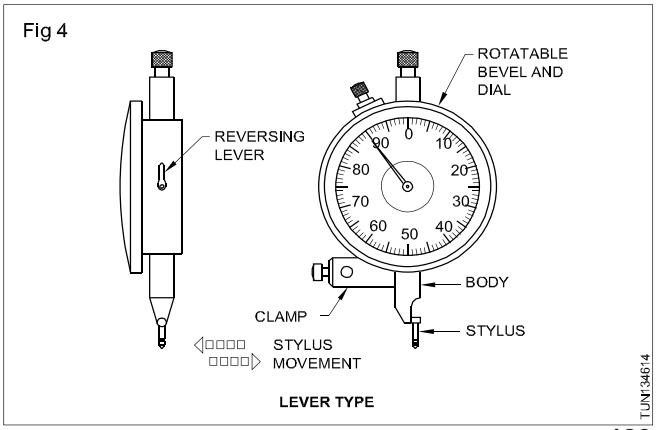


Fig 4

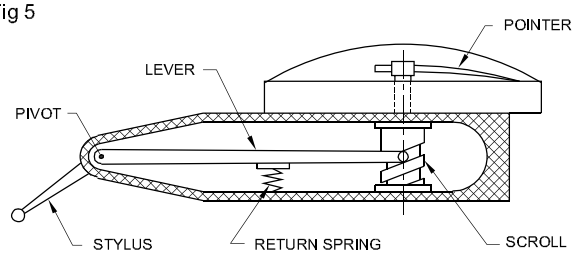


Many dial test indicators read plus in a clockwise direction from zero and minus in a counter clockwise direction to give plus and minus indications.

The lever type dial test indicator

In the case of this type of dial test indicators the magnification of the movement is obtained by a mechanism of lever and scroll. (Fig 5)

Fig 5



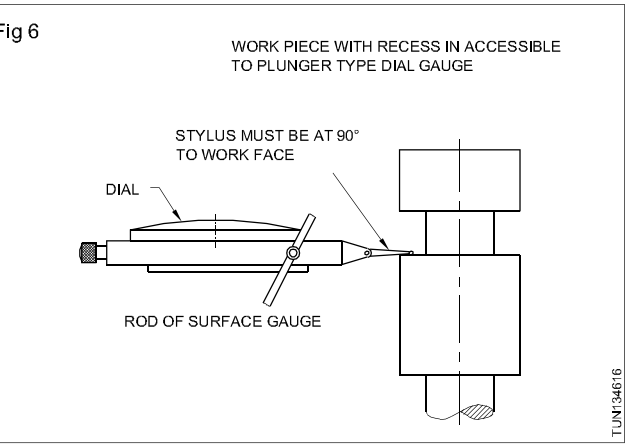
MECHANISM OF THE LEVER TYPE DIAL GAUGE

TUN134615

It has a stylus with a ball type contact operating in the horizontal plane.

This can be conveniently mounted on a surface gauge stand and can be used in places where the plunger type dial test indicator application is difficult. (Fig 6)

Fig 6



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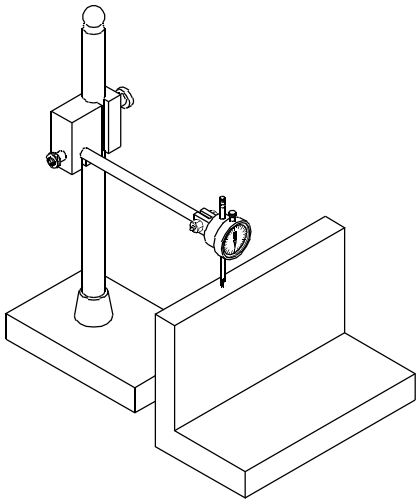
Uses (Figs 7 to 11)

- To compare the dimensions of a workpiece against a known standard.
- To check plane surfaces for parallelism and flatness.
- To check parallelism of shafts and bars.
- To check concentricity of holes and shafts.

Stands

Dial test indicators are used in conjunction with stands for holding them so that the stand itself may be placed on the datum surface or machine tools.

Fig 7



CHECKING FOR PARALLELISM

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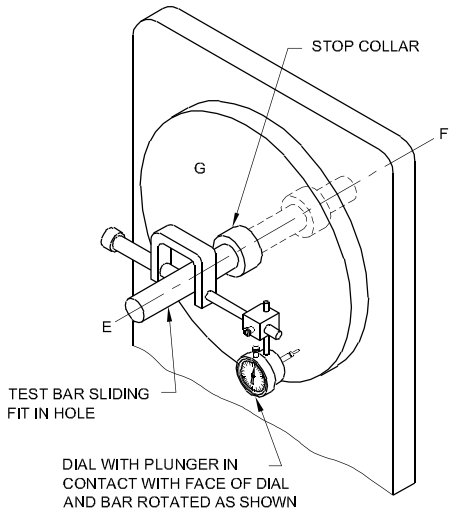
Fig 8



TESTING SQUARENESS OF FACE G WITH AXIS EF OF CENTRE HOLE

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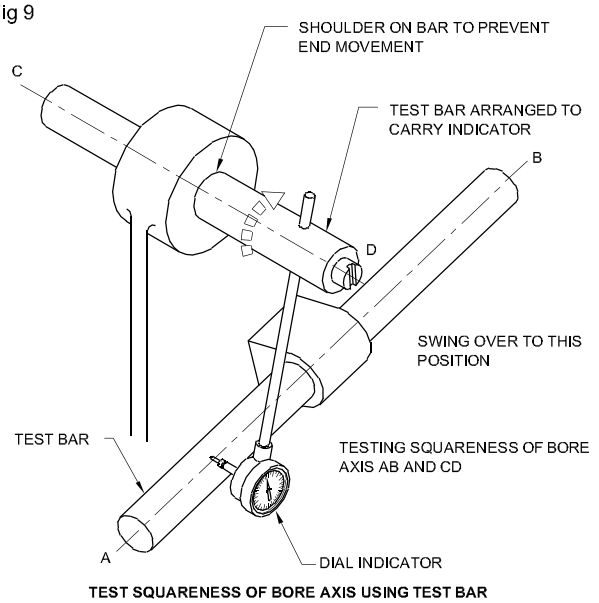
Fig 9



TEST SQUARENESS OF BORE AXIS USING TEST BAR

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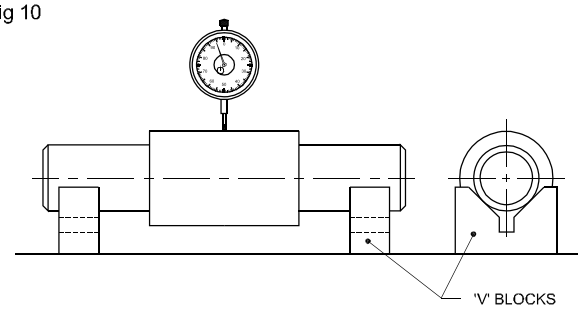
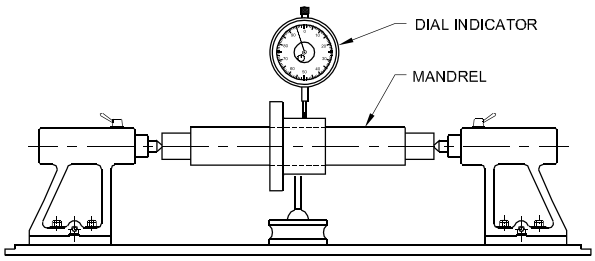
Fig 10



CONCENTRICITY TEST ON ENLARGED PORTION OF SHAFT



TESTING BUSH FOR CONCENTRICITY

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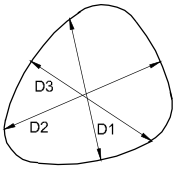
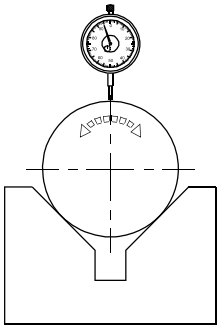
Fig 11



CONSTANT DIAMETER FIGURES WHICH WOULD APPEAR TO BE ROUND IF MEASURED ACROSS DIAMETERS



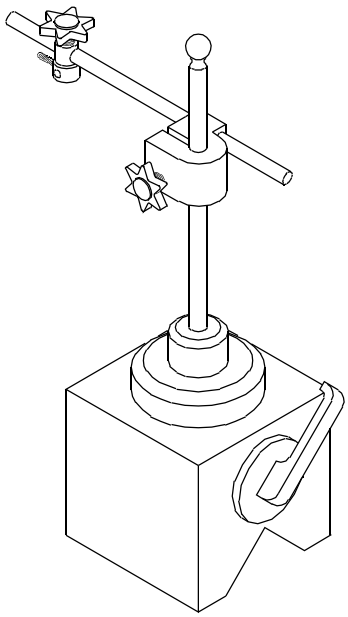
TEST FOR ROUNDNESS WITH VEE BLOCKS AND CLOCK INDICATOR

TUN'13461B

The following are the three types of stands available.

Magnetic stand with universal clamp. (Fig 12)

Fig 12

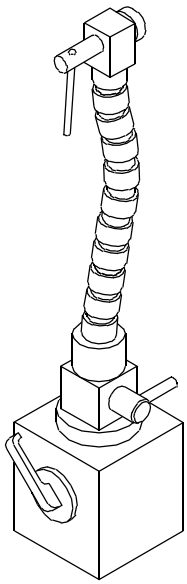


MAGNETIC STAND UNIVERSAL CLAMP

TUN'13461C

Magnetic stand with flexible post. (Fig 13)

Fig 13

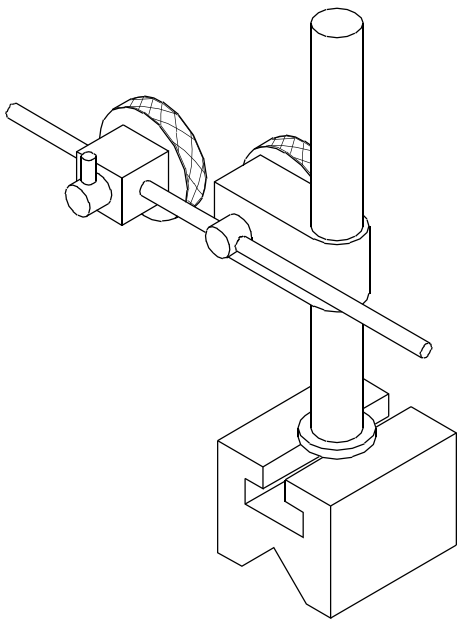


MAGNETIC STAND WITH FLEXIBLE POST

TUN'13461D

General purpose holder with cast iron base(Fig 14)

Fig 14



GENERAL PURPOSE HOLDER WITH CAST IRON BASE

TUN13481E

Care for dial Indicator

1 Make sure clean greases and oils on the dial face

2 Use soft and clean cloth to clean the dial face to prevent from scratching.

3 Use thin film of oil to prevent rust

4 Be sure to store dial indicator properly to protect from dirt, moisture and damage.

Tool posts - Types and tool setting

Objectives : At the end of this lesson you shall be able to
- **identify and name the different types of tool posts**
- **state the constructional features of each types of tool post**
- **indicate the application of each type or tool post.**

Tool post

The tool post holds the tool or tools meant for the operation to be performed on the work.

The tool post is assembled to the top slide.

The three types of tool posts most commonly found lathes are listed here.

American type tool post or single way tool post

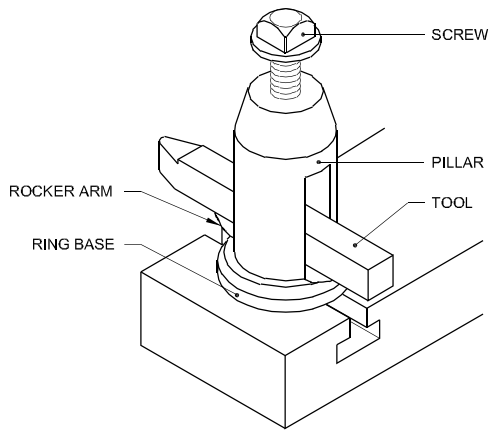
Indexing type of tool post or square tool post.

Quick change tool post.

Single way tool post (Fig 1)

It consists of a circular tool post body with a slot, for accommodating the tool or tool-holder. A ring base, a rocker arm, and a tool clamping screw complete the assembly of this type of tool post. The tool is positioned on the rocker arm and clamped. The centre height of the tool tip can be adjusted with the help of the rocker arm and the ring base. Only one tool can be fixed in this type of tool post. The rigidity of the tool is less as it is clamped with only one bolt.

Fig 1

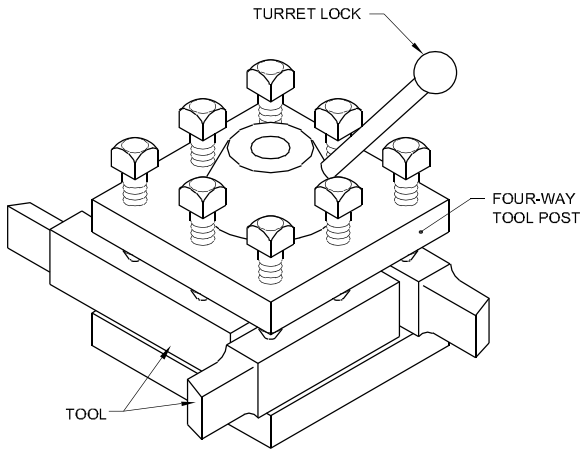


AMERICAN PILLAR TYPE TOOL POST

Indexing type tool post (Fig 2)

It is also called a square tool post or a four-way tool post. Four tools can be fixed in this type of tool posts and any one can be brought to the operating position and the square head is clamped with the help of the locking lever. By loosening the locking lever the next tool can be indexed and brought to the operating position. The indexing may be manual or automatic.

Fig 2



INDEXING TYPE TOOL POST

The advantages are

each tool is secured in the tool post by more than one bolt and so rigidity is more.

frequent changing of the tool for different operations need not be done as four tools can be clamped simultaneously.

The disadvantage is that skill is required to set the tools and it takes more time to set to the centre height.

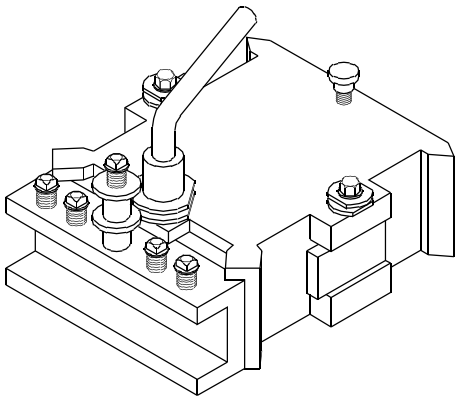
Quick change tool post/universal tool post (Fig 3)

Modern lathes are provided with this type of tool posts. Instead of changing the tools, the tool holder is changed in which the tool is fixed. This is expensive and requires a number of tool holders. But it has the advantage of ease with which it can be set to the centre height and has the best rigidity for the tool.

British type tool post (Fig 4)

This type of tool post is found mostly on British lathes. This also has provision for only one tool to be clamped for performing the operation. This is more rigid when compared to the pillar-type tool post, as the tool is held in position by

Fig 3



QUICK CHANGE TOOL POST

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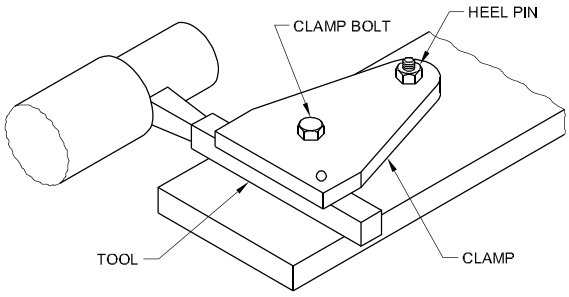
Fig 4



BRITISH (CLAMP) TYPE TOOL POST

TUN134714

the flat clamp. This requires greater skill in clamping as the adjustment of the heel pin is needed to give a grip on the full width of the tool.

Packing strips may be needed to be placed for adjusting the tool centre height.

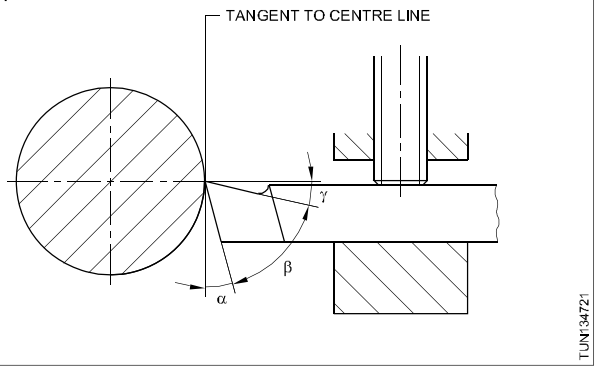
Tool setting

Objective : This shall help you to

- **set the tool in the tool post for performing the operation.**

For optimum cutting, the effective rake angle and clearance angle of the clamped tool must be equal to the ground angles of the tool. This requires clamping of the tool to have its axis perpendicular to the lathe axis, with the tool tip at the workpiece centre. (Fig 1)

Fig 1



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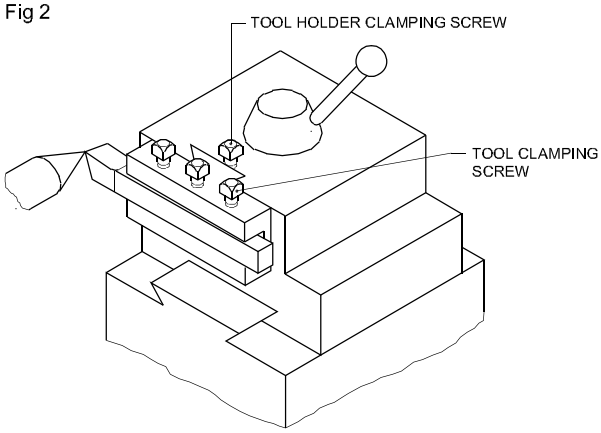
It is difficult to determine the effective angles of the tool when it is not set to the centre height.

The tool nose can be set to the work centre by means of a tool-holder with adjustable height. (Fig 1)

The tool nose can be set to the exact centre height by placing the tool in the tool post on the shims or packing strips. These packing strips should be preferably a little less in width than the width of the tool but should never be more. The length of these strips should be according to the shank length and the tool seating face of the tool post. (Fig 2)

Fig 2



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The procedure to follow is given below.

Clean the tool post seating face, and place the shims on the seating face.

> **Use a minimum number of shims for height adjustment.**

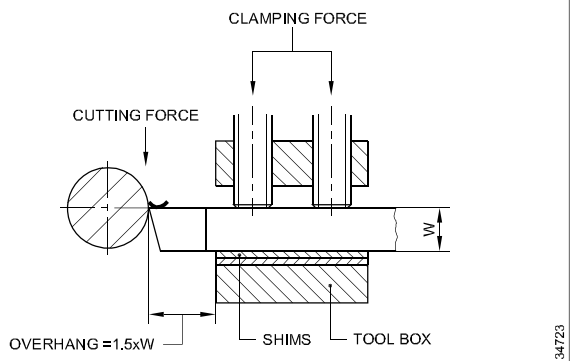
Shims must be flushed with the edge of the seating face.

Place the tool in the tool post on the shims, with the rear butting against the wall of the seating face. (Fig 3)

> **The unsupported length of the overhanging end of the turning tool should be kept to a minimum. As a rule, the overhanging length of tool is equal to the tool shank width x 1.5.**

Tighten the tool with the centre screw of the tool post.

Fig 3

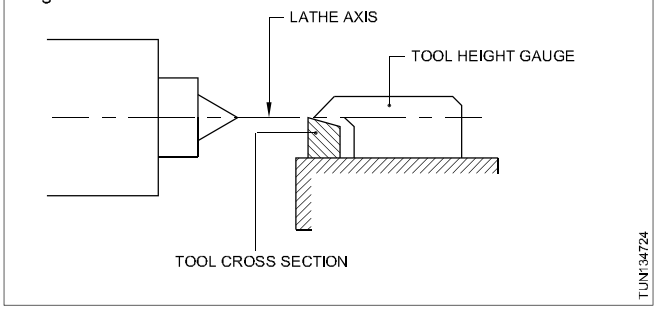


Check the centre height with a height setting gauge. (Fig 4)

Remove or add shims and check the height when the tool is tightened by the centre screw.

Tighten the other two tool-holding screws alternately applying the same amount of pressure.

Fig 4



When both the screws have a full gripping pressure, tighten the centre screw fully.

Check once again with a tool height setting gauge.

The gauge should be made according to the size of the machine. If a gauge is not available, use a surface gauge and set the pointer tip to the dead centre height fixed in the tailstock. Use this as the height to which the tool is to be set.