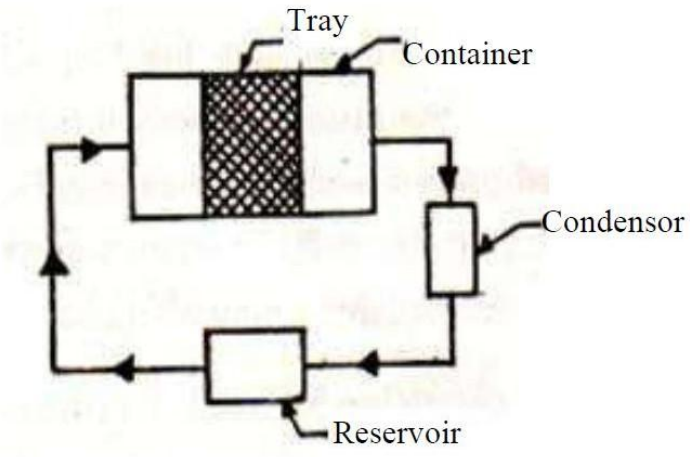
Engine reconditioning is a method of engine servicing. Some companies set up special engine dissemble and rebuilding lines. They bring in old, worn engines, dismantle them completely, repair or replace all worn parts and then completely, recondition the engine using the old parts that are still in good condition. By reconditioning the engine becomes as good as new. There are many machine operations performed on engine parts. Good machining will give like new quality, while poor machining can ruin salvageable parts. Hence care should be taken to get the parts machined from well-equipped machine shop which has a reputation of quality work.

Different types of equipments are required for reconditioning of engine. They are cylinder reboring and honing equipments, cylinder ridge reamer, line boring machine, valve reconditioning equipment, crankshaft grinder etc.

**DEGREASING PLANT**

A layer of oil, grease and dirt gets coated to the engine parts with passage of time and usage. Before performing servicing of the engine (i.e. disassembly, inspection and measure), the unwanted layer should be removed. This can be done by hand cleaning or by means of certain cleaning methods. For small parts, where only a limited number is concerned, a paraffin bath can be used, the parts being brushed or scrubbed with a stiff bristle brush to get rid of hard deposits.




For the larger components it is usual in small workshop to use a hot caustic soda bath or stem bath. The caustic soda should not be used for aluminium alloys since it has a masked chemical action-paraffin or steam bath is recommended instead. In a larger workshop special chemical degreasing plant is employed to clean engine parts. Usually, the dirty parts are placed in a large perforated tray or wire basket and exposed within a tank like contains to the vapour of the heated trichloroethylene. It is a cheap and powerful solvent and is non-inflammable. A condenser is used to condense the vapours and return to the reservoir for the further use.

## DE-CARBONIZING

Carbon is deposited in cylinder due to rich mixture supply, use of wrong grade oil, unnecessary idling, too much oil. Poor fitted piston and piston rings. Deposition of carbon causes engine knockings, missing of explosions and burnt valve resulting in loss of power. The carbon collector at the valve head make the head unable to dissipate heat resulting its burning or warping sometimes. The carbon depositing in between valve and seat and impact of valves causes pits in the seat. Therefore, a loss of compression, reduced power, greater fuel consumption are caused. There, are in general three methods of decarbonising or decoding-

- Scraping method
- Oxygen decarbonizing method
- Chemical method of decarbonising.

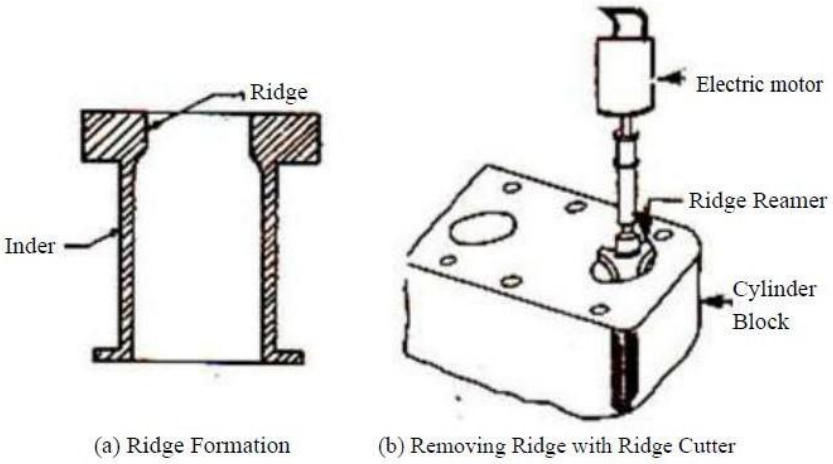
**1. Scrapping method:** The scraping of the carbon is done usually by hand scraping with the help of tools. To remove carbon from the piston, remove it from the cylinder. Now scrap the carbon removing brushes may be fixed in the chuck of an electric portable drill. To clean valve grinder, valve stems etc., special wire brushers may also be used.

**2. Oxygen decarbonising method:** It is the process of removing carbon from the inside of the cylinder and head of the piston without removing the cylinder head by means of an oxygen flame. The equipment consists of an oxygen tank fitted at an initial pressure of 156kg/cm2. The oxygen is applied to the combustion space by inserting a flexible delivery jet through a valve plug orifice or spark plug hole by slightly bending or turning it. The oxygen flame will burn away all the carbon deposits completely.

**3. Chemical method of decarbonising:** The chemical method consists in injecting into each cylinder head trough the spark plug hole a special chemical in liquid form. The engine should be in a warm condition so that the liquid can act more efficiently, after standing for about12 hours the carbon is loosened, so that upon starting up the engine it is blown out of the exhaust pipe.

## CYLINDER RIDGE REMOVAL

Cylinders should be inspected for the ridge at the top which shows the upper limit of piston travel in cylinder




(a) Ridge Formation (b) Removing Ridge with Ridge Cutter

This ridge if found must be removed before proceeding further, because otherwise the rings are liable to break once the attempt is made to take out the piston rod assembly from the top. The ridge is removed by means of a special ridge reamer.

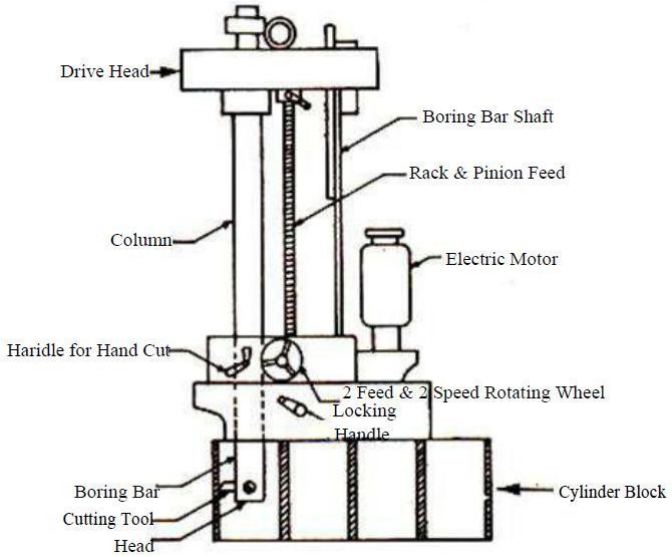
However, care should be taken not to remove any excess metal from the cylinder. Further before starting ridge removal, rotate the crankshaft so that piston of the cylinder being worked upon is at the bottom of the stroke. In this position stiff clean in the cylinder.

Rider is consist of column, spindle head, cutter and level table. The cylinder block is placed over the table below the spindle. The cutter is centered with the cylinder, then speed and feed for the speed is selected and the machine is started. This procedure is repeated until the ridge is removal. This procedure is repeated for other cylinders also.

## CYLINDER REBORING METHOD

Reboring is done on special machines. In this machines uses a single point tool (or) cutter which is set to the exact diameter required with special micrometer. The cutting edge is sharpened on a revolving disk, using a mixture of diamond dirt and oil. The cutter blade shaft is mounted inside a column which moves up and down its housing in the mixed part of the machine, for tool feeding purpose. The cutter is driven at low speed by an electric motor mounted on the machine.

The top surface of the cylinder block is thoroughly cleaned and the boring bar set at one of the cylinder bores. The bar is centered set to the desired depth of cut and the machine started. The cutter will bore progressively to the other end, and the machine stops when the boring complete. After the job is complete again the cylinder must be washed thoroughly to remove all abrasive particles.




Before starting reboring operation it is very important to prevent the entry of metal or abrasive particles in the oil galleries. It is a good practice to warp insulation tapes on crank pins and to cover other parts as is possible.

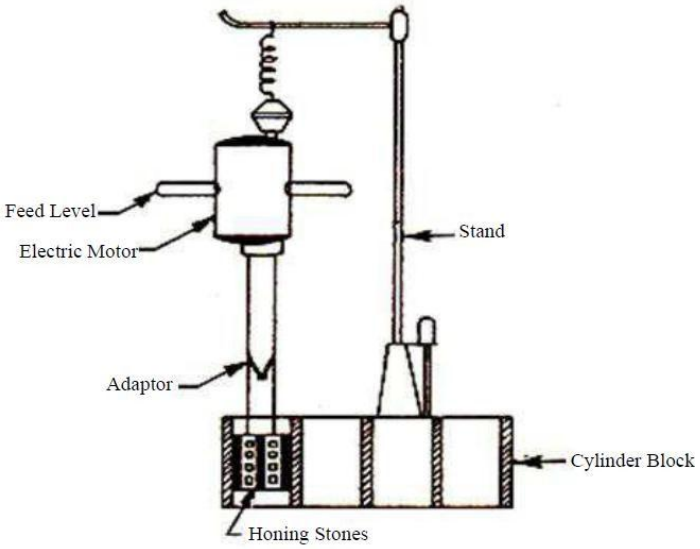
**CYLINDER HONING METHOD**

Honing the cylinder walls is necessary after reboring, or to remove minor imperfections and glaze. A hone consists of four or six narrow, fine-graded grinding stones mounted in cage around a spindle which is rotated by an electric motor.

In the fixed, machine-shop type hone, the cylinder block is mounted on the machine table, and the vertical or stroking movement of the hone up and down the bore often effected automatically. Portable hones, designed to be driven by a heavy duty electric drill mounted on a stroking stand are also widely used, especially in conjuction with a portable boring bar; in these cases the stroking action is effected manually.

Place the hone in the cylinder and expand the stones until the assembly can just be turned by hand and machine started. Home drive at drill speed while moving the hone up and down the entire length of the cylinder until the hone begins to run free. During this operation a liberal amount of kerosene, or other suitable cutting fluid, should be used to keep the stones clean.

Move the hone up and down slowly with the first-cut rough rough stones, but more rapidly with the finish-cut line stones. Expand the stones against the cylinder walls and repeat honing operation until the desired bore diameter is obtained. After the honing is completed, all abrasive particles must be removed from the engine parts. Hot water and soap is recommended to clean the cylinder walls.




## VALVE SEAT CUTTING & VALVE GRINDING

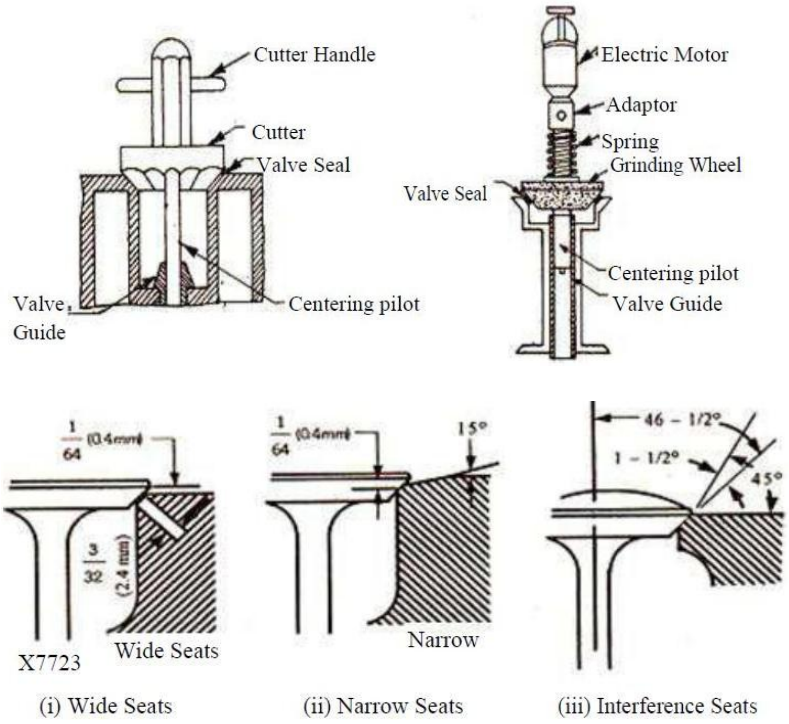
The valve seats can be reconditioned with the help of valve seat grinders by 30 , 45 and 60 stone to get actual contact width. In absence of valve seat grinding machine valve seat cutters can also be used. Although the seats cut by valve seat cutters are not very good.

### ❖ OPERATING PROCEDURE

- Clean the seat carefully.
- Fit 45 cutters to the holder and slide it into the valve guide.
- Press down lightly on the handle and turn it right of left.
- Do not grind the seat to much. Over grinding will reduce valve clearance.
- If the outside diameter of the seating surface is too small, repeat the 45 grind until the diameter is within the specified range.
- If the outside diameter of the seating is too large, make the 32 grind.
- Grind the seat a 32 angle until the seat outside diameter is with in the specified range.
- If the seat width is too narrow, repeat 45 grind until the seat is slightly too wide , and then return to the seat outside diameter.
- If the seat width is too wide, make the 60 grind.
- If the seat width is with in the specified range, lap the valve.

## VALVE SEAT GRINDING

The grinding stone of proper shape in rotated on the valve seat by means of concentric grinding .in this system the stone is kept concentric with the valve seat by a pilot installed in the valve guide the pilots are usually adjustable enabling them to fit tightly in guides over a range of different sizes. Therefore, the use of pilot means that the valve guide must be serviced before the seat is ground. The stone is automatically lifted about once a revolution. this permits the stone to clear itself of dirt and dust by centrifugal




(i) Wide Seats (ii) Narrow Seats (iii) Interference Seats

## VALVE REFACING

If the valve face is badly scored or pitted, it may be done on a special valve refacing machine . The machine consists of a grinding wheel operated by an electric motor. The valve is held in chuck which is also rotated with electric motor. There is a provision to set the valve chuck at any desired angle. This angle must just match the valve seat angle. Then put the valve into the chuck and tighten the chuck. The valve should be placed in the chuck so that the part of the stem that runs in the valve guide is gripped by the chuck.

To start the operation, align the coolant feed so that it sprays coolant on the rotating valve face. Then start the machine, move the lever to carry the valve face across the grinding wheel. The first cut should be a light one. If this cut removes metal from only one half or one third of the face, the valve may not be centered in the chuck or the valve stem is bent, and the valve should be discard. Cuts after the first should remove only enough metal to true the surface and pits. Do not take heavy cuts. If so

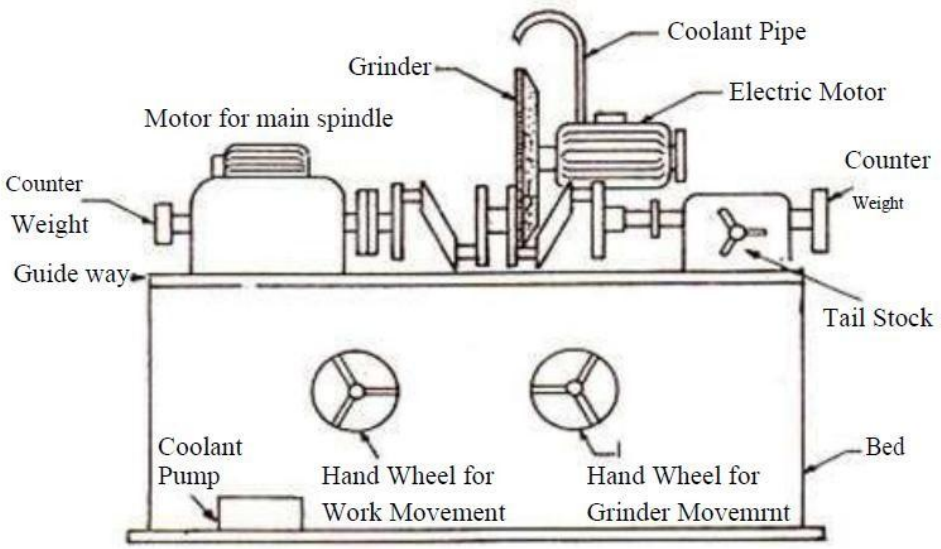
much metal must be removed that the margin is lost, discard the valve. Loss of the margin causes the valve to run hot. Then it will soon fail.

Before starting refacing operation, it must be ensured that the grinding wheel is properly dressed. This may be done on the machine itself, with the diamond dressing tool.

## CRANKSHAFT GRINDING

A special lathe or a crankshaft grinder is required to grind the journal and crank pins of a crankshaft. Crankshaft machine consists of a bed on which guide ways are provided, at one end head stock is mounted and another end tail stock is mounted. Both head stock and tail stock combinely move on the bed ways along with crankshaft, a hand wheel is provided in front of machine for this purpose. The spindle can be driven by a separate motor.

At the back of the machine big grinding wheel is installed an a suitable base. It can be moved forward and backward by a hand wheel provided in front of the machine.




The grinding wheel is driven by a separate motor. A coolant pump is provided with a flexible pipe line to supply the coolant at the cutting zone. Counter weights are provided at head stock and tail stock to balance the crank shaft.

The crank shaft is mounted in between the chuck and the dead center. The job under process is centred each time with the spindle axis. Adjust the spindle speed and grinding wheel speed according to the specifications. Now start the machine and perform the grinding operation by bringing the grinding wheel against the work surface. A micrometer can be used to check diameter of crank pin and journal until required size is obtained.