Grinding :

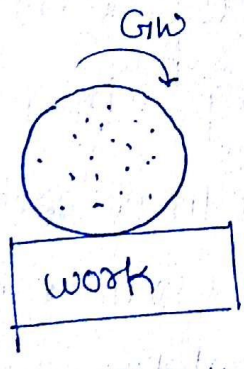
In a Grinding wheel Abrasives are randomly embedded in some boinding agent so most of the abrasive will have -ve back rake angle this will increase the drag hence specific energy require for grinding will be More.

→ Infeed are the feed, feed experiance by the cutting edge normal to the thickness of work and the through feed is parallel to the grinding wheel.

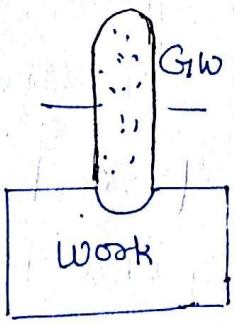
→ In creep feed Grinding infeed are high and speeds are low and it is ment for bulk material removal

→ In highspeed grinding infeed are low and speeds are high and it is ment for finishing / superfinishing operation.

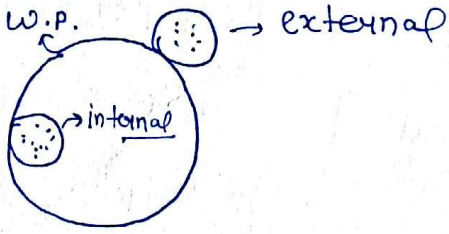
*



Surface Grinding



Form Grinding

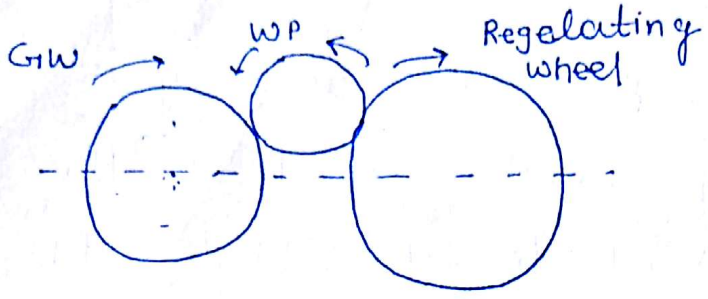


Cylindrical Grinding

$$\text{Specific Cutting energy} = \frac{F_c V}{MRR}$$

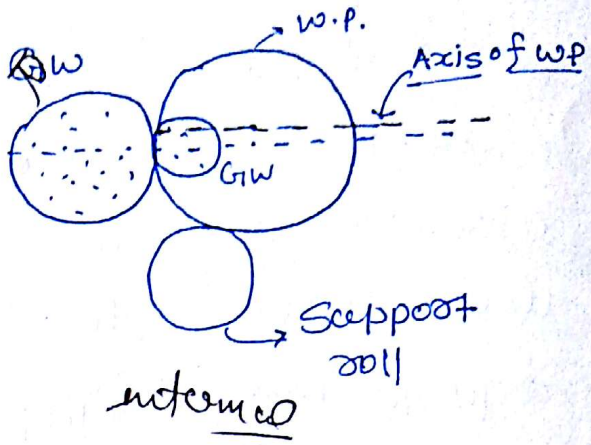
$$F_c V = F_s V_s + \frac{f V_c}{drag}$$

Centreless Grinding:



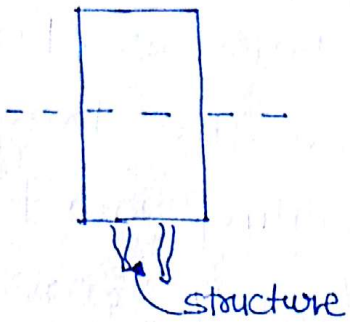
Velocity = $V_{RW} = \frac{1}{20}(V_{GW})$

external



internal

In this process during machining centre of workpiece is not fixed. Axis of work will Always be slightly above the common axis of GW and Regulating wheel. Axis of regulating wheel is slightly at an angle from the axis of Grinding wheel. Work will be normal to the surface of regulating wheel so the forces will also be normal to surface of regulating wheel. A Component of this force will be normal to the Surface of Grinding wheel and hence it provide Infeed and another Component of this force will be parallel to Grinding wheel and it provide through Feed so workpiece will be grinded and automatically come out from other Side

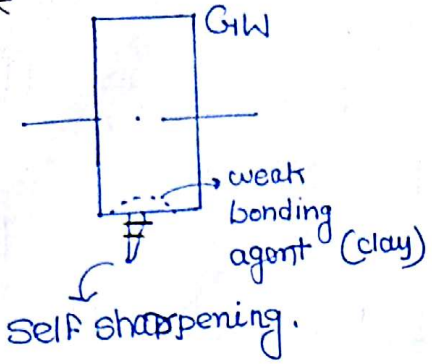


⇒ The space between two consecutive grains is called structure. when space is more it is called open structure and when the space is less it is called Close structure.

⇒ For machining ductile material we use open structure and for machining brittle material we use close structure. D

⇒ Ductile material produces continuous chip and these chips goes to this space and when this portion of Grinding wheel is not in contact with work chip will go away. When ductile materials are machined using close structures, hot chips forced to enter in the space which is not sufficient to not accomodate them so there will be welding ~~voids~~ between abrasives. when such conditions continuous slowly all the abrasive will be welded and grinding is rubbing over the work without any cutting this phinomena is called loading or clogging.

*



⇒ As soon as fresh Grinding we wheel comes in contact with work, sharp edge become blunt this will increase the drag force. if the bonding agent is weak blunt abrasive will automatically come out of the Grinding wheel and the fresh abrasive from the background start cutting. This phinomena is called self sharpening characteristic of Grinding wheel.

⇒ The Grinding wheel in which self sharpening characteristic are predominant are called soft wheel and Grinding wheel which does not dislodge the blunt abrasive are called hard wheels.

⇒ For machining soft material we use hard wheel and for machinining of hard material we use soft wheel it is because unless the cutting edge is sharp hard material can not be machined.

⇒ If hard material are machined by hard tools, slowly all the abrasives will wear out and after some time wheel is rebbing over the work without any cutting. This phinomena is called Glazing.

Iso designation :- (Tool designation for Grinding tools)

C 30 M 5 V

C - Type of Abrasive
- A - Al_2O_3
- C - Carbides
- D - diamond

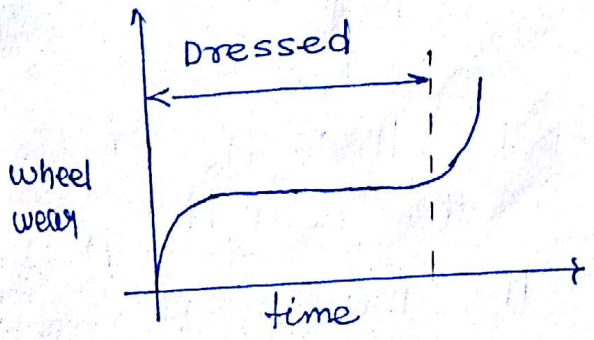
30 - Size of Abrasive (Sieve no.)
- 10-24 Rough
- 30-60 medium
- 70-180 Finish
- 220-600 superfinish

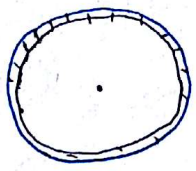
M - Hardness
- A - H → soft wheels
- I - P → medium
- Q - Z → Hard

5 - structure
- 0 → dense
- 16 → open

V - type of bond
- V → Vitrified (clay)
- S → Silicate.
- B → Resonoid
- R → Rubber
- M → Metal

*





Diamond tool turning

→ As soon as fresh Grinding wheel comes in Contact with the workpiece material sharp edges are rounding off.

So wheel wear will be more in the begaining. After a certain time period condition of loading and Glazing will exist and if we continue to use the Grinding wheel there will be wheel breakdown. Before this condition arises wheel has be withdrawn from workpiece and drossed. * Dressing is a processes of removing a thin layer of material from the surface of Grinding wheel. The time between two dressing is called wheel life.

* During dressing wheel looses its Cylindericity the process of making it again Cylinderical is called wheel trueing.

Lathe:

① Speed lathe:- It is the initial lathe machine develope in lathe Categeory. There is no carriage tool, spindle and tailstock are mount on adjustable sites only 2-3 Cutting Speed are available for use. (1200 - 3600 rpm)

② Engine or Centre lathe:- In this lathe there is a ($1\frac{1}{2}$ axis) carriage over the carriage there is tool post and the movement

of tool post/ crossside give the depth of cut

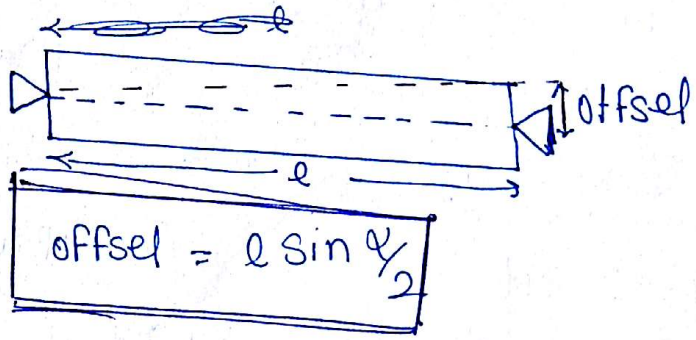
③ Bench lathe:- These are small size $1\frac{1}{2}$ axis machines meant for small size work or the material having low shear strength.

④ Tool room lathe:- These machines are similar to the engine lathe but varieties of cutting speed are available for use.

These machines are used to optimize the cutting parameter.

⑤ Capston & Turret lathe:- Tail stock is replaced by a Hexagonal turret and each and every face one tool can be mounted. So on such lathe seven tools can be mounted. These are hard automated lathe meant for small size work pieces.

Taper ① cross slide
② Tailstock offset



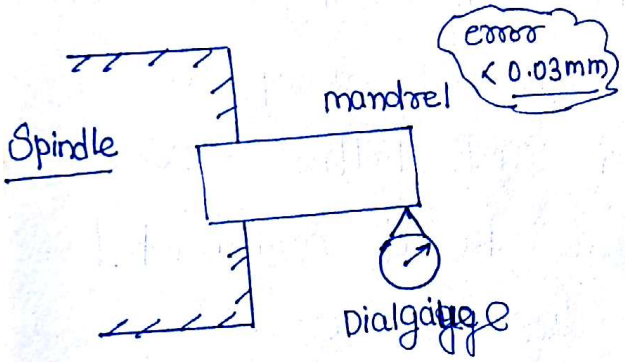
* Size of lathe is defined by three parameters
① Distance b/w line and dead centre
② max. swin diameter.
③ Height of spindle axis from bed

Allignment test :-

① **Whether bed is Flat:-**

surface of bed is devided into sigments with sigment size equal to the size of spirit level. By keeping the spirit level from sigment to sigment if the deviation of the bubble is withing some tolerable limit it means the bed is flat!

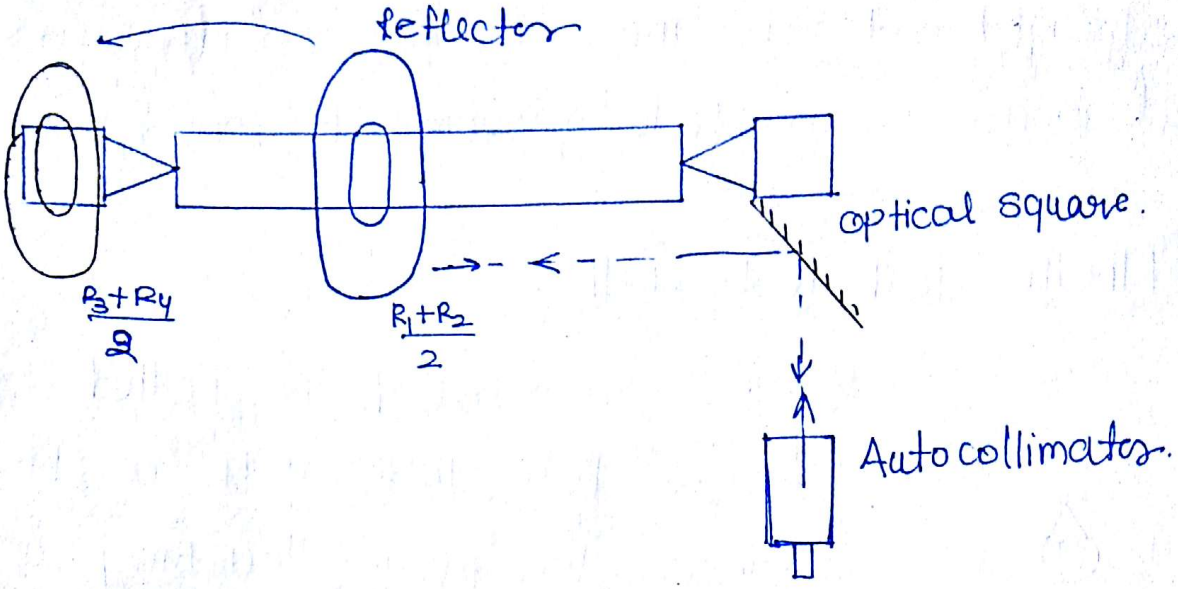
② **Whether spindle axis is parallel to the carriage movement:-**



→ A mandrel is fitted in the spindle with plunger of dialgage touching one of its sides. Base of the dialgauge is fixed over the carriage and by moving the carriage towards spindle and there is no variation in dial gauge it means spindle axis is parallel But it is not possible to have this error zero so this error is permissible in the upward direction of towards tools.

③ **Whether work axis is parallel to spindle axis:-**

Large size work pieces has to be held between head stock and tail stock. Now axis of work may not coincide with spindle axes.

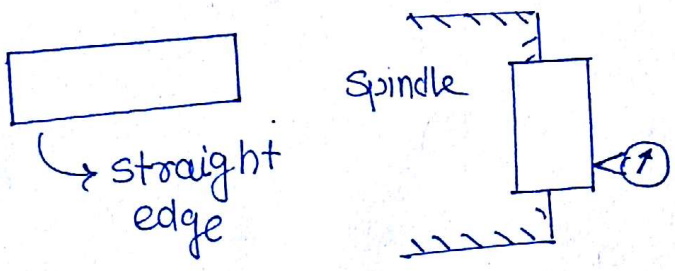


⇒ Reflector of auto collimator is initially placed on the workpiece and with 180° phase diff auto-Collimator reading (R_2) are taken. ①

⇒ In the second setting Reflector is placed on the spindle and the same experimentation is repeated.

⇒ If both axis are parallel auto collimator reading will match

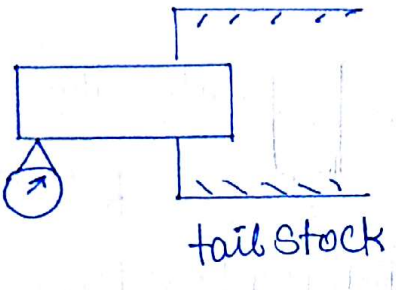
④ Whether Crosslide movements are Normal to work axis:-



One straight edge is fitted in the spindle with plunger of Dial gauge touching one of its side. Base of dial gauge on the cross side. By Giving movemen to cross side dialgauge will move over the

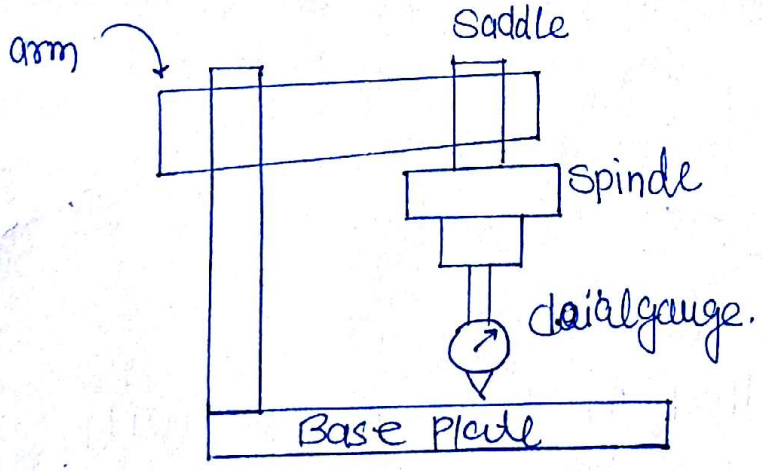
straight and if there is no variation in dialgauge it means crosslide movements are normal.

⑤ Whether tail stock Quill :-



A mandrel is fitted in the tail stock with a plunger of dial gauge touching one ~~side~~ of its side. Base of the dial gauge fixed over carriage. Carriage is moved towards tail stock and if there is no movemoment in dial gauge means axis is parrellto tailstock i.e. quill moment at parrell.

Alignment test for Radial Drilling Machine :-

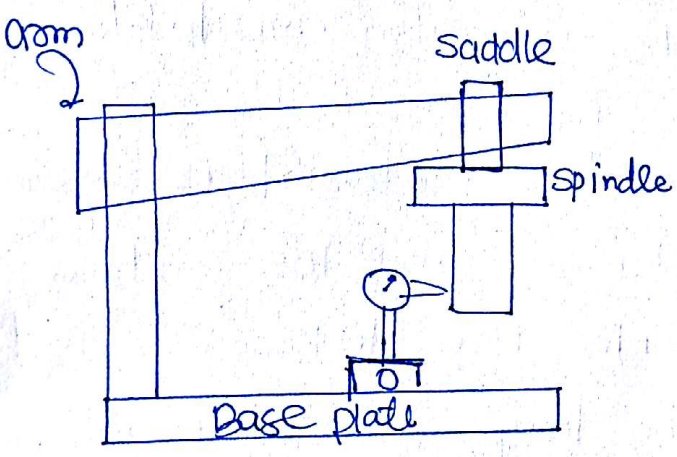


① Whether arm movement / saddle movement are parallel to base plate:-

Base of the dial gauge is fixed over the spindle with plunger touching the base plate. By rotating the arm if there is no variation in dial gauge it means arm moment are parallel

In the ~~sem~~ second setting fix the arm and move saddle if there is no variation in dial gauge it means saddle movement are parallel

② Whether spindle axis is parallel to the drill axis and these axis are normal to the base plate:-



A mandral is fitted in the spindle with pungey touching at bottom portion. Base of the dial gauge will be fixed over base plate. By giving downward motion to spindle if there is no variation in dial gauge it means both axis are parallel