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CMR

Internal Test - 1.

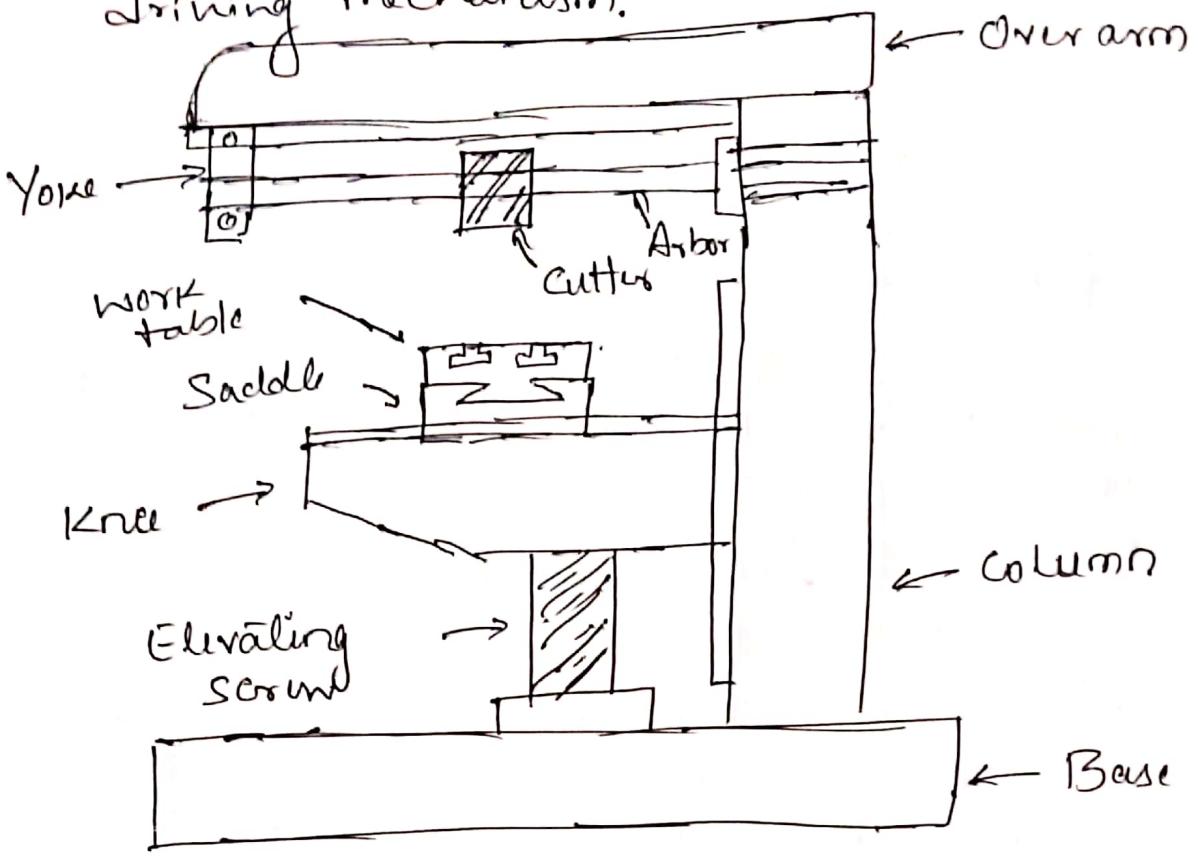
Scheme & Evaluation.

1) Horizontal milling m/c.

Construction

* It includes the following parts; base, column, knee, saddle, Table, Overarm; Arbor, Elevating screw & Yoke.
* Base - It gives support to the other parts of the machine
* Column - It is the main support frame mounted on the base & it is house of power driving mechanism. It supports Knee & overarm.
4. * Knee:- It is mounted on the front face of the column. It supports Table & saddle & it is operated by elevating screw.
* Saddle - It supports the Table & slide on the guide ways which is provided on the top surface of the knee.
* Table - It slides on the saddle. with the help of guide ways. and it gives supports the work piece.
* Overarm - It is mounted on the top portion of the column. It supports the ~~Arbor~~ & yoke.

Arbor - Milling cutter mounted on the arbor and arbor is connected to the spindle of the driving mechanism.



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Working

* Workpiece is properly mounted on the work table
* The knee height is adjusted to bring the w/p w.r.t the cutter.
* The cutter is mounted on the arbor and revolves at high speed.
* The workpiece is fed towards the cutter.
* The cutter cuts / removes the metal from the surface of workpiece and the desired shape is produced.

3

2) Horizontal boring machine

Construction :-> It has the following main parts.

1) Bed :- It supports the other parts of the machine.

2) Headstock :- It is mounted on the column, which drives, and feed the tool. It provides rotary movement to the tool.

3) Tailstock :- It is mounted on the right part of the bed and it gives support to the other free end of the workpiece.

4) Saddle & Table :- The table support the work to be moved longitudinally on the bed. The table can also moved crosswise on the saddle.

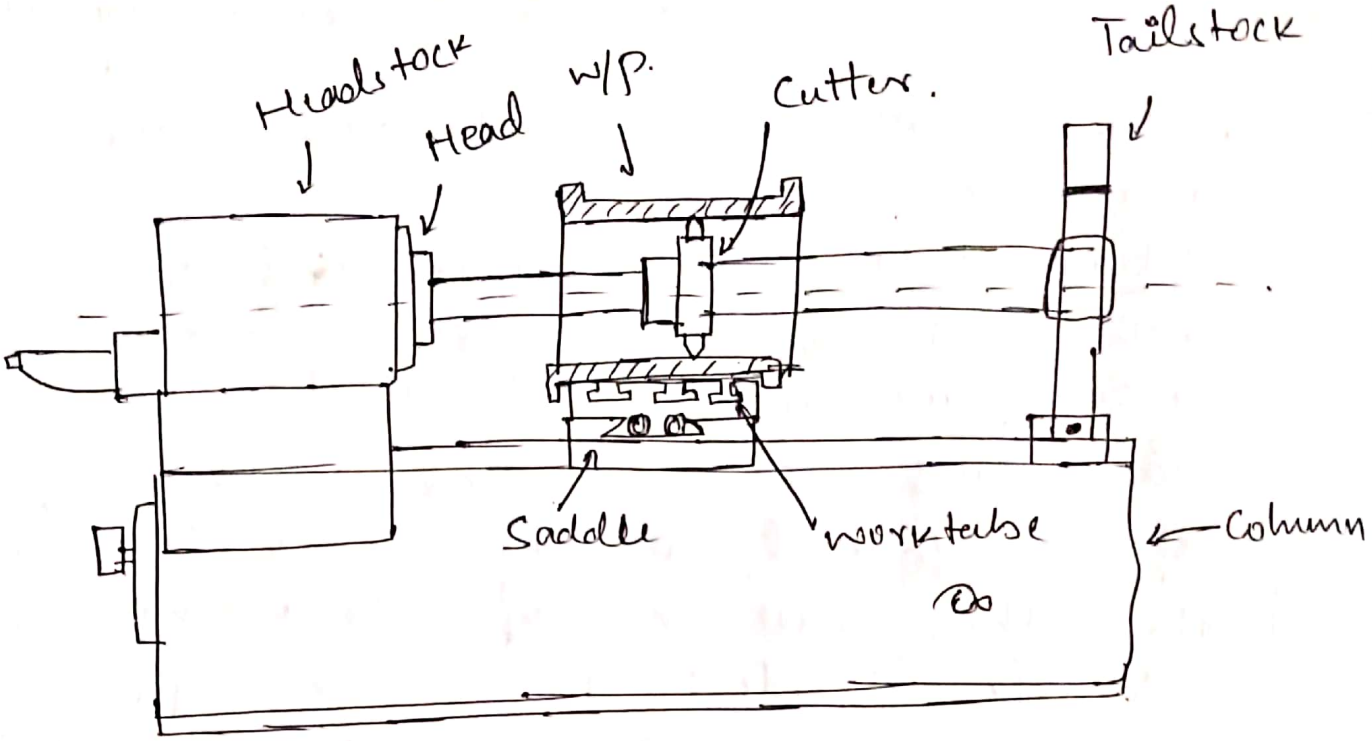
5) Boring bar - It supports the cutter for holding operations on jobs having large bore diameters. For short holes, the bar may support on the headstock spindle end only.

Working

* The work is supporting on a table which is constant and the tool turns into a horizontal axis.

* The table is moved along the length of the guide ways to continuous the cutting

the cutting action along the length of the w/p.



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3) Cutting Speed. – It is the speed of the tool when it is cutting the workpiece.

$$V_c = \frac{\pi D N}{1000} \text{ m/min.}$$

2

where

N = Spindle speed in RPM

D = Dia. of the w/p in mm.

Feed rate - Feed rate (f) is the rate of travel of the w/p in mm/min.

$$f = N \times f_z \times Z$$

where

Z = Number of flutes

f_z = Feed/tooth

N = Spindle speed rpm

2

Depth of Cut - It is the thickness of metal that is removed during machining. It is denoted by the letter 't' and is measured in terms of 'mm'

2

$$t = \frac{d_1 - d_2}{2}$$

where

d_1 = Initial dia

d_2 = Final dia required

Machining time - It is the time required to remove the undesirable parts of a material.

2

$$T_m = \frac{L}{N \times f}$$

where

L = length of the job

N = Spindle speed.

f = feed of the w/p.

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Material removal rate - The amount of material removed per unit time.

$$MRR = \frac{\text{Volume Removed}}{T_m}$$

$$= \frac{L \times b \times t}{T_m} \quad mm^3/min.$$

2

Where

L = length of the job — mm

b = width of the job — mm

t = depth of cut — mm

T_m = Cutting time — min.

or machining time

4) Turret lathe	Capstan lathe
1) It is heavy duty m/c	It is light duty m/c
2) The turret head is directly mounted on the saddle and the saddle slides over the bed ways	The turret head is mounted on the ram & the ram is mounted on the saddle
3) The saddle is moved along with the turret head during machining	3) The saddle will not moved during machining
4) The lengthwise movement of turret is more	The lengthwise movement of turret is more
5) long work piece can be machined	short workpiece can be machined
6) Turret head will not move along with saddle	Turret head slide along with ram.
7) Turret head moved crosswise in turret lathe	Turret head cannot moved crossslide.
8) Construction is rigid, heavy cut can be given	Construction is not rigid, heavy cut cannot be given
9) Used to machine of upto 200 mm dia	Used to machine w/p up to 60 mm diameter.
10) Jaw chuck is used	Collet is used

5) Indexing 87 divisions.

1
1) Factor the no. of divisions to be required
$N = 87 = 29 \times 3$
2) Select randomly any two hole circles from the single plate and factor it
$N_1 = 23$ & $N_2 = 29$
$N_1 = 23 \times 1$
$N_2 = 29 \times 1$

1
3) Factor the crank movement required to make one complete revolution of the w/p.
$40 = 2 \times 2 \times 2 \times 5$.
4) Factor the difference of selected hole circles
$29 - 23 = 6$.
$6 = 2 \times 3$

2
5) Divide the factors of no. of divisions to be required & difference of Selected hole circles from the factors of Selected whole circle plates & rotation required for one complete rotation of the w/p

$$\frac{87 = 29 \times 3 \quad 6 = 2 \times 3}{40 = 2 \times 2 \times 2 \times 5 \quad 23 = 23 \times 1 \quad 29 = 29 \times 1} = \frac{3 \times 3}{2 \times 2 \times 5 \times 23 \times 1}$$

~~The reduced~~

According to the rule factors above the horizontal line should get cancell from the factors below the line.

But few factors remains uncancelled. so ~~step~~. This shows that selected hole circles are wrong. Hence repeate the procedure from step 2.

Step 2 - Select randomly any two hole circle plate. & factor it

$N_1 = 29 \qquad N_2 = 33$

~~Step 3~~

$N_1 = 29 = 1 \times 29$

$N_2 = 33 = 3 \times 11$

Step 4 - Factor the difference of selected hole circle plates.

$33 - 29 = 5$

$5 = 5 \times 1$

Step 5 -

$$\frac{\begin{array}{l} 87 = 29 \times 3 \\ 5 = 5 \times 1 \\ \hline 40 = 2 \times 2 \times 2 \times 5 \end{array}}{} = \frac{1}{2 \times 2 \times 2 \times 11}$$

$29 = 29 \times 1$

$33 = 11 \times 3$

$n_1 = n_2 = 88.$

Step 6 - Compound indexing movement.

$$\frac{N}{40} = \frac{n_1}{N_1} \pm \frac{n_2}{N_2}.$$

1 $$\frac{87}{40} = \frac{88}{29} \pm \frac{88}{33}$$

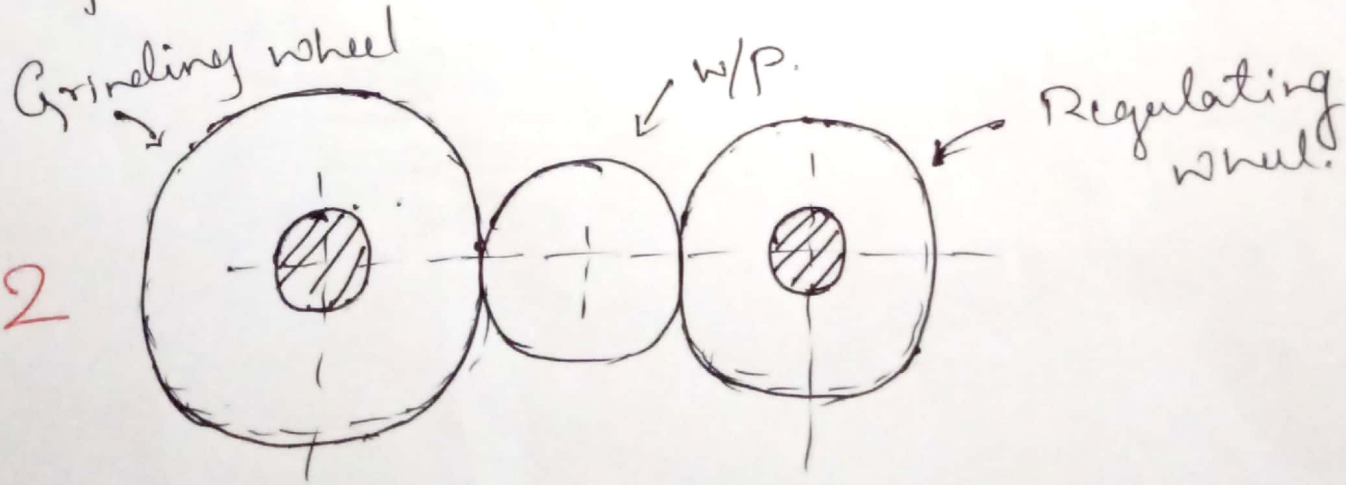
$$\frac{87}{40} = 3\frac{1}{29} - 2\frac{22}{33}$$

Index 1 = Three complete rotations of the crank with one hole movement in 29 hole circle plate.

1 Index 2 = Fixing the index plate at the previous (index 1) position and two complete index plate with crank movement of 22 hole circle movement in 33 hole circle plate.

6) External Centerless grinding

* The w/p is held between two wheels where one is grinding wheel & another is support wheel and are rotates in the same direction
* Both the wheels are alined in the same axis.
* During the operation the w/p is fed in between the wheels and the grinding wheel performs the cutting action and the regulating wheel (support wheel) applies the pressure to enhance the depth of cut. 3
* The regulating wheel is tilted to the small angle to provide through feed to the w/p.
* The grinding wheel acts the downward force on the w/p, which makes the w/p to displace its position. Hence rest part is provided to overcome this action.



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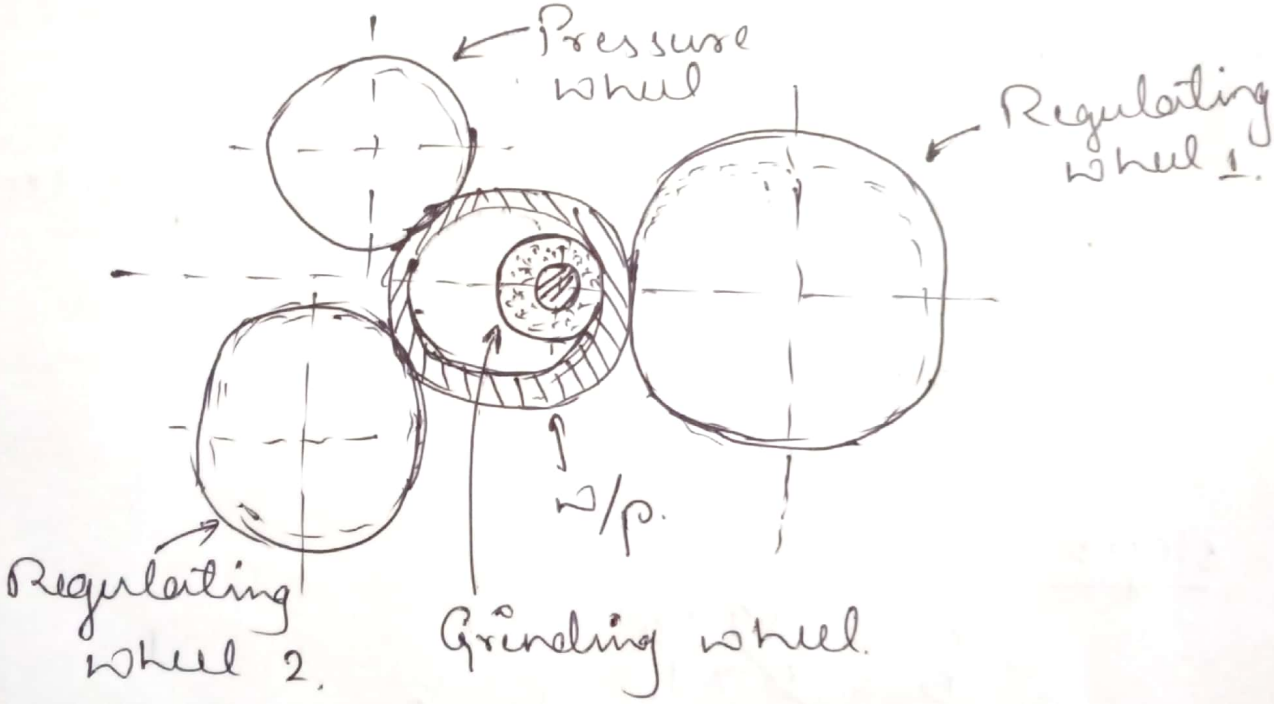
CMR

Internal Centerless grinding

* In this process, the w/p is held between three wheel. where in one is grinding wheel, two regulating wheels and third wheel is pressure wheel.
* In this process the grinding wheel perform the cutting action, and regulating wheel gives support to the w/p. The pressure wheel used to apply depth of cut during the process.
* The grinding wheel is placed inside the w/p.

3



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