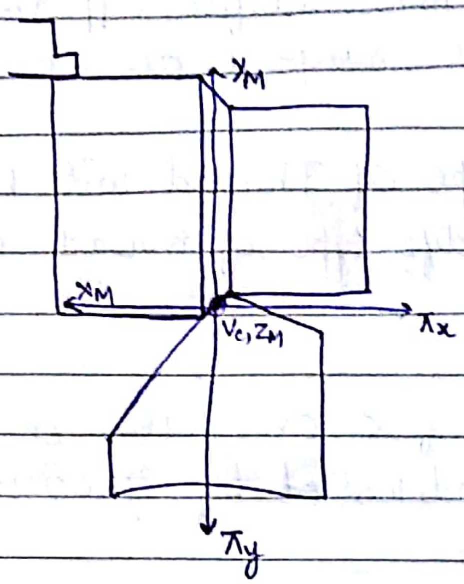
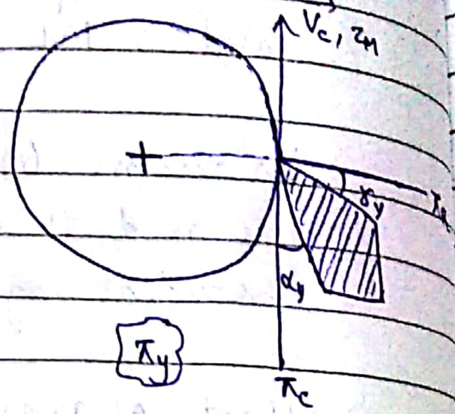
Date 14/2/18

# Work Reference System

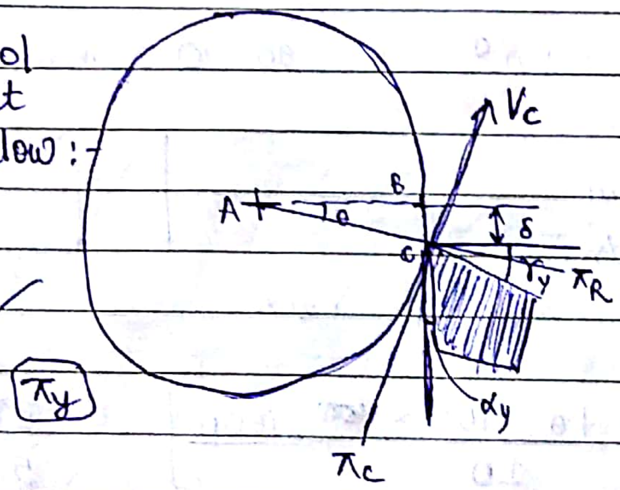
change in tool geometry due to tool-setting error.




Tool has been set properly at the "centre" of W/P

→ Tool set below:-




If the tool is set above then

$\gamma_{WY} = \gamma_y + \theta$

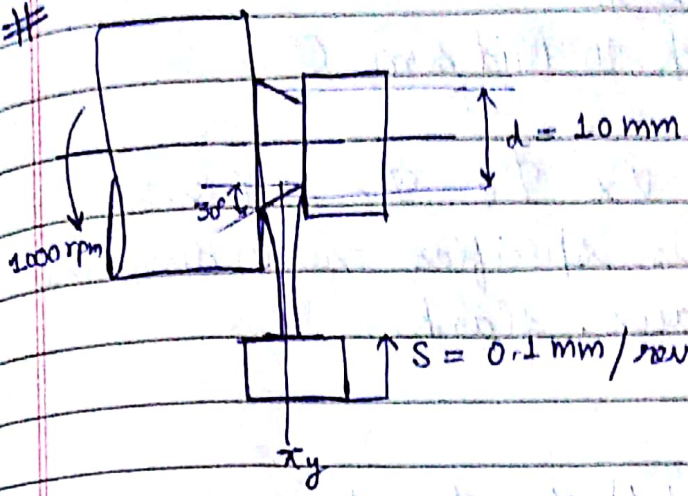
$\boxed{\alpha_{WY} = \alpha_y - \theta}$

→ setting tool above the "centre" of W/P may lead to rubbing at the flank.

$\delta$ → Tool setting error

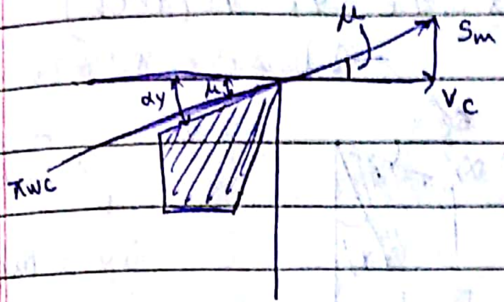
$$\sin\theta = \frac{BC}{AC} = \frac{\delta}{d/2} = \frac{2\delta}{d}$$

then $\left.\begin{aligned} \gamma_{wy} &= \gamma_y - \theta \\ \alpha_{wy} &= \alpha_y + \theta \end{aligned}\right\}$ provided the tool has ~~below the~~ been set below the "centre" of the W/p by an amount "$\delta$".





Further the C/T has been set 1 mm above the centre of the W/p. Find $\alpha_{wy}$




$$\mu = \tan^{-1}\left(\frac{S_m}{V_c}\right)$$

$$\mu = \tan^{-1}\left(\frac{s}{\pi d}\right) =$$

$$\theta = \sin^{-1}\left(\frac{2\delta}{d}\right) = \sin^{-1}\left(\frac{2}{10}\right) = 11.5^\circ$$

$$\mu = \tan^{-1}\left(\frac{s}{\pi d}\right) = \tan^{-1}\left(\frac{0.1}{\pi \times 10}\right) = 0.2^\circ$$

$$\alpha_{wy} = 7^\circ - 11.5^\circ - 0.2^\circ = -4.7^\circ$$ (severe problem)

→ In parting off / facing / grooving operation, the problem of rubbing due to −ve clearance angle ↑↑ as ~~the~~ tool progresses towards the centreline of w/p as $d \downarrow\downarrow$ ∴ $\mu$ & $\theta$ ↑↑
∴ ~~α↓↓~~ $\alpha$ becomes more −ve.

END of mid-sem syllabus

## END SEM

Date 15/2/18

~~# Geometry of drill~~

## Back to Mid sem ☺ :-

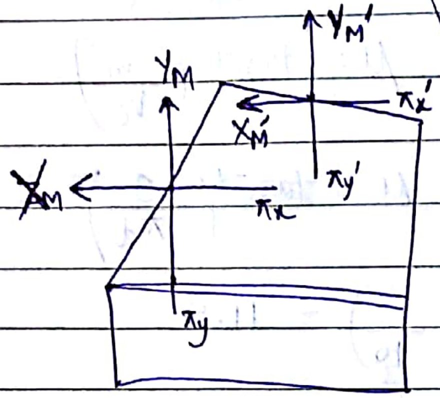
**ASA :-**

$\gamma_y \quad \gamma_x \quad \alpha_y \quad \alpha_x \quad \phi_e \quad \phi_s \quad r$ (inch)

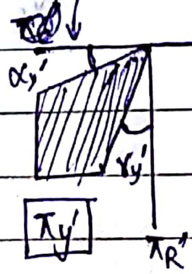
→ no parameter is specified regarding the clearance of aux. flank.

**modified ASA :-**

$\gamma_y \quad \gamma_x \quad \boxed{\alpha_y'} \quad \alpha_x \quad \phi_e \quad \phi_s \quad r$ (inch)




Intersecⁿ of $\pi_c'$ & $\pi_R$




Auxiallary back Rake

$\gamma_y'$ → Back Rake evaluated on Aux. C/T edge

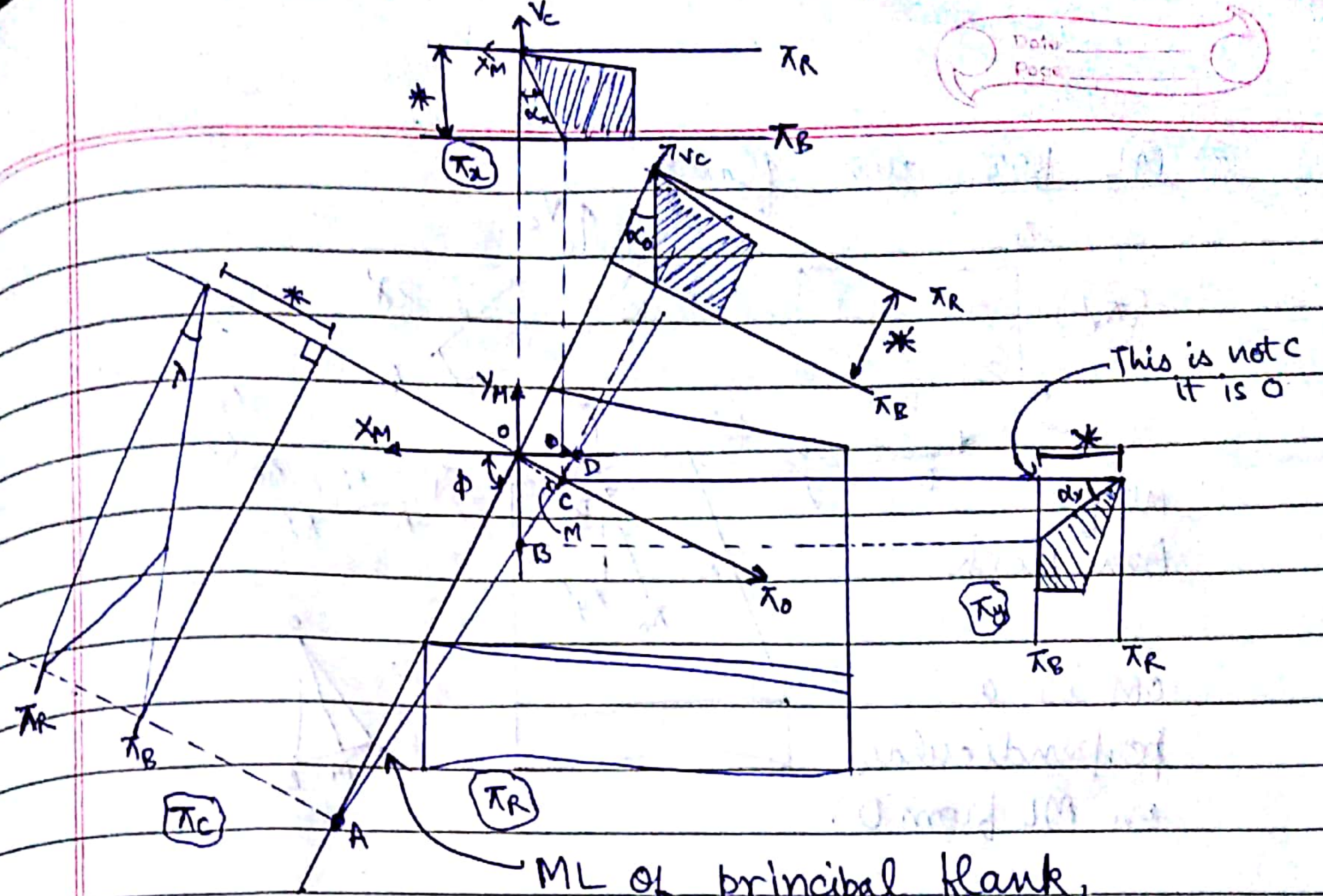
$\pi_x'$ – m/c longitudinal plane at aux CE/ flank

$\pi_y'$ → m/c transverse plane at aux CE/ flank.
$(\pi_x \parallel \pi_x')$ & $(\pi_y \parallel \pi_y')$

$\gamma_y'$ → no industrial significance
→ but is $\gamma_y'$ and $\gamma_y$ related in any way?

$\gamma_y'$ → Angle b/w Rake surface & $\pi_R$ measured on $\pi_y'$ (which is $\parallel$ to $\pi_y$) $\therefore$ $\boxed{\gamma_y' = \gamma_y}$

$\alpha_y'$ → Angle b/w Aux. clearance flank & $\pi_c'$ measured on $\pi_y'$ ($\therefore$ not necessarily equal to $\alpha_y$ which is b/w Principal flank & $\pi_c$ and principal & aux. flank can have diff. orientations) ⇒




$\tan\alpha_x = \frac{OD}{*}$ ; $\cot\alpha_x = \frac{1}{OD}$ ; $\cot\alpha_0 = \frac{1}{OC}$

$\cot\alpha_y = \frac{1}{OB}$ ; $\tan\lambda = \frac{1}{OA}$ ; $\cot\alpha_M = \frac{1}{OM}$

→ Relate: $\alpha_0, \lambda, \alpha_x$
$\downarrow OC \quad \downarrow OA \quad \downarrow OD$

$\Delta OAD = \Delta OAC + \Delta OCD$

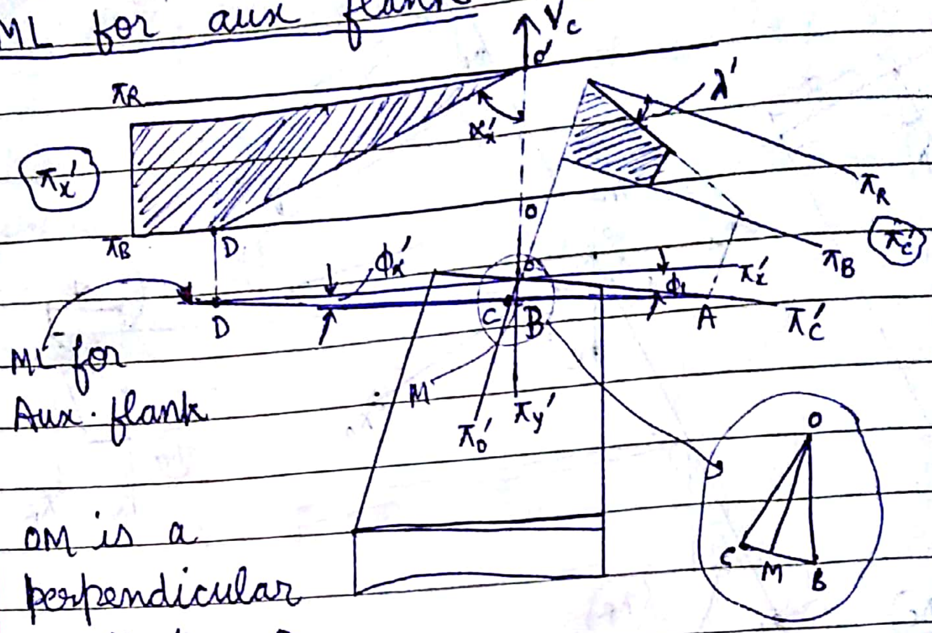
$\frac{1}{2} OA \cdot OD \cdot \sin\phi = \frac{1}{2} OA \cdot OC + \frac{1}{2} OC \cdot OD \cdot \cos\phi$

$$\frac{\sin\phi}{OC} = \frac{1}{OD} + \frac{\cos\phi}{OA}$$

$$\cot\alpha_0 = \left\{\frac{\cot\alpha_x + \cos\phi \cdot \tan\lambda}{\sin\phi}\right\}$$

$\alpha_0 = \alpha_x \Rightarrow \pi_x$ & $\pi_0$ coincide (when $\phi = 90°$)

→ ML for aux flank




OM is a perpendicular on ML from O.

$$\tan \alpha_x' = \frac{OD}{O'O} \qquad \cot \alpha_x' = \frac{1}{OD} \quad (\text{thickness} = 1)$$

similarly, $\cot \alpha_y' = \frac{1}{OB}$

$$\cot \alpha_o' = \frac{1}{OC}$$

$$\cot \alpha_M' = \frac{1}{OM}$$

$$\tan \lambda' = \frac{1}{OA}$$

→ $$\cot \alpha_o = \frac{(\cot \alpha_x + \tan \lambda \cos \phi)}{\sin \phi}$$

$$\cot \alpha_o' = \frac{(\cot \alpha_y' - \tan \lambda' \sin \phi_1)}{\sin \phi}$$

$$\cot \alpha_M = \sqrt{\cot^2 \alpha_o + \tan^2 \lambda}$$

$$\tan(\phi - \phi_x) = \tan \alpha_o \tan \lambda$$

$$\cot \alpha_M' = \sqrt{\cot^2 \alpha_o' + \tan^2 \lambda'}$$

$$\tan(\phi_1 - \phi_x') = \tan \alpha_o' \tan \lambda'$$