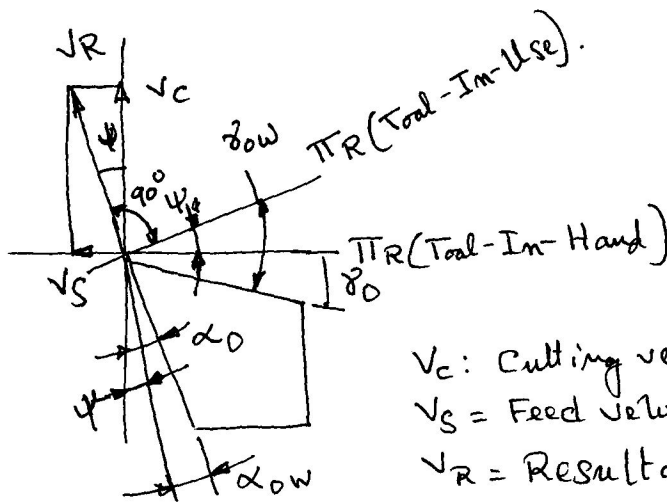
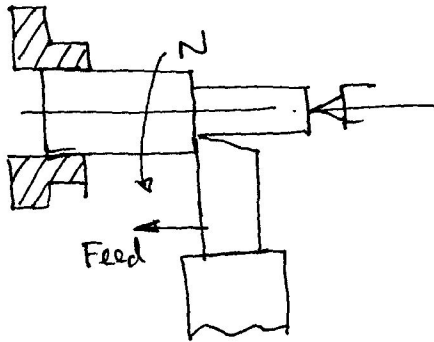


Notes on Tool-In-Use System

A cutting tool is engaged in longitudinal turning

Given $\phi = 90^\circ$, mode of cutting: orthogonal



V_c : Cutting velocity

V_s : Feed velocity

V_r : Resultant cutting velocity

$$V_c = \pi D N \text{ mm/min (where } D \text{ is the diameter of workpiece in mm).}$$

$$V_s = S N \text{ mm/min}$$

where Feed: $S \text{ mm/rev}$ and $\text{RPM} = N$

δ_0 : orthogonal rake in Tool-In-Hand System.

α_0 : orthogonal clearance in Tool-In-Hand System.

δ_{ow} : orthogonal rake in Tool-In-Use System.

α_{ow} : orthogonal clearance in Tool-In-Use System.

From the diagram.

$$\tan \psi = \frac{V_s}{V_c} = \frac{S N}{\pi D N} = \frac{S}{\pi D} \therefore \psi = \tan^{-1} \frac{S}{\pi D}$$

$$\text{Also } \delta_{ow} = \delta_0 + \psi = \delta_0 + \tan^{-1} \left(\frac{S}{\pi D} \right)$$

$$\alpha_{ow} = \alpha_0 - \psi = \alpha_0 - \tan^{-1} \left(\frac{S}{\pi D} \right)$$