

Repeat - 0 - Meter

20µin



Fixture

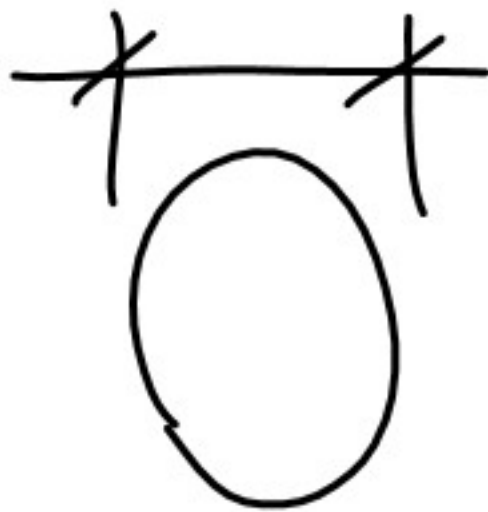




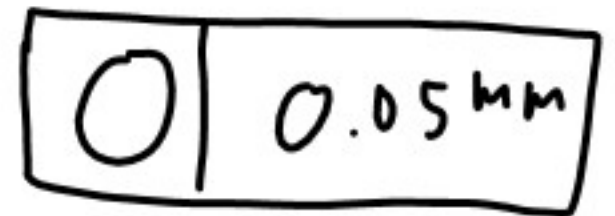
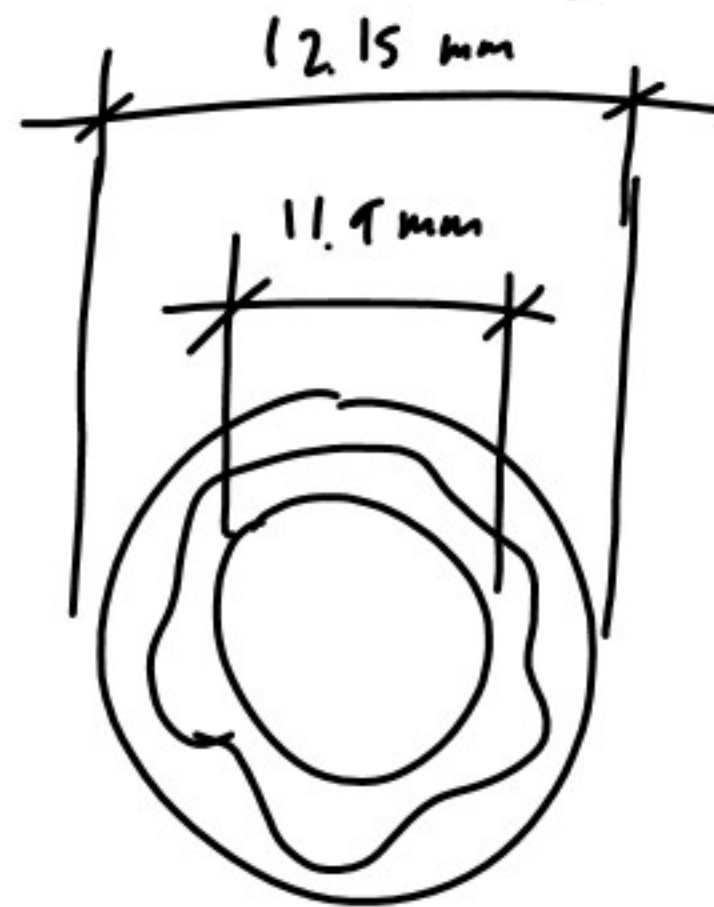
# GD & T

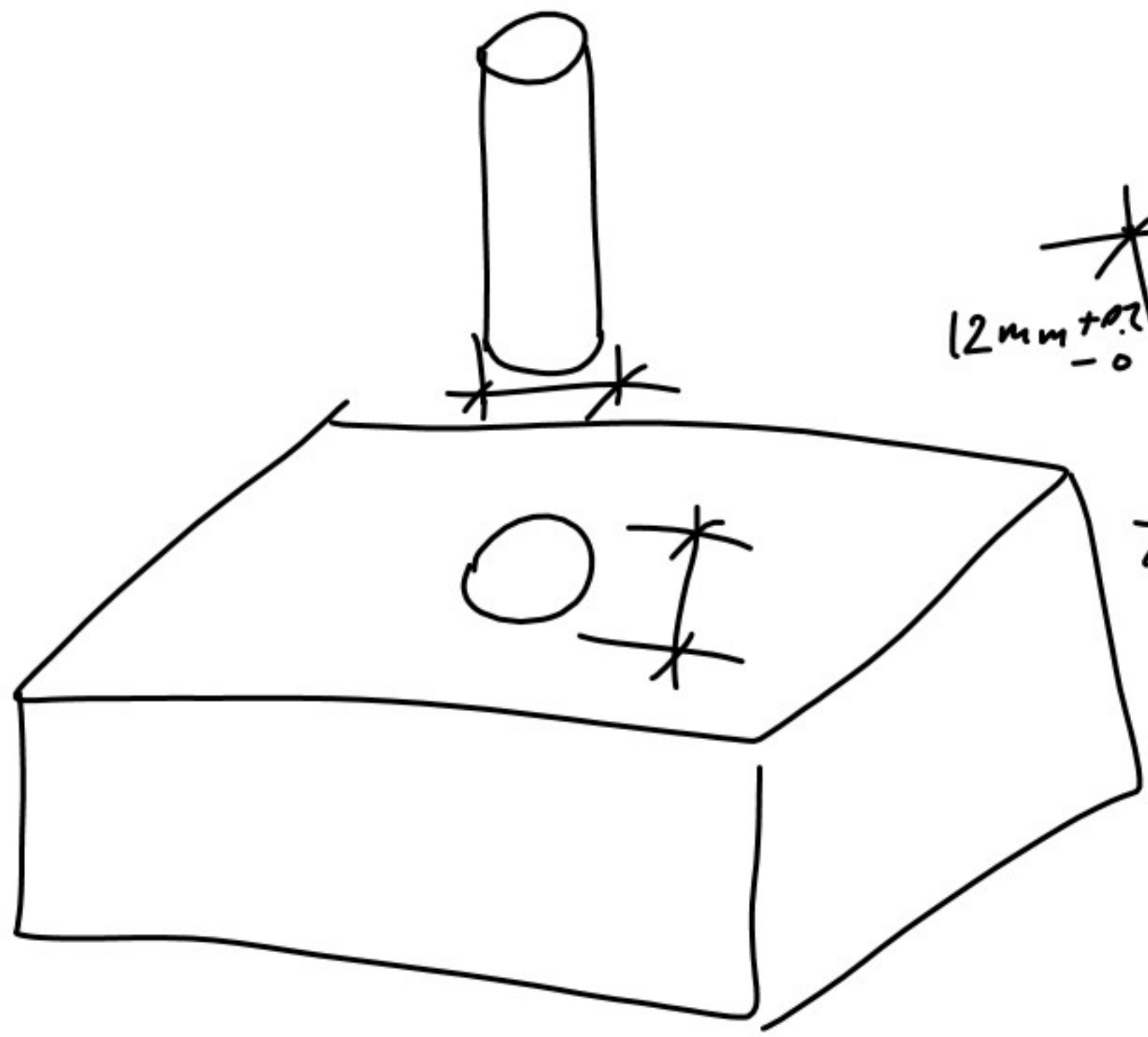
geometric dimensioning and tolerancing

Tolerances 12 mm  $+0.15$  mm  
 $-0.1$  mm



and tolerancing



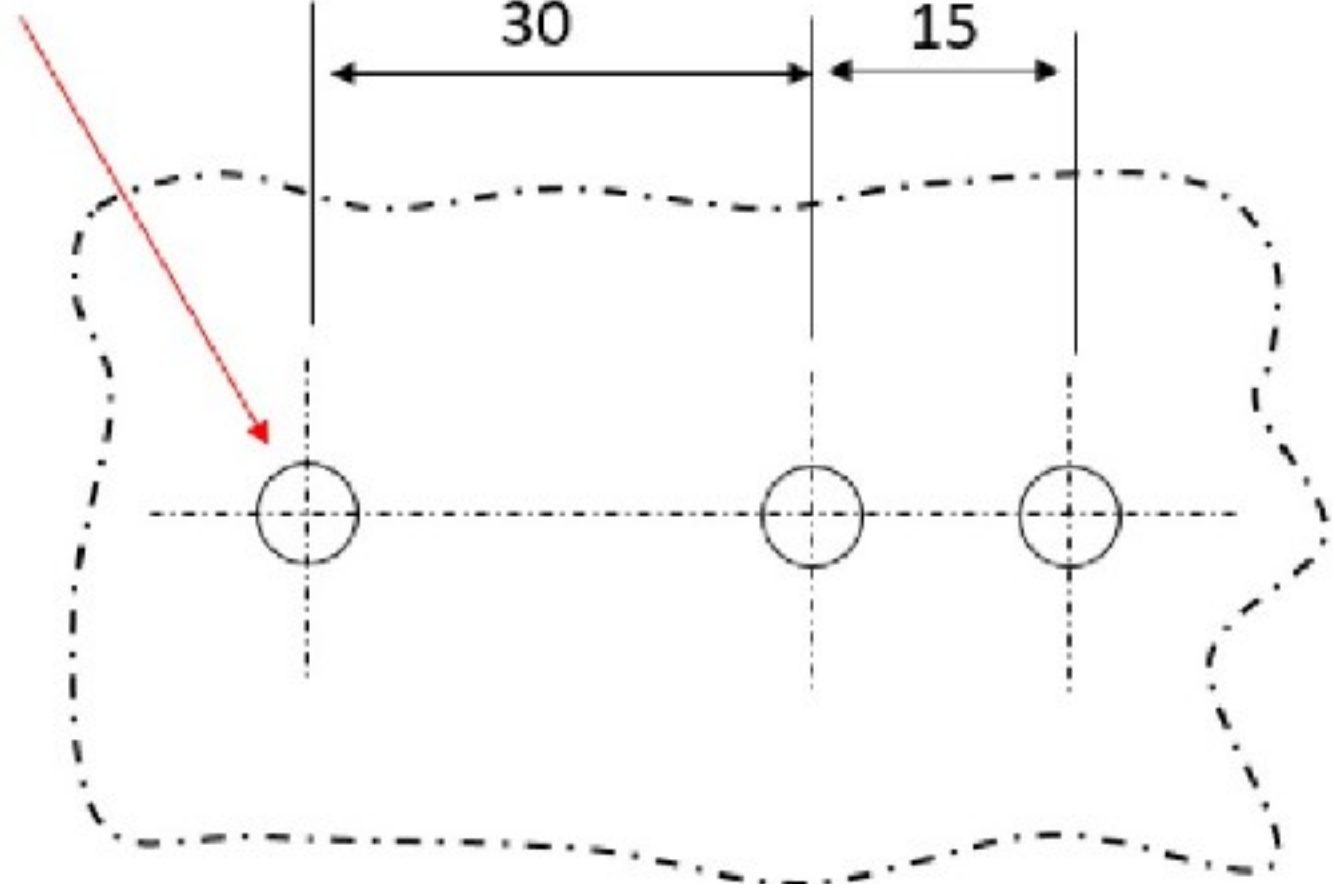
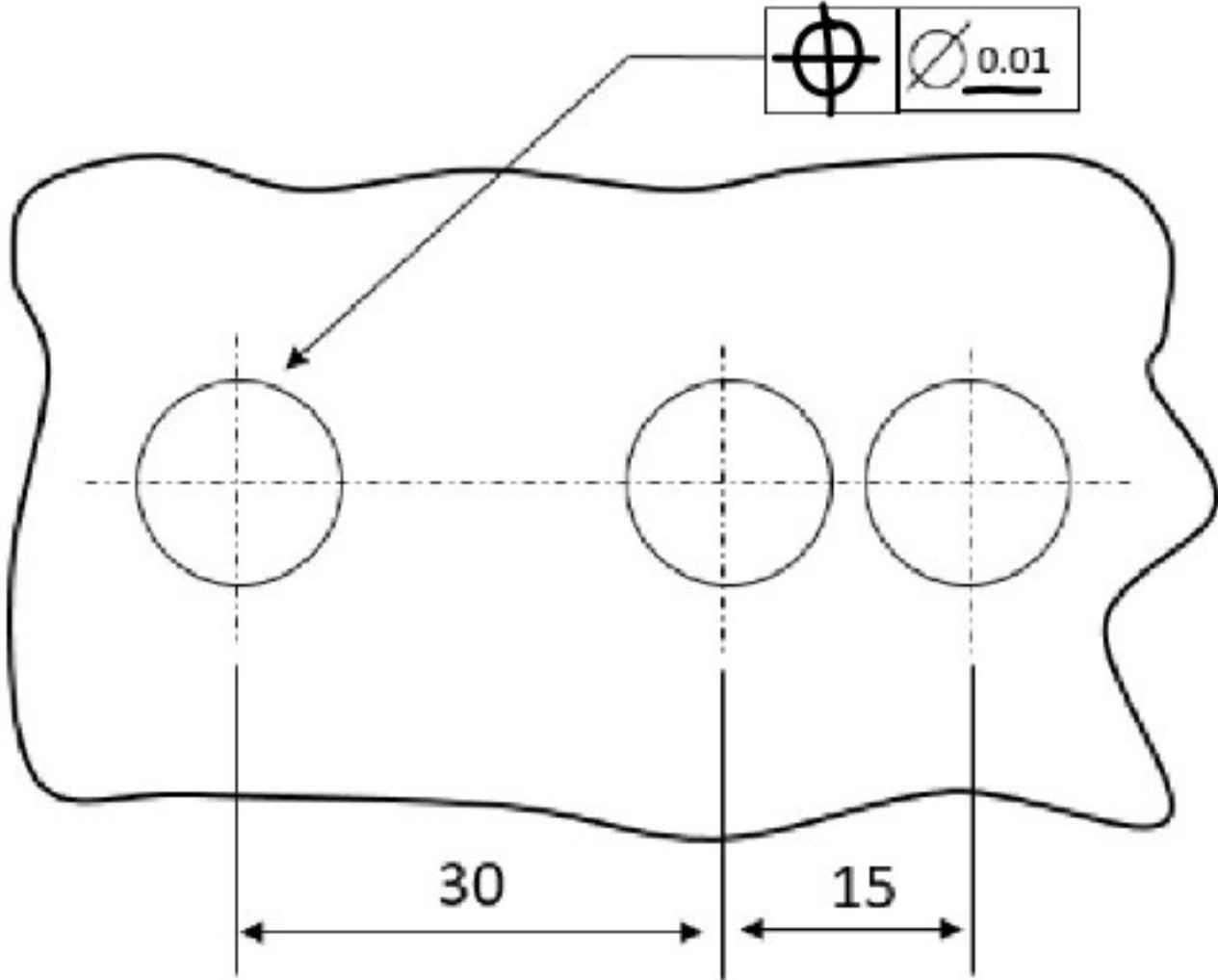


$12\text{mm}^{+0.2}$   
 $-0$

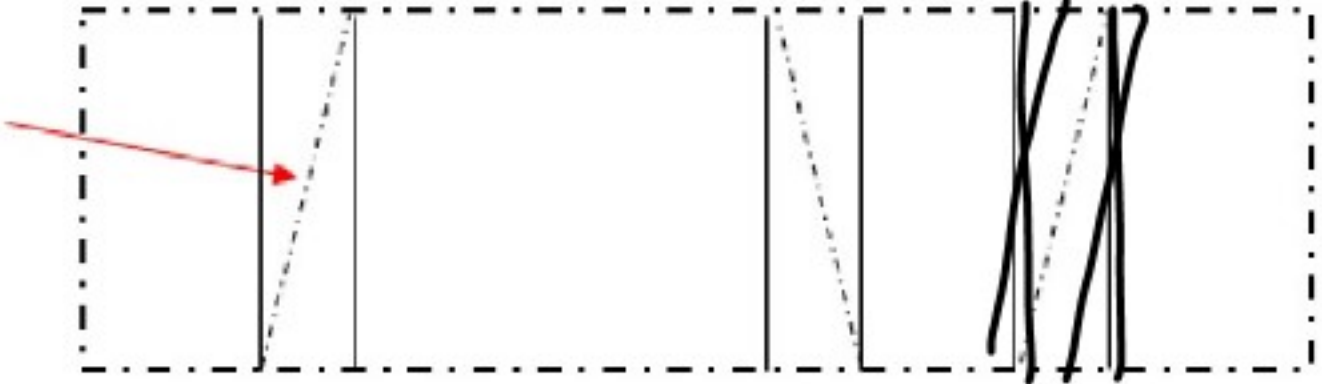


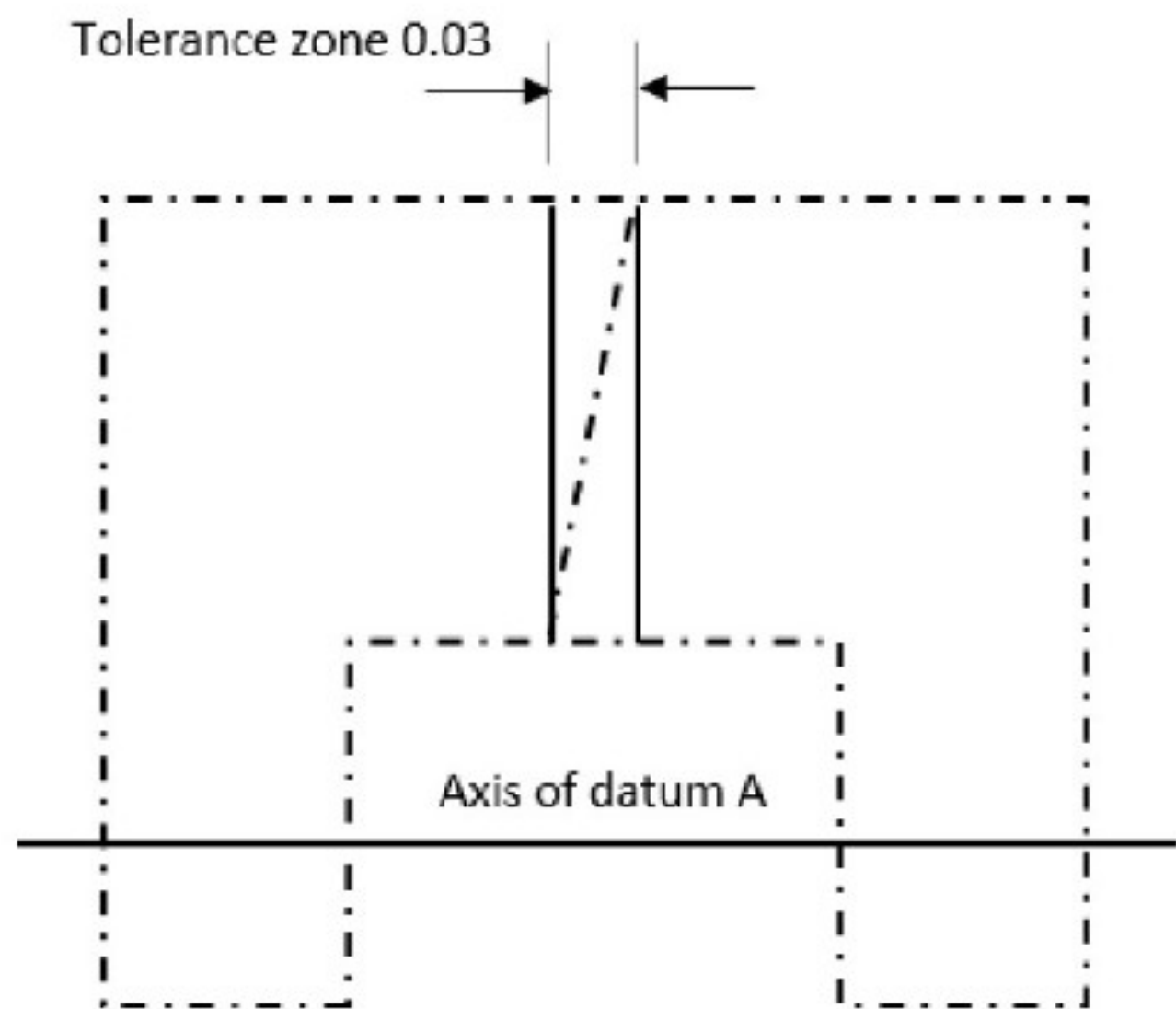
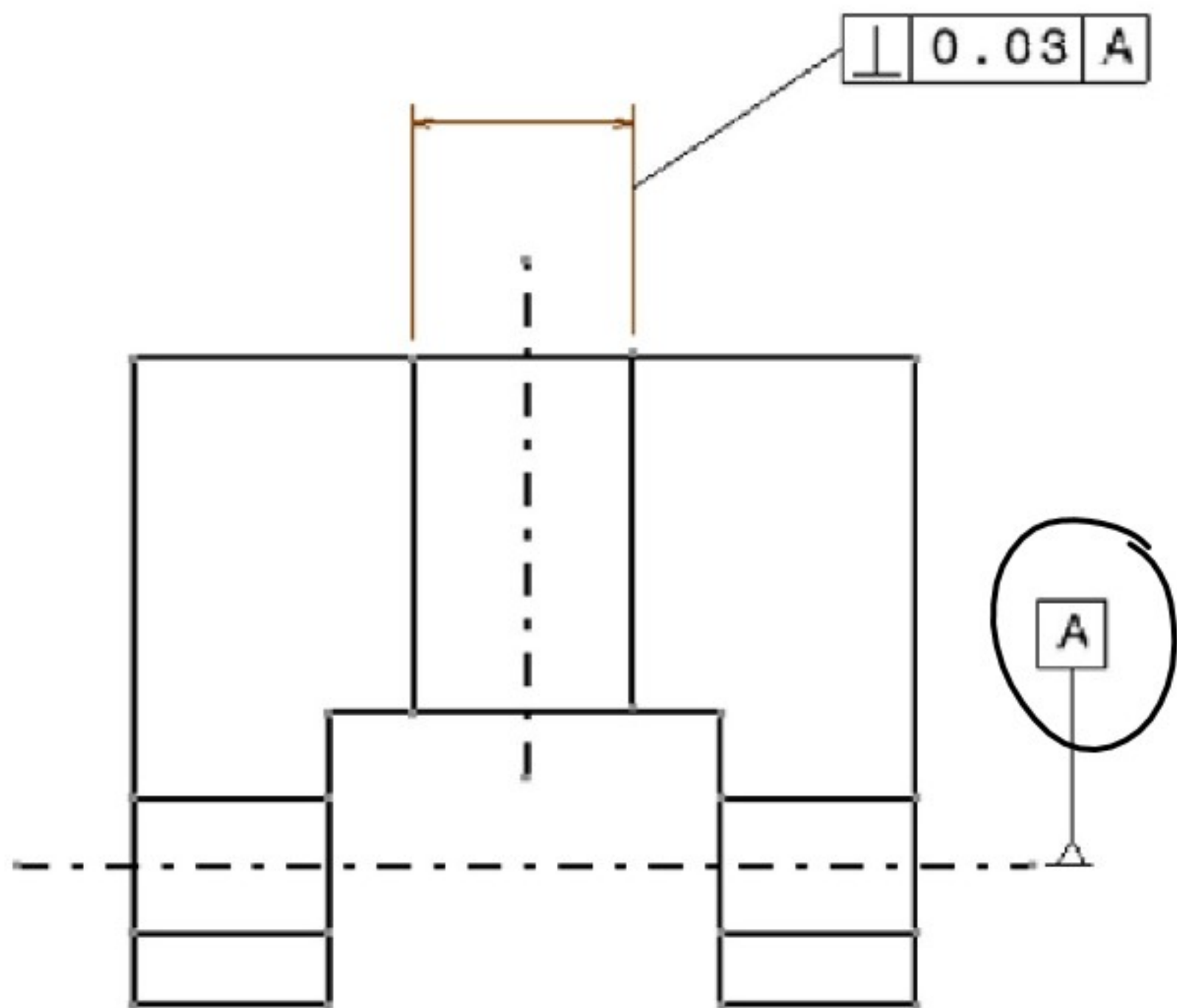
$12\text{mm}^{+0}$   
 $-0.2$

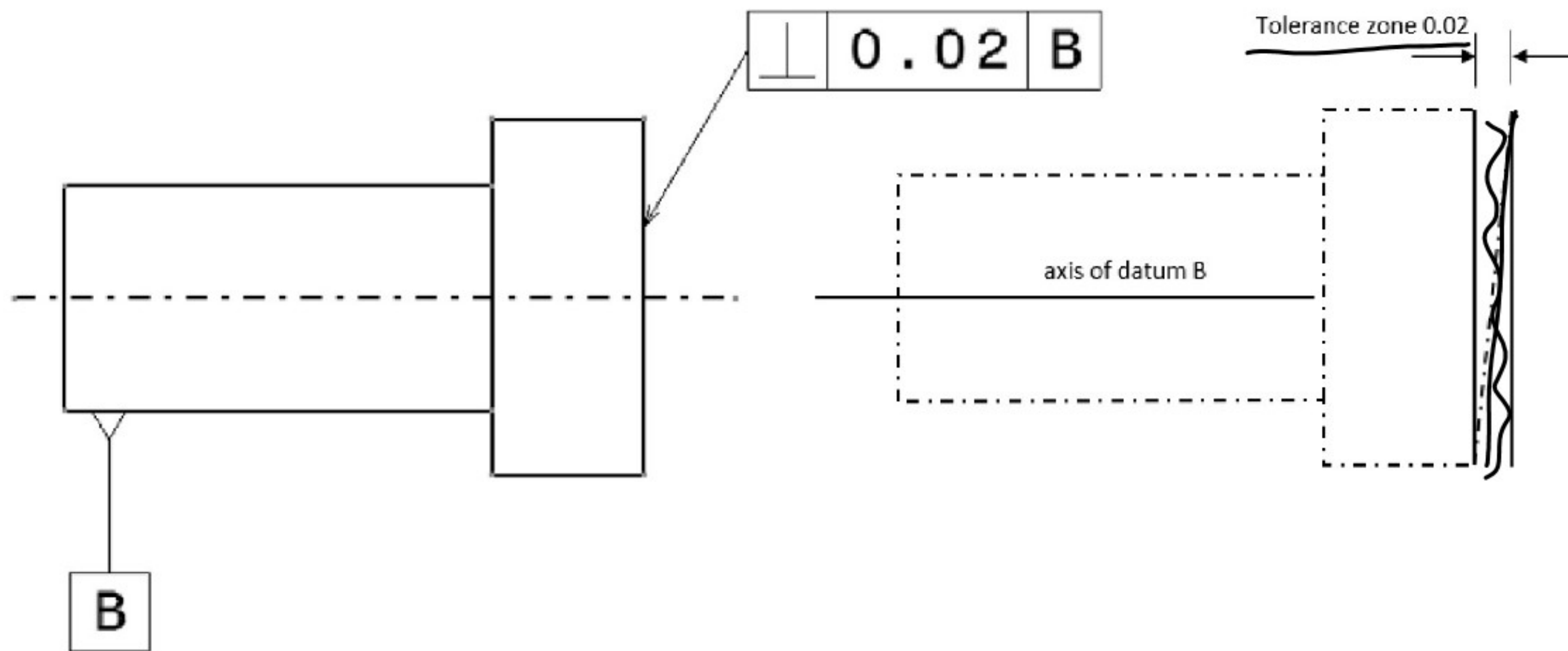
3 × cylindrical tolerance zone  
with 0.01 diameter

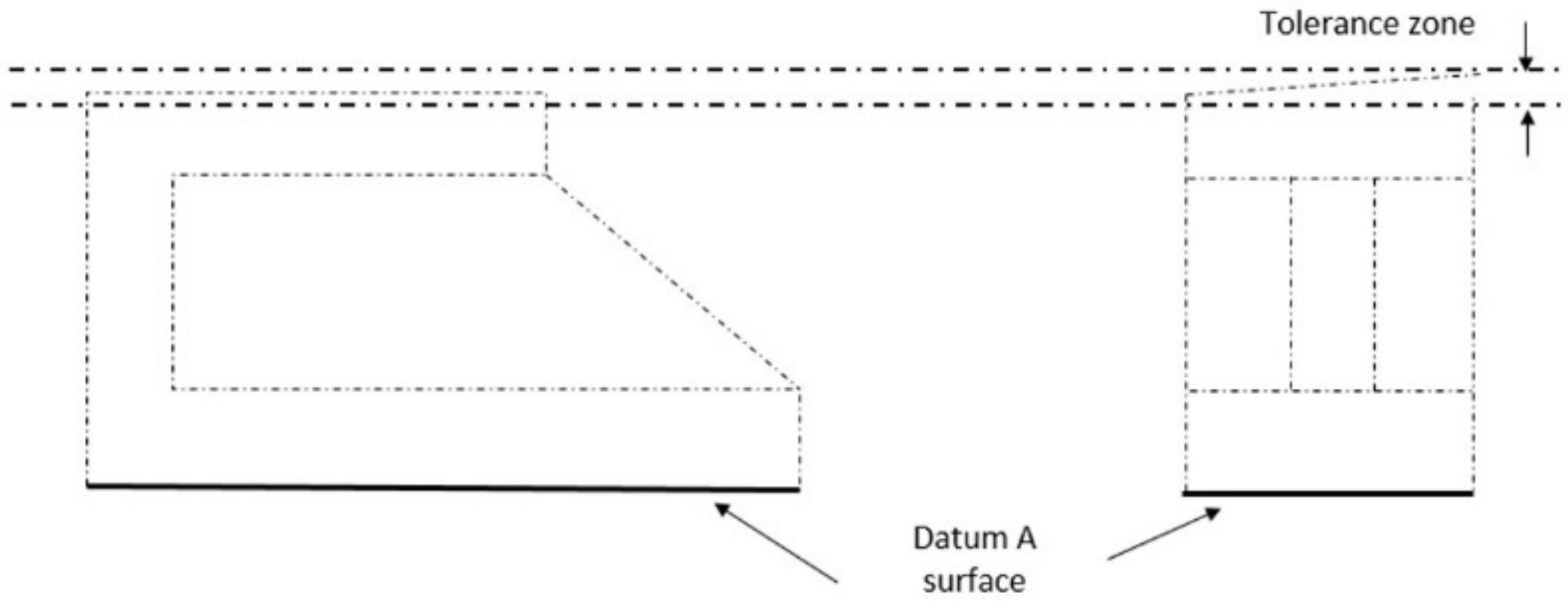
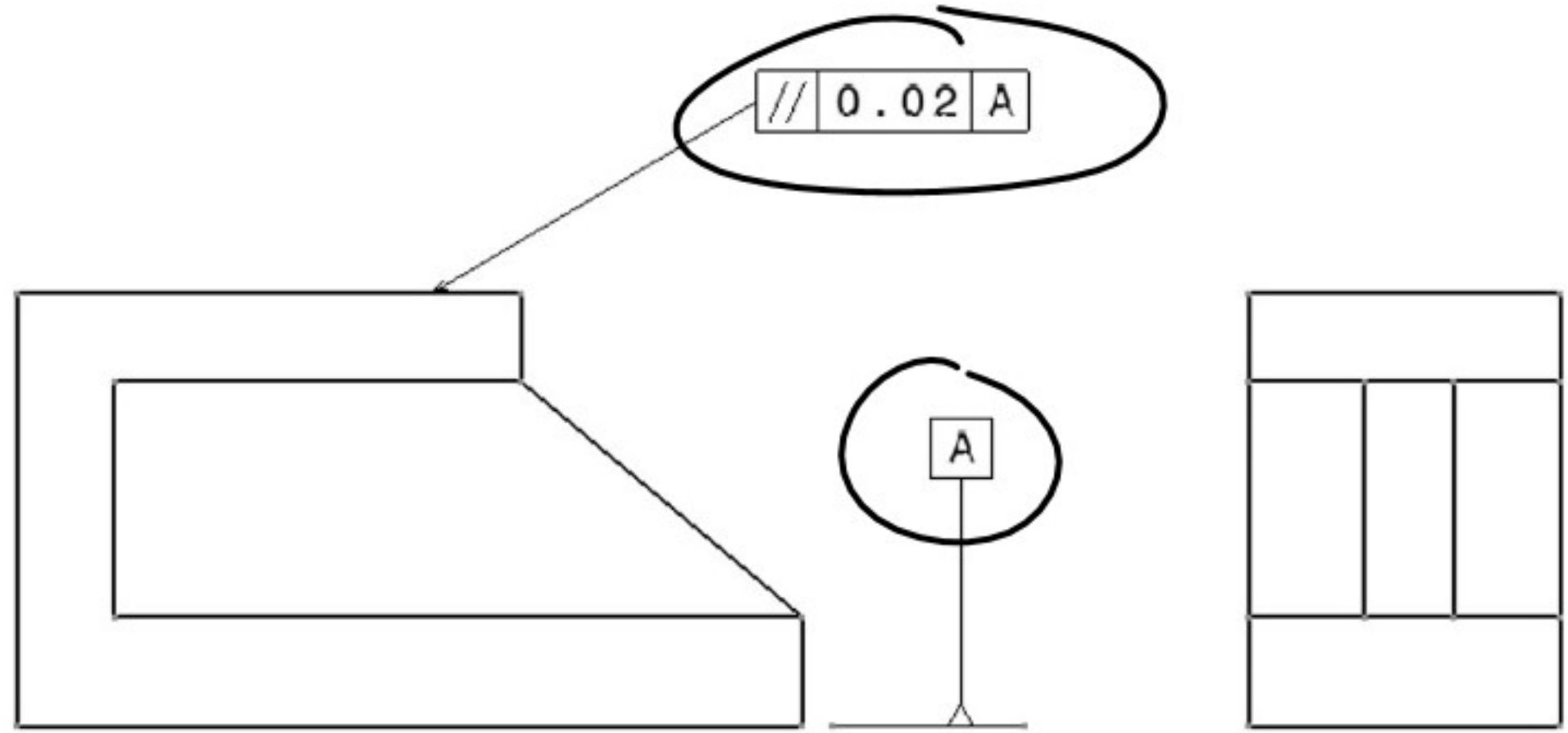


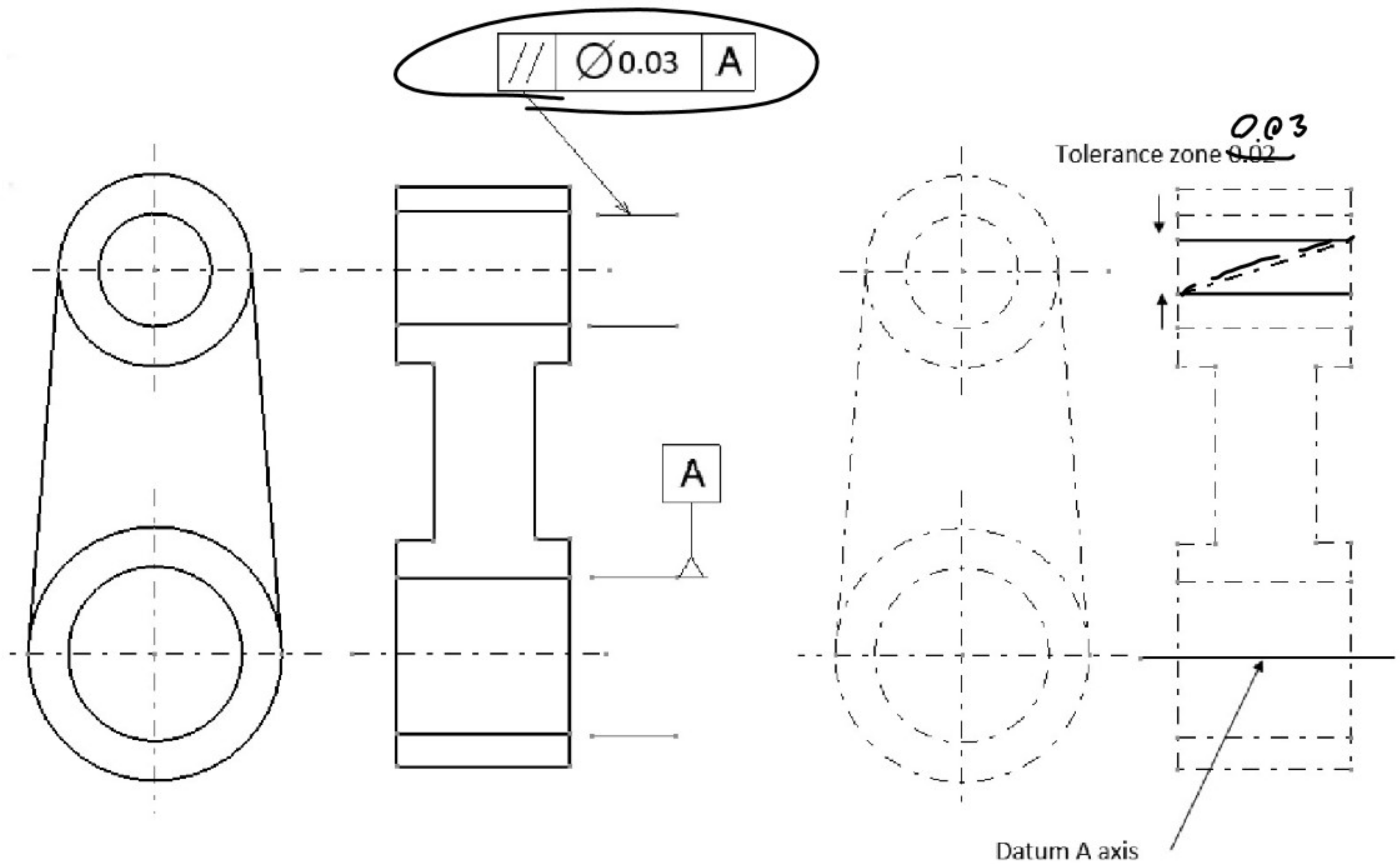
Axis within  
tolerance



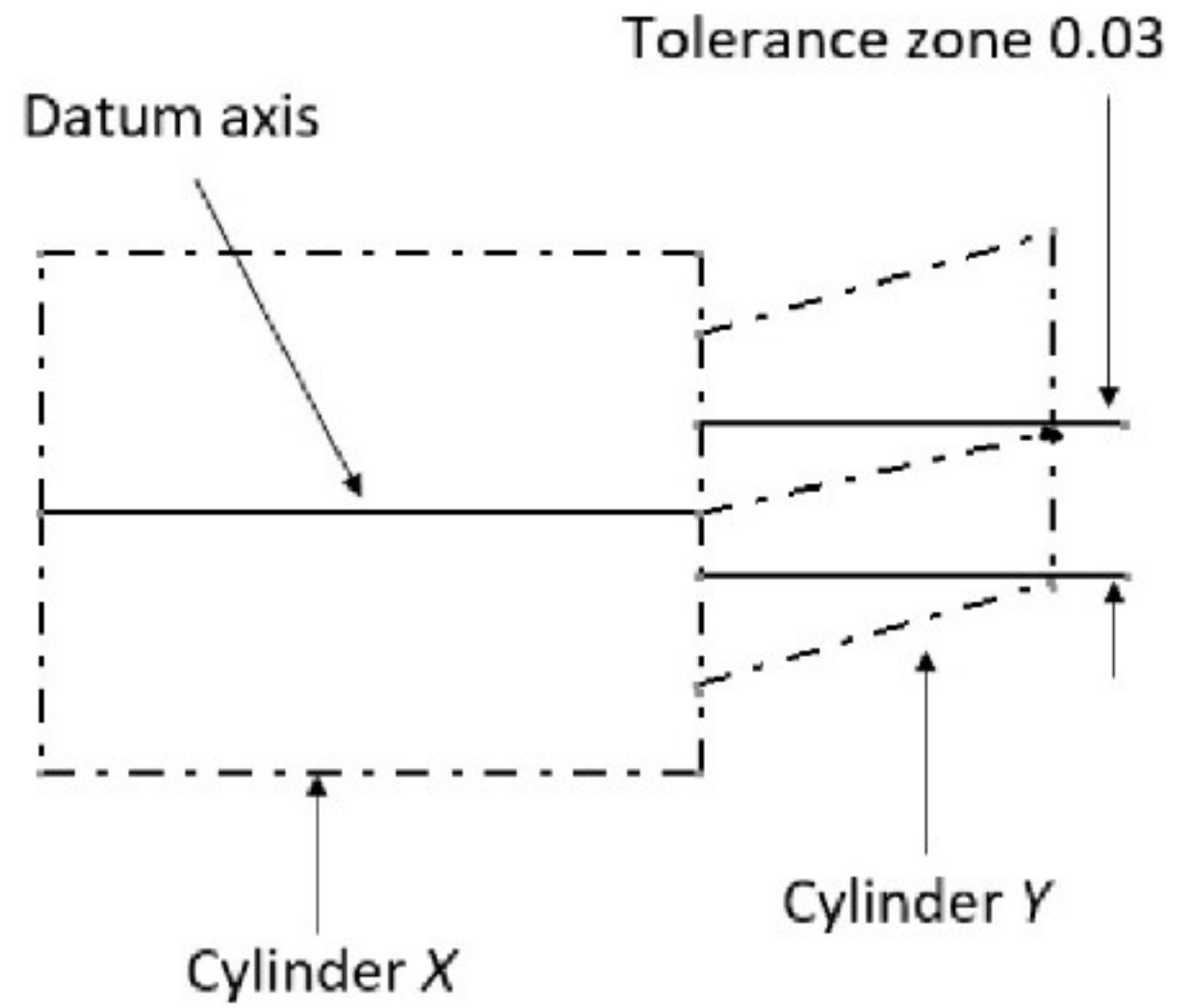
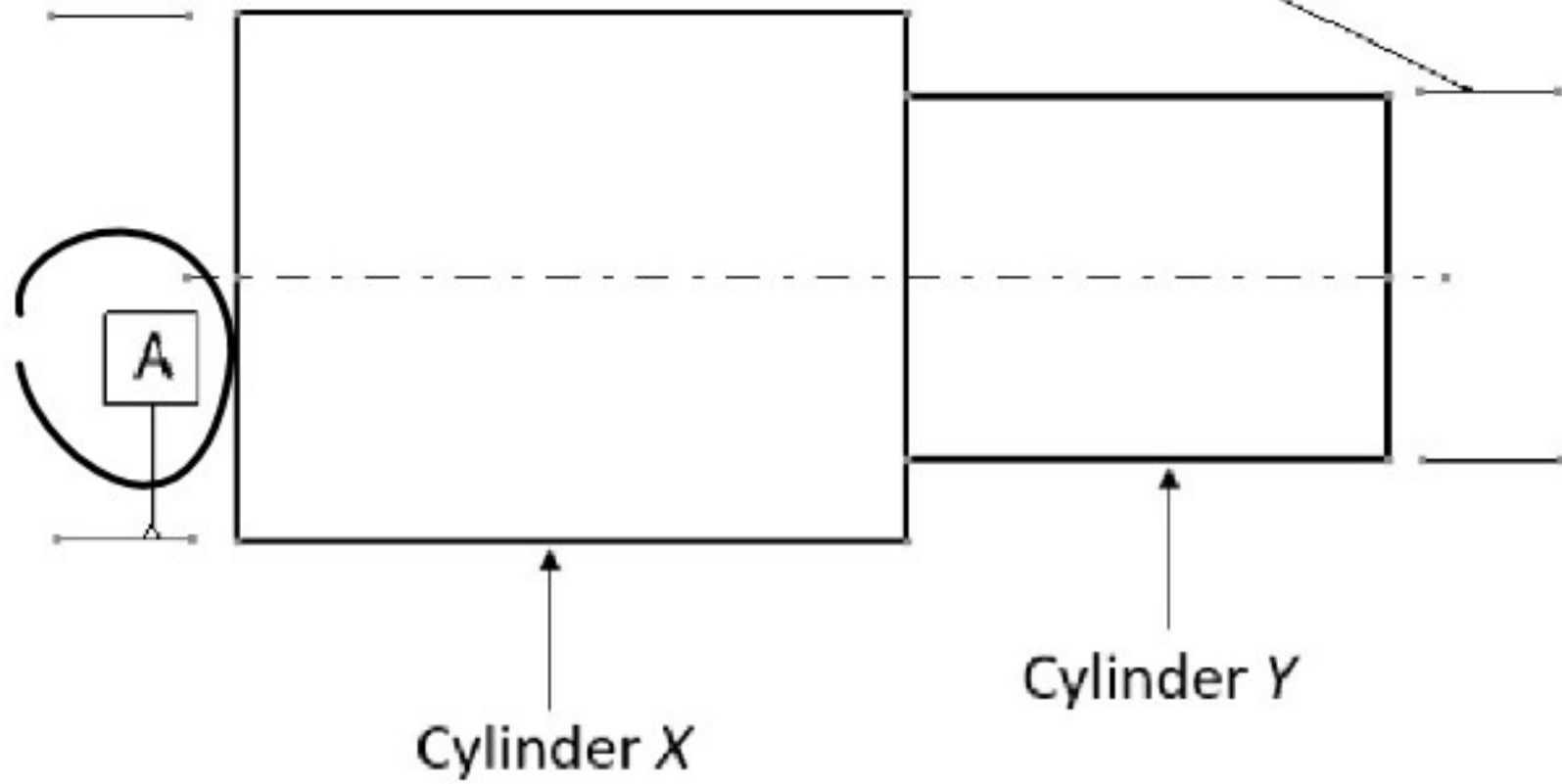
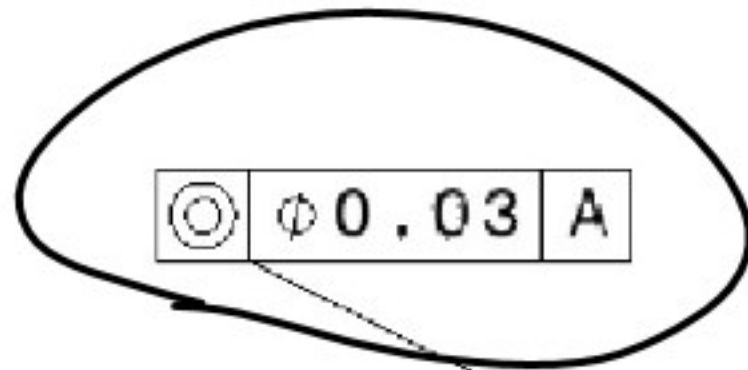
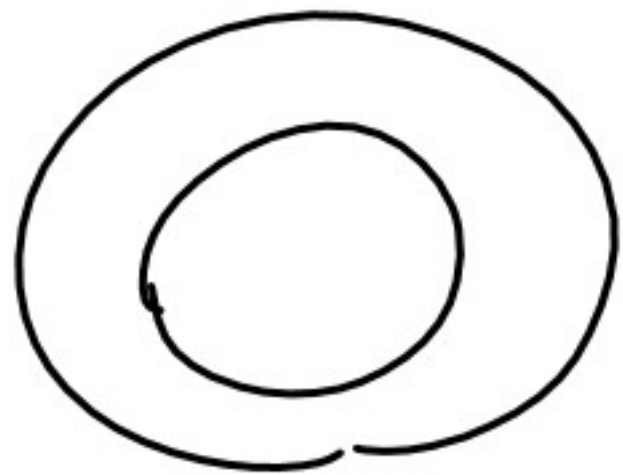


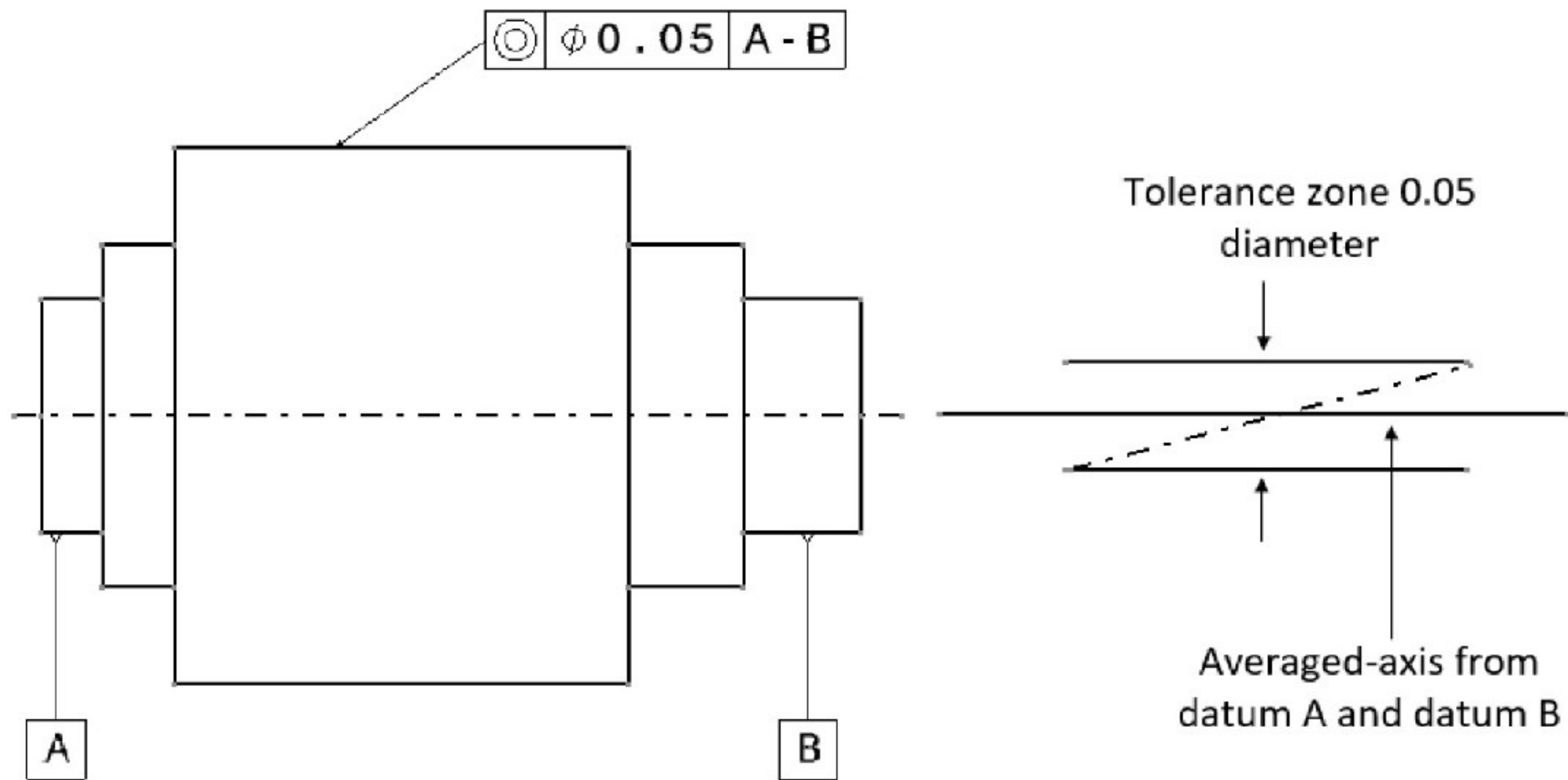


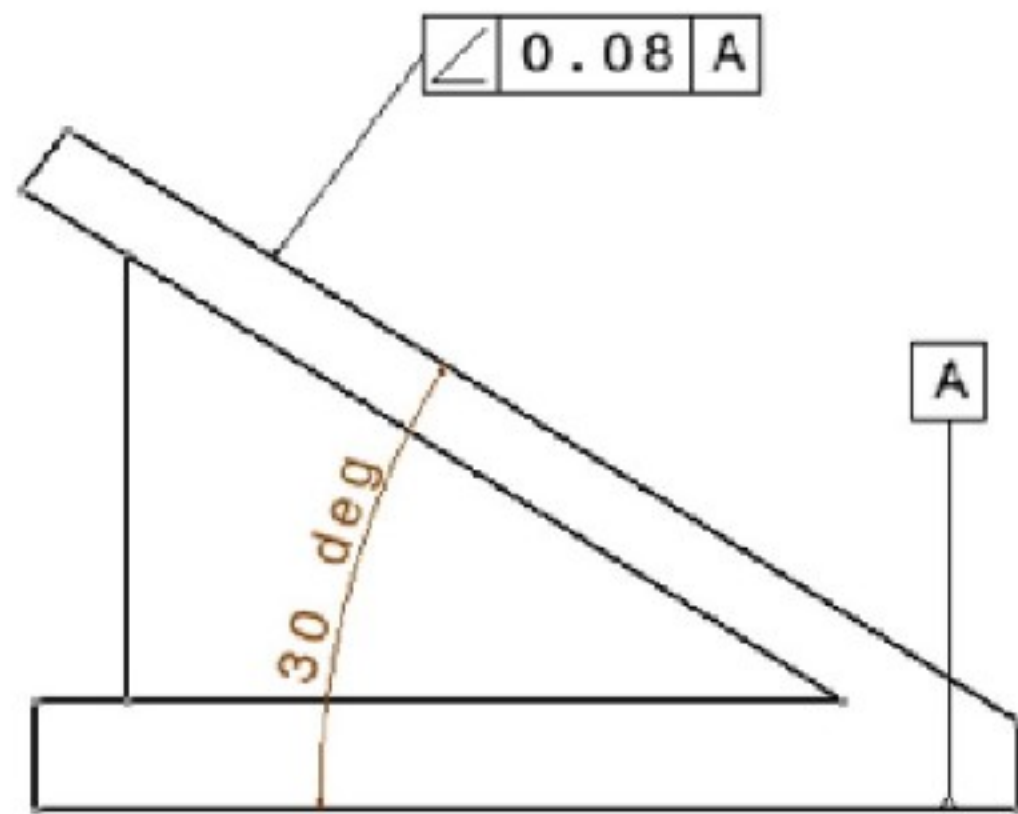




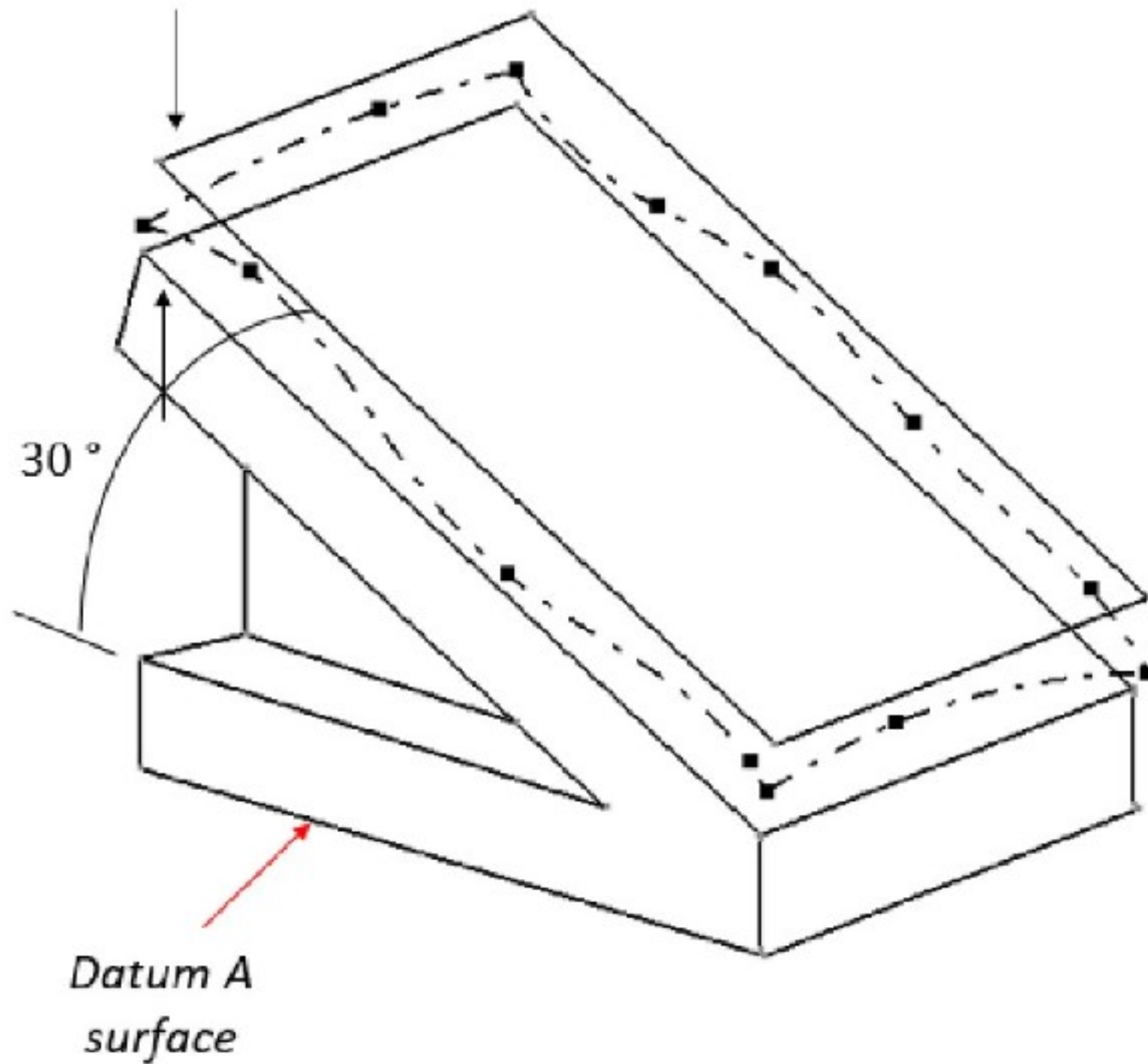


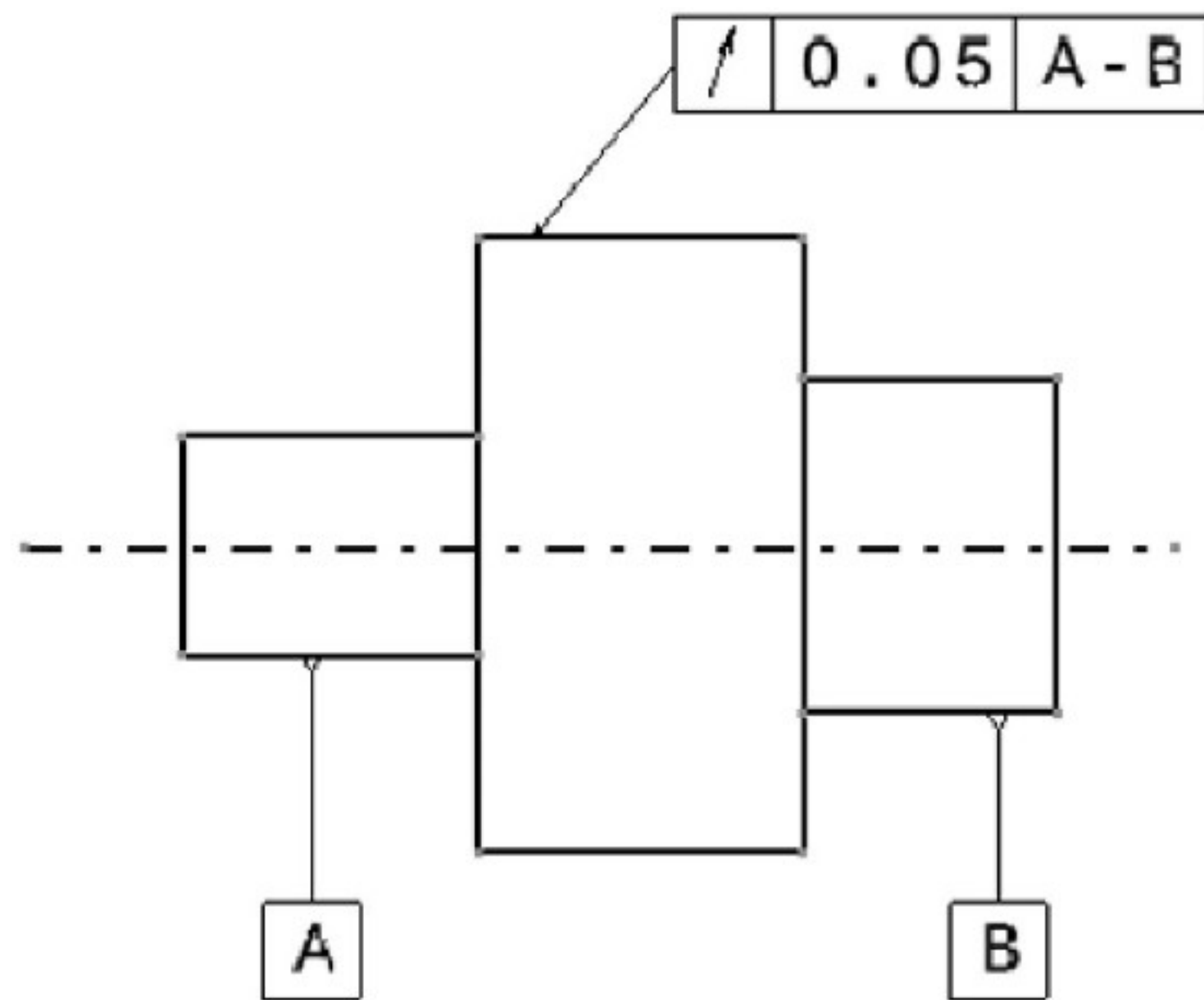




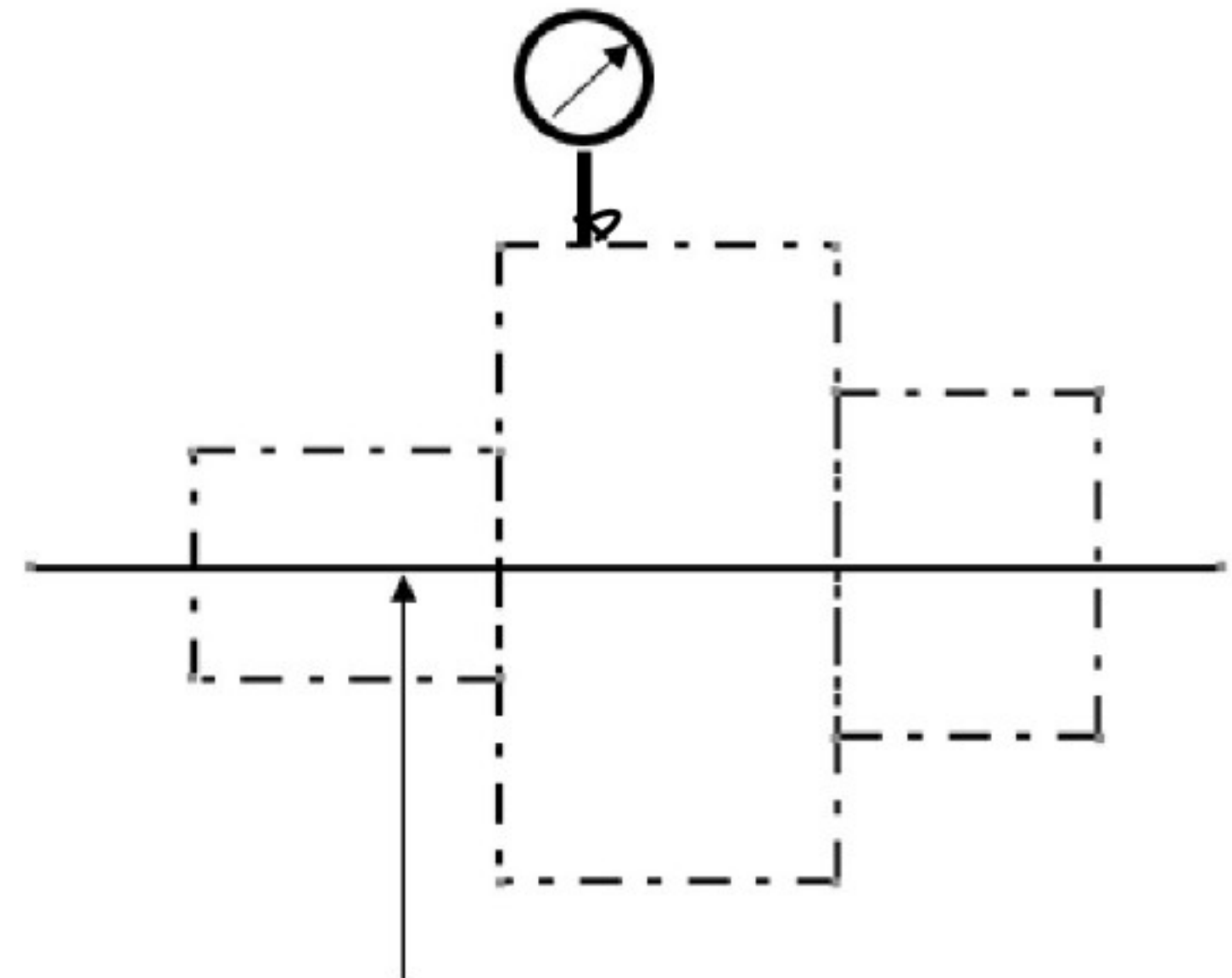


Tolerance zone 0.06





	0.05	A-B
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The axis of datum  
A-B





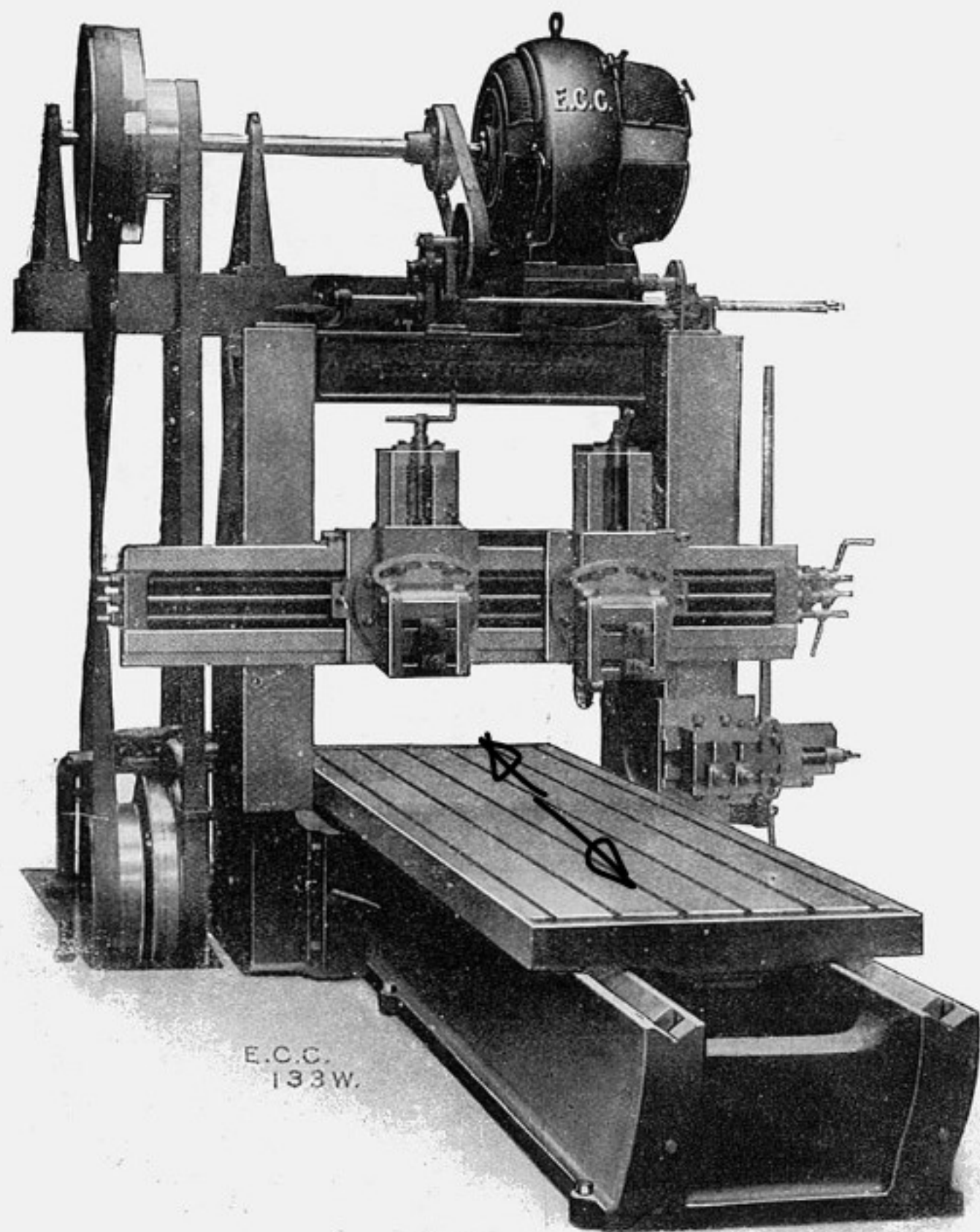
# Mechanics of Metal Cutting

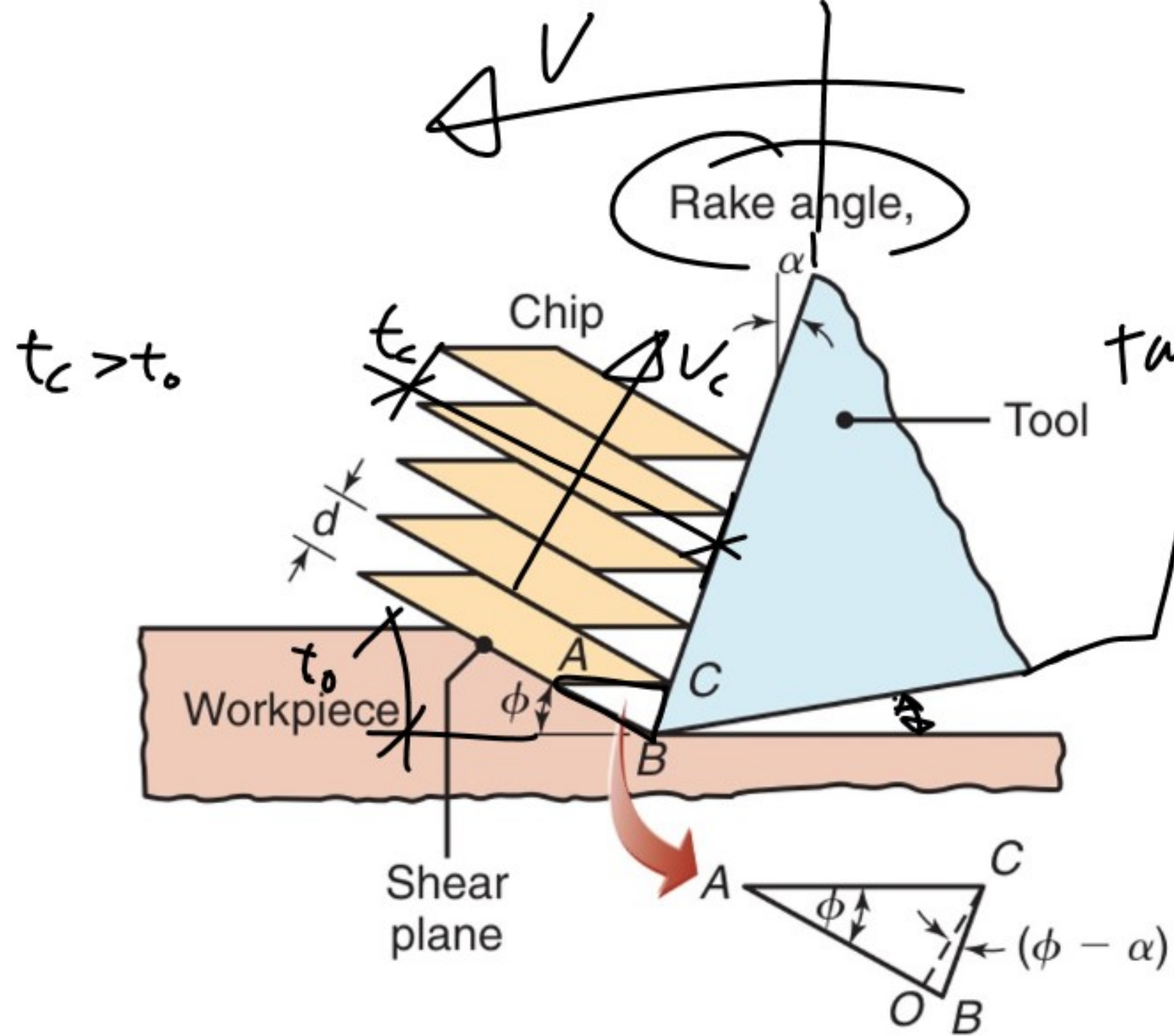
Shaper





Planer

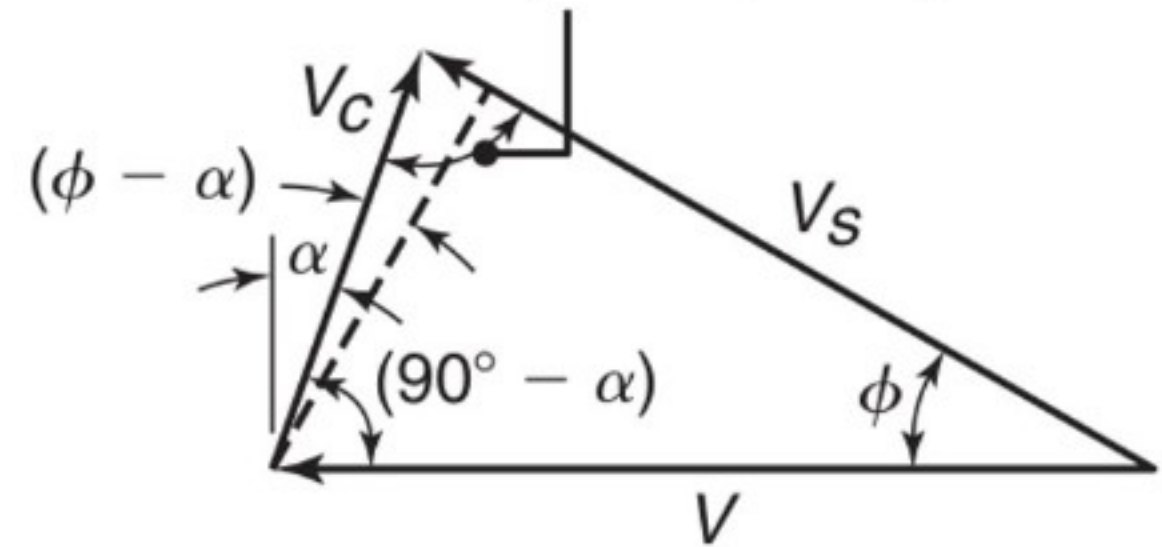




Cutting ratio

$$r = \frac{t_0}{t_c} = \frac{\sin \phi}{\cos(\phi - \alpha)}$$

$$\tan \beta = \frac{r \cos \alpha}{1 - r \sin \alpha} \quad (90^\circ - \phi + \alpha)$$



Shear Strain

$$\gamma = \frac{AB}{BC} = \frac{AO}{OC} + \frac{OB}{OC}$$

$$\gamma = \cot \beta + \tan(\beta - \alpha)$$

Estimate  $\phi$

Friction  $\mu$

$$\mu = \tan \beta$$

$$\phi \cong 95^\circ + \frac{\alpha}{2} - \frac{\beta}{2}$$

$$\phi \cong 95^\circ + \alpha - \beta$$



# Cutting Velocity

$$V t_o = V_c t_c$$

$$\frac{t_o}{t_c} = \frac{V_c}{V} = r$$

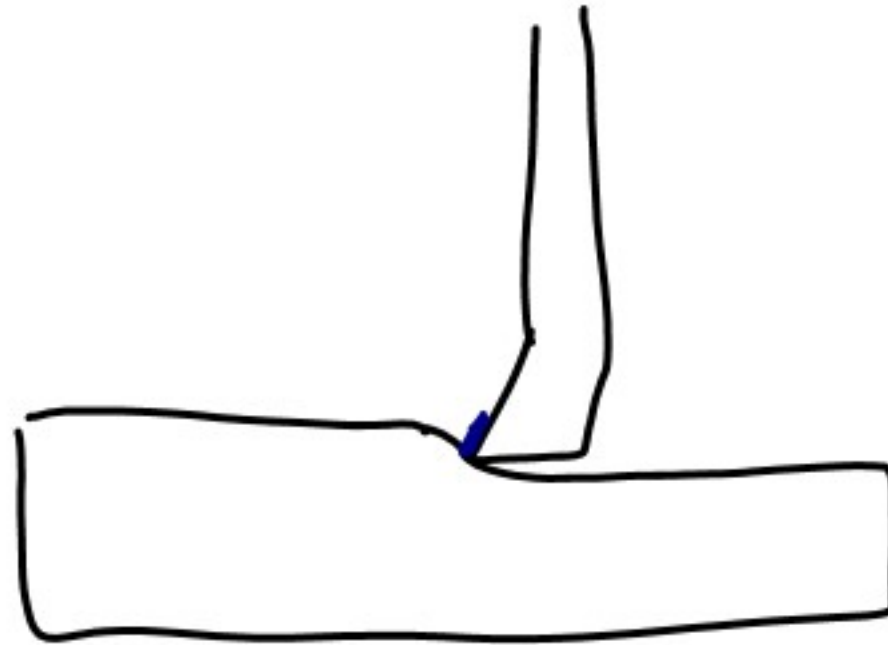
$$V_c = \frac{V t_o}{t_c}$$

$$V_c < V$$

# Chips

- Continuous
- Built up Edge

Good Finish  
Tangled



Bad Finish  
Low tool Wear

- Serrated Chips
- Discontinuous Chips

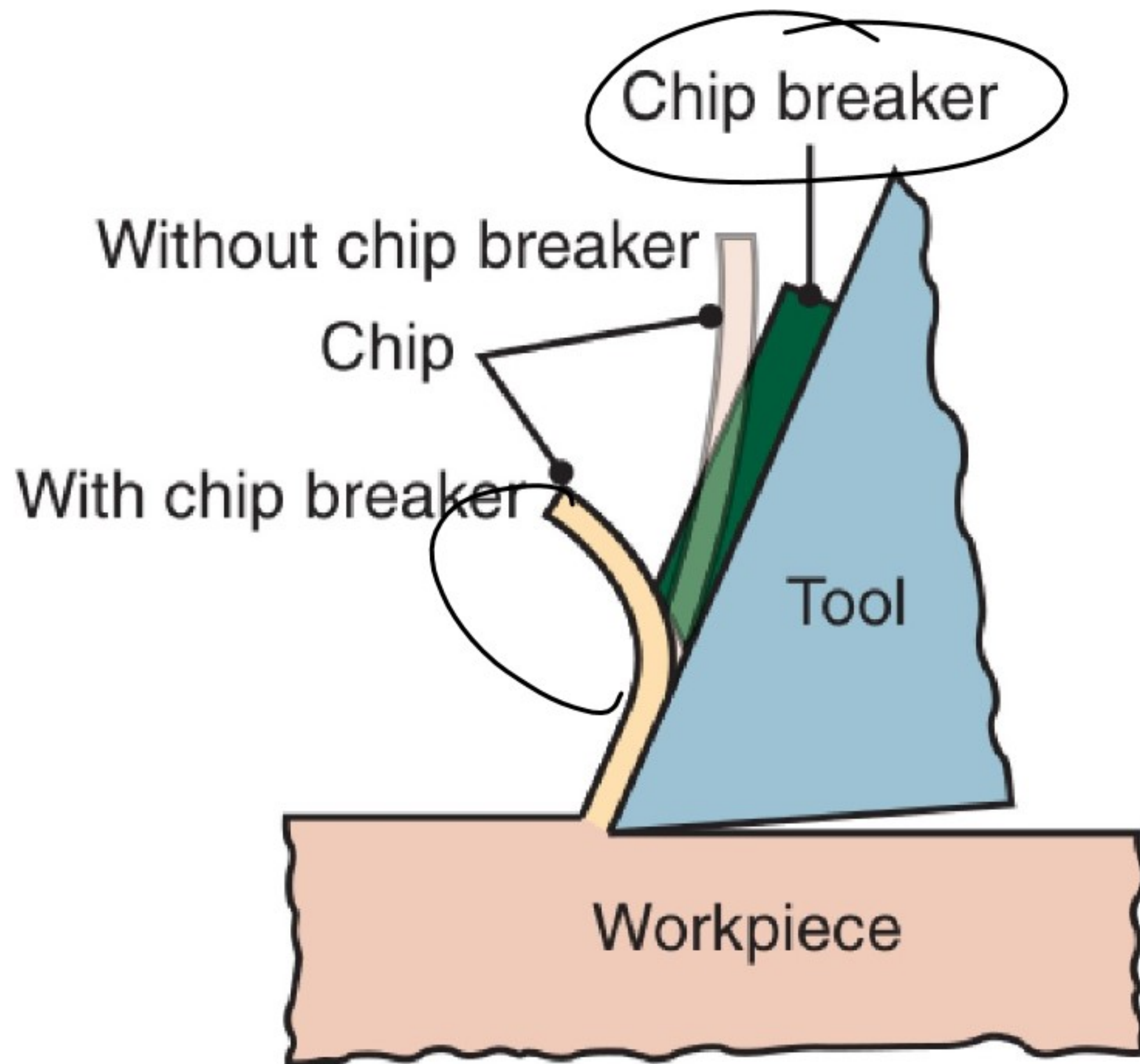
Material Thermal Properties

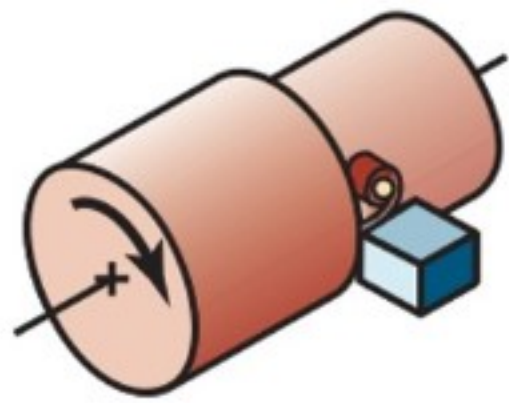
Chips break into pieces

Brittle Materials

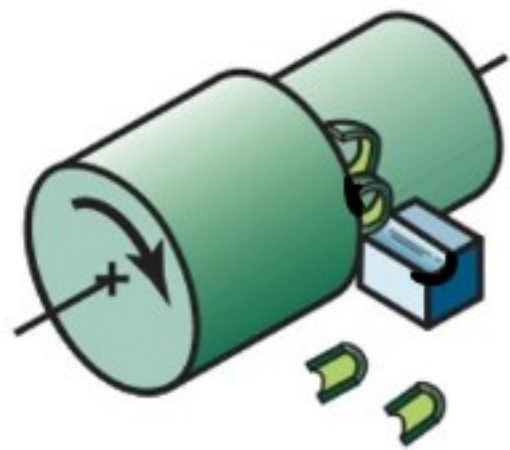
Tool geometry

Good surface finish

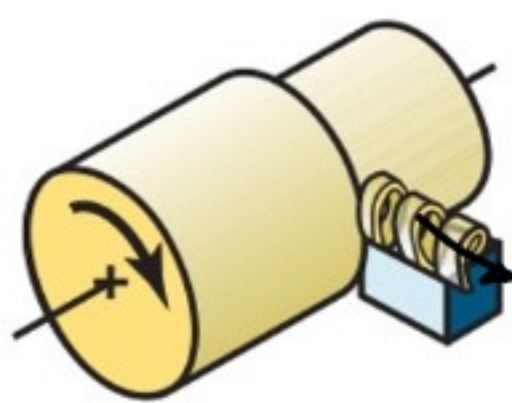




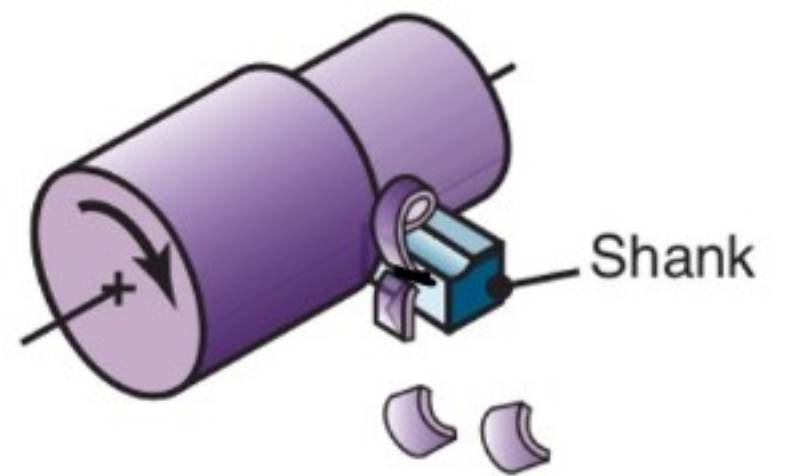
(a)



(b)



(c)



(d)



