

Prob 5. Tool life

$$D = 500 \text{ mm}, L = 1000 \text{ mm}$$

$$f = 0.4 \text{ mm/rev}, t_s = 3 \text{ mm}$$

$$n = 0.23, C = 400 \text{ m/min}$$

$$\therefore VT^n = C$$

$$\Rightarrow T = \left(\frac{C}{V}\right)^{\frac{1}{n}}$$

$$\therefore T_m = \frac{L}{fN}$$

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$$\therefore N = \frac{V}{\pi D}$$

$$\Rightarrow T_m = \frac{L \pi D}{fV}$$

$$T_m = T$$
$$\frac{L \pi D}{fV} = \frac{C^n}{V^{1/n}}$$

$$\frac{V^{1/n}}{V} = \frac{C^n \times f}{L \pi D}$$

$$V^{\frac{1}{0.23}-1} = \frac{400^{\frac{1}{0.23}} \times 0.4 \text{ m/rev}}{1000 \times 3.14 \times \frac{500}{1000}}$$

$$V^{3.347} = 52416093.3$$

$$V = (52416093.3)^{\frac{1}{3.347}}$$

$$V = 202.48 \text{ m/min}$$