MACHINING TIME

- The time, t for a single pass is given by

$$t = \frac{L + L_o}{f\,N}$$

where L = length of the job, mm

L_o = over travel of the tool beyond the length of the job to help in the setting of the tool, mm

f = feed rate, mm/rev

MACHINING TIME

- The number of passes required to machine a component depends upon the left-over stock (stock allowance). Also depending upon the specified surface finish and the tolerance on a given dimension, the choice would have to be made as to the number of finishing passes (1 or 2) while the rest of the allowance is to be removed through the roughing passes. The roughing passes, Pr is given by

$$P_r = \frac{A - A_f}{d_r}$$

where A = Total machining allowance, mm
A_f = Finish machining allowance, mm
d_r = Depth of cut in roughing, mm

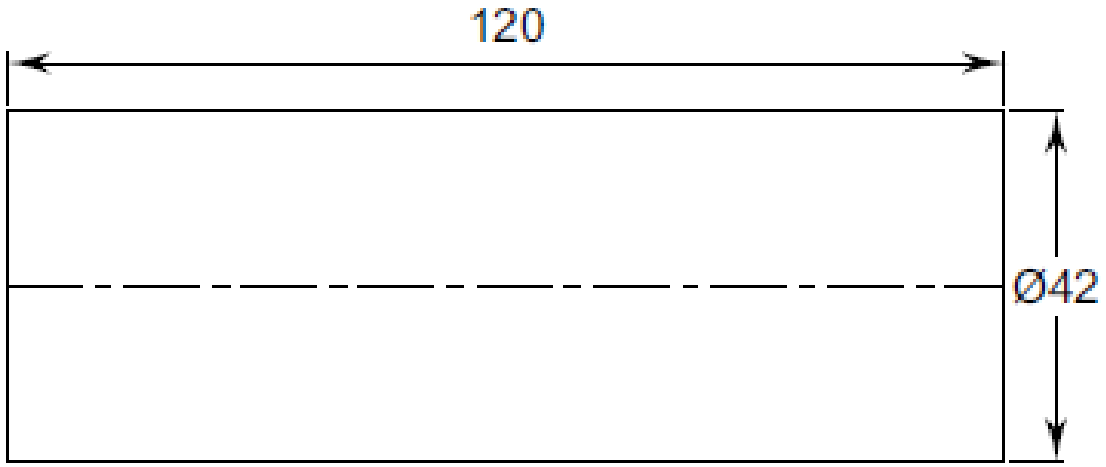
- Similarly the finishing passes, Pf is given by

$$P_f = \frac{A_f}{d_f}$$

where d_f = Depth of cut in finishing, mm

MACHINING TIME

- Estimate the actual machining time required for the component (C40 steel) shown in Fig. below. The available spindle speeds are, 70, 110, 176, 280, 440, 700, 1100, 1760 and 2800. Use a roughing speed of 30 m/min and finish speed of 60 m/min. The feed for roughing is 0.24 mm/rev while that for finishing is 0.10 mm/rev. The maximum depth of cut for roughing is 2 mm. Finish allowance may be taken as 0.75 mm. Blank to be used for machining is 50 mm in diameter.



MACHINING TIME

Solution Stock to be removed $= \dfrac{50 - 42}{2} = 4$ mm

Finish allowance = 0.75 mm

Roughing:

Roughing stock available = 4 – 0.75 = 3.25 mm

Since maximum depth of cut to be taken is 2 mm, there are 2 roughing passes.

Given cutting speed, $V = 30$ m/min

Average diameter $= \dfrac{50 + 42}{2} = 46$ mm

Spindle speed, $N = \dfrac{1000 \times 30}{\pi \times 46} = 207.59$ RPM

The nearest RPM available from the list is 176 RPM as 280 is very high compared to 207 as calculated.

MACHINING TIME

$$\text{Machining time for one pass} = \frac{(120+2)}{0.24 \times 176} = 2.898 \text{ minutes}$$

Finishing:

Given cutting speed, $V = 60$ m/min

$$\text{Spindle speed, } N = \frac{1000 \times 30}{\pi \times 42} = 439.05 \text{ RPM}$$

The nearest RPM available from the list is 440 RPM.

$$\text{Machining time for one pass} = \frac{(120+2)}{0.10 \times 440} = 2.77 \text{ minutes}$$

$$\text{Total machining time} = 2 \times 2.888 + 2.77 = 8.546 \text{ minutes}$$