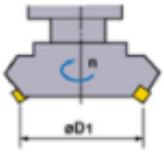
Calculation of cutting speeds and feeds

Cutting speed (vc)

$$vc = \frac{\pi \cdot D_1 \cdot n}{1000} \text{ (m/min)}$$

vc (m/min) : Cutting speed
π (3.14) : Pi
D1 (mm) : Cutter Diameter
n (t/min) : Speed

*Divide by 1000 to convert mm to m.



(Problem) Find the cutting speed for a Ø125mm cutter at 350 rpm.

(Answer) Substitute π=3.14, D1=125, n=350 in the formula.

$$vc = \frac{\pi \cdot D_1 \cdot n}{1000} = \frac{3.14 \times 125 \times 350}{1000} = 137.4 \text{m/min}$$

Cutting speed is 137.4m/min

Feed per tooth (fz)

$$fz = \frac{vf}{z \cdot n} \text{ (mm/dent)}$$

fz (mm/dent) : Feed per tooth
vf (mm/min) : Feed per min.
n (t/min) : Speed (feed per turn f=z x fz)
z : Insert reference

(Problem) Find the feed per tooth for a 10-tooth cutter, a speed of 500 rpm and a feed per minute of 500mm.

(Answer) Apply the above answer to the formula.

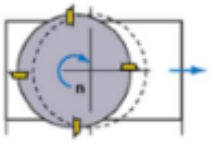
$$fz = \frac{vf}{z \times n} = \frac{500}{10 \times 500} = 0.1 \text{mm/tooth}$$

The answer is 0.1mm/tooth

Table feed (vf)

$$vf = fz \cdot z \cdot n \text{ (mm/min)}$$

vf (mm/min) : Feed per min.
fz (mm/dent) : Feed per tooth
n (t/min) : Speed
z : Insert reference



(Problem) Find the feed per minute for a 10-tooth cutter, a feed per tooth of 0.1mm and a speed of 500 rpm.

(Answer) Apply the above answer to the formula.

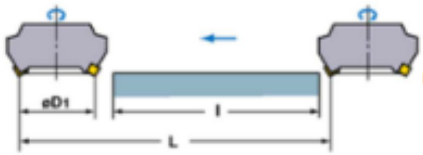
$$vf = fz \times z \times n = 0.1 \times 10 \times 500 = 500 \text{mm/min}$$

The table feed is 500m/min.

Cutting time (Tc)

$$Tc = \frac{L}{vf} \text{ (min)}$$

Tc (min) : Cutting time
vf (mm/min) : Feed per min.
L (mm) : Length machined (part length: l+Milling diameter: D1)



(Problem) Find the effective cutting time to machine a 300mm long part with a 200 diameter, 16-tooth cutter. Cutting speed 125m/min, feed per tooth 0.25mm, (rotation speed 200t/min).

(Answer) First calculate the feed per minute. vf=0.25x16x200=800mm/min
Machined length is 300mm + Ø Milling cutter L=300+200=500mm
Apply the above answer to the formula.

$$Tc = \frac{500}{800} = 0.625 \text{ (min)}$$

0.625x60=37.5(sec). The answer is 37.5sec