# Turning definitions

***n*** **= RPM**
(revolutions per minute)

$v_c$ **= Cutting speed**
(meter per minute)

$D_c$ **= Workpiece diameter**
(millimeter)

$a_p$ **= Depth of cut**
(millimeter)

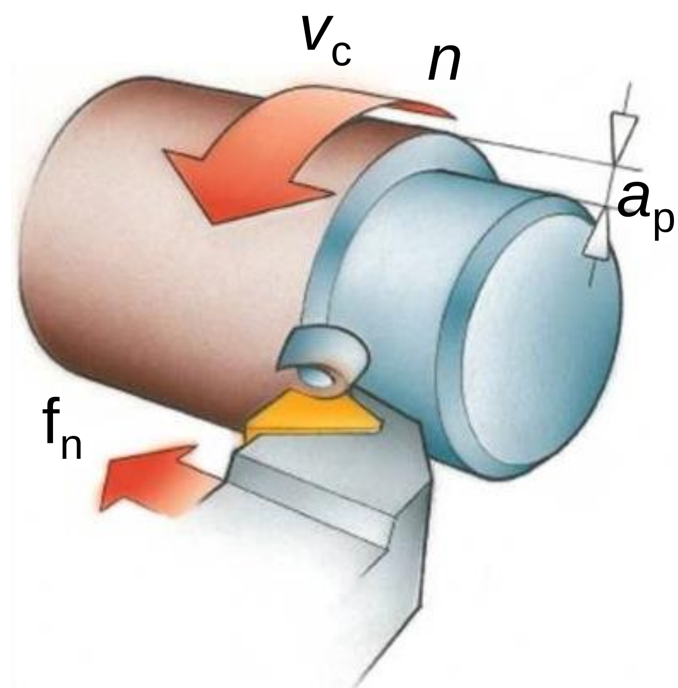
# Definition of terms

***$v_c$* = Cutting speed**
(m/min.)

***$a_p$* = Depth of cut**
(mm)

***n* = Spindle speed**
(rpm)

***$F_n$* = Feed**
(mm/rev.)

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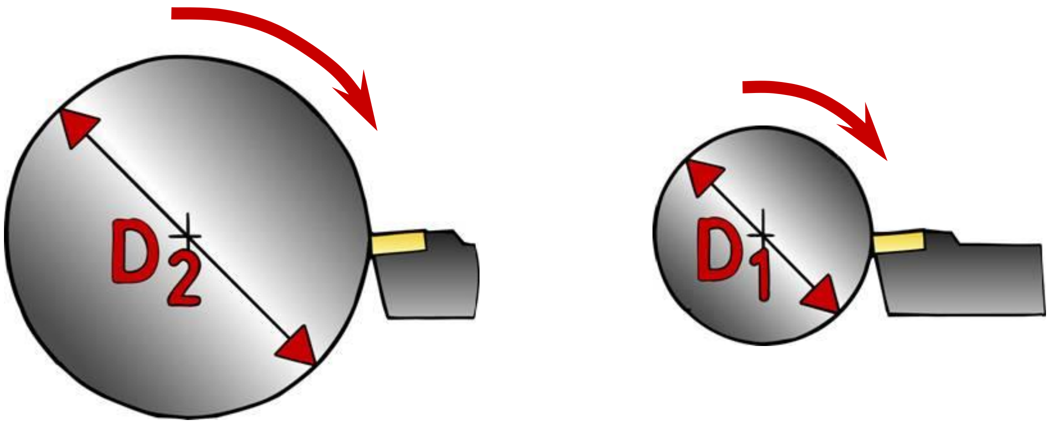
# Cutting data calculation




**Circumference = π x diameter**

**π = 3.14 (approx. = 3)**

**$D_2$ 100 mm diameter = 300 mm (3 x 100)**

**$D_1$ 50 mm diameter = 150 mm (3 x 50)**

# Calculating cutting data

RPM ($n$) from cutting speed ($v_c$)

Given $v_c = 400$ m/min

$D_c = 100$ mm

$$n = \frac{v_c \text{ x } 1000}{\pi \text{ x } Dc}$$

$$n = \frac{400 \text{ x } 1000}{3.14 \text{ x } 100}$$

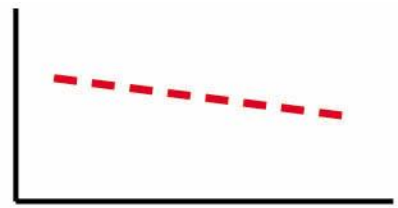
**= 1275 rev/min**

# How do cutting data parameters effect tool life?

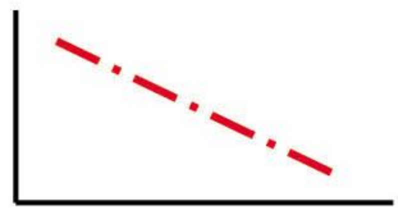
**Utilize the potential of**

***$a_p$*** - to reduce number or cuts
***$f_n$*** - for shorter cutting time
***$v_c$*** - for best tool life

**Effect on tool life**



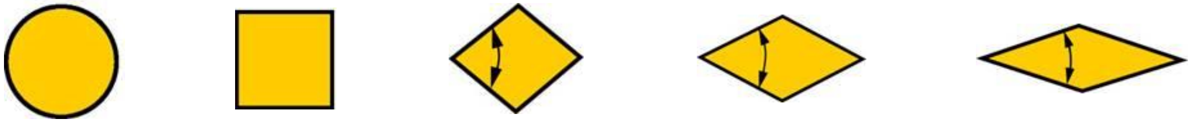
***$a_p$*** - little effect on tool life



***$f_n$*** - less effect on tool life than $v_c$

***$v_c$*** - large effect on tool life. Adjust $v_c$ for best economy

# Insert shape



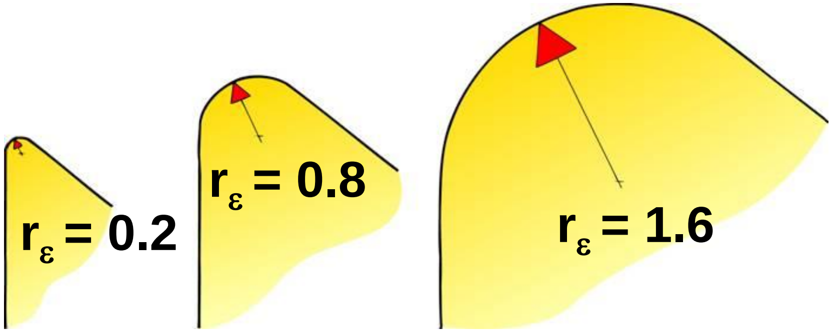
**Large insert shape**

- Stronger cutting edge
- Higher feed rates
- Increase cutting forces
- Increase vibration

**Small insert shape**

- Increase accessibility
- Decrease vibration
- Decrease cutting forces
- Weaker cutting edge

# Effect of nose radius




**Small nose radius**

- Ideal for small cutting depth
- Reduces vibration
- Insert breakage

**Large nose radius**

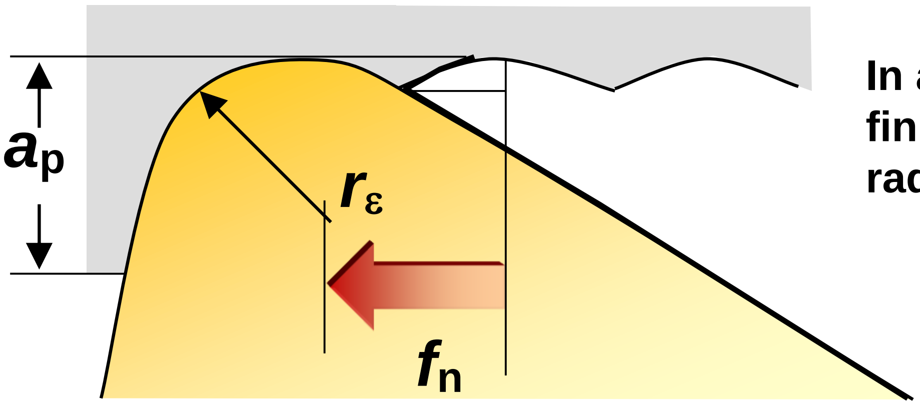
- Heavy feed rates
- Large depths of cut
- Strong edge security
- Increased radial pressures

**Note:** As a general rule of thumb, the depth of cut should be no less than 2/3 of the nose radius.

# Surface finish: negative T-Max® P inserts

$$R_{max} = \frac{f_n^2 \times 1000}{8 \times r_\varepsilon}$$

| Surface finish, µm | | Insert nose radius, mm | | |
|---|---|---|---|---|
| $R_a$ | $R_t$ | 0.4 | 0.8 | 1.2 |
| 0.6 | 1.6 | 0.07 | 0.10 | 0.12 |
| 1.6 | 4.0 | 0.11 | 0.15 | 0.19 |
| 3.2 | 10.0 | 0.17 | 0.24 | 0.29 |
| 6.3 | 16.0 | 0.22 | 0.30 | 0.37 |

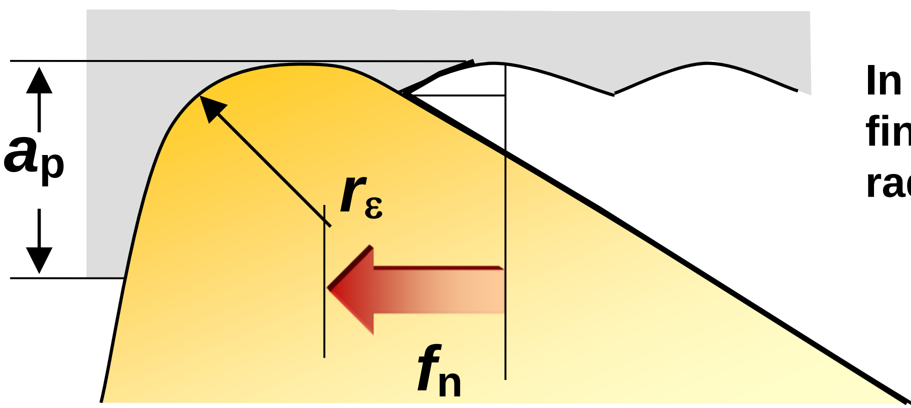



**In a turning operation, surface finish is a function of nose radius and feed per revolution**

# Surface finish: positive CoroTurn® 107 inserts

$$R_{max} = \frac{f_n^2 \times 1000}{8 \times r_\varepsilon}$$

| Surface finish, µm | | Insert nose radius, mm | | | | |
|---|---|---|---|---|---|---|
| $R_a$ | $R_t$ | 0.2 | 0.4 | 0.8 | 1.2 | 1.6 |
| 0.6 | 1.6 | 0.05 | 0.07 | 0.10 | 0.12 | 0.14 |
| 1.6 | 4.0 | 0.08 | 0.11 | 0.15 | 0.19 | 0.22 |
| 3.2 | 10.0 | 0.10 | 0.17 | 0.24 | 0.29 | 0.34 |
| 6.3 | 16.0 | 0.13 | 0.22 | 0.30 | 0.37 | 0.43 |




In a turning operation, surface finish is a function of nose radius and feed per revolution