## How to use Yamawa’s cutting speed recommendations for taps

### [Question]

How can I calculate the revolutions per minute (RPM) of a tap if I know the recommended cutting speed?
- Spiral fluted tap M12 X 1.75
- I’m using the recommended cutting speed of 7m/min or 23 SFM.

### [Answer]

All cutting speed recommendations are given in Meters Per Minute (MPM) or Surface Feet Per Minute. Taps vary in diameter depending on the thread size, so they produce a different MPM when run at the same RPM.

When using the recommended MPM of the tap, the recommendation must be converted to RPM so different diameter taps can be run at the same MPM.

The calculation for Revolutions Per Minute (RPM) requires the measurement of the circumference of a circle.

As you can see, it is easy to measure a straight line with a scale or ruler but measuring the circumference of a circle seems overwhelming at times.

This is also easily done by multiplying the diameter of the circle by $\pi$ (Pi) or the constant 3.14 to determine the distance around the circle.

You can calculate revolutions per minute (RPM) from the recommended MPM by using a simple formula.
You will need the following information to calculate the conversion of cutting speed MPM to RPM. You will need the same information to convert RPM to MPM.

Dc (Outer diameter of the tap): Shown in mm.

Vc (tapping speed): In Meters Per Minute (MPM).

1m = 1000 mm.

m/min: Meter Per Minutes.

<Calculate "n" when "Vc" is given>

\[
\frac{n}{\pi} = \frac{1000 \times V_c}{\pi \times D_c}
\]

Vc: Tapping speed (meters per min.)
Dc: Outer diameter of the tap (mm)
\(\pi\) : 3.14
n : Revolutions per minute (RPM)

To calculate the Revolutions Per Minute (RPM) of the M12 X 1.75 spiral fluted tap above with a speed recommendation of 7 meters per minute use the following:

\[
(1000 \times 7\text{m/min}) ÷ (3.14 \times 12\text{mm}) = 7000 ÷ 37.68 = 185.77 \text{ RPM}
\]

The ideal revolutions per minute (RPM) for the machinery with a M12 tap at 7 meters per minute is 186 RPM.

<Calculate "Vc" when "n" is given>

\[
V_c = \frac{\pi \times D_c \times n}{1000} \div \text{m/mm}
\]

Vc: Tapping speed (meters per min.)
Dc: Outer diameter of the tap (mm)
\(\pi\) : 3.14
n : Revolutions per minute (RPM)

How to calculate tapping speed Vc (m/min) using the same information shown above:

The tapping speed of a M12 X 1.75 spiral flute tap at 186 RPM's is:

\[
(3.14 \times 12 \text{ mm} \times 186 \text{ RPM}) ÷ (1000) = 7.008 \text{ MPM (Meters Per Minute)}.
\]

How to calculate the RPM of an automobile tire:

Use the following to calculate the RPM of an automobile tire;

Diameter of car tire: 60 cm
Driving speed: 100 km/h

Dc = 60 cm = 600 mm
Vc = 100km = 100,000m

Time 1 hour = 60 minutes

\[
\frac{1,000 \times 100,000\text{m}}{3.14 \times 600\text{mm}} ÷ 60 \text{ minutes} = 884 \text{ RPM}
\]

Take this challenge to see what you’ve learned.

Remember this?

\[
V_c = \frac{1,000 \times V_c}{\pi \times D_c} \div \text{m/mm}
\]