Cutting Speed ↔ Spindle Speed (rpm)

Spindle speed for a cutting speed and diameter, or the cutting speed at a spindle speed, for turning, milling, drilling and grinding.

Method: v_c = π D N

Input parameters

Unit system: SI

Parameter	Value	Unit
Value given	Cutting speed (find rpm)	
Work (turning) or tool diameter	50.000	mm
Cutting speed From the tool maker for the work and tool materials.	180.00	m/min
Spindle speed	1,000.0	rpm

Calculated results

Parameter	Value	Unit
Spindle speed	1,145.9	rpm
Cutting speed	180.00	m/min

Formula and method

$$N = \frac{v_c}{\pi D}$$

Variables

given	Value given	-
D	Work (turning) or tool diameter	m
v_c	Cutting speed	m/s
N	Spindle speed	1/s

Method and standards

Kinematics.

Assumptions and limits

- Rigid set-up.

References

- v_c = π D N

Report details

Report reference	FCC-D9JK-KD63 (the same inputs always give the same reference)
Generated	17 November 2026, 19:46 UTC
Calculator	Cutting Speed ↔ Spindle Speed (rpm)
Method last reviewed	12 November 2026
Software release	FireCAD Calc, release of 17 November 2026
Release checks	2 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/mechanical/manufacturing/cutting-speed-rpm

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.