Tool Life by Taylor's Equation

Tool life at a cutting speed, or the speed for a target tool life, from Taylor's equation V T^n = C with your exponent and constant.

Method: Taylor (1907) V Tⁿ = C

Input parameters

Unit system: SI

Parameter	Value	Unit
Cutting speed	150.00	m/min
Taylor exponent About 0.1–0.15 for HSS, 0.2–0.3 for carbide, higher for ceramics.	0.25000	
Taylor constant: cutting speed for a 1 min tool life Any speed unit (m/min, ft/min); the constant must be fitted with tool life in minutes.	400.00	m/min
Target tool life	30.000	min

Calculated results

Parameter	Value	Unit
Tool life at V	50.568	min
Speed for the target life	170.91	m/min

Notes for this case

- C is the speed giving a 1 min tool life: constants fitted with T in seconds or hours must be converted first.

Formula and method

$$VT^n = C$$

Variables

V	Cutting speed	m/s
n	Taylor exponent	-
C	Taylor constant: cutting speed for a 1 min tool life	m/s
T_t	Target tool life	s
T	Tool life at V	s
V_t	Speed for the target life	m/s

Method and standards

Taylor.

Assumptions and limits

- C is the cutting speed that gives a 1 min tool life, so it can be entered in any speed unit; the equation is evaluated with V in m/min and T in minutes. Constants fitted with T in seconds or hours must be converted first.
- Lives outside about 1–1000 min are flagged: small n makes T extremely sensitive to speed, and extrapolation beyond the fitted speeds is unreliable.
- Same tool, work and feed as the constants.

References

- Taylor (1907) V Tⁿ = C

Report details

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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/taylor-tool-life

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.