Milling Formulas

SYMBOLS AND MEASUREMENT UNITS

- **Dc** = Cutting diameter
- **ap** = Axial depth of cut (inches)
- **Vf** = Feed rate (inches per minute)
- **fn** = Advance per revolution (inches)
- **fz** = Feed (inches per tooth)
- **K** = Power constant of work material (See table on back)
- **Q** = Metal removal rate (cubic in./min.)
- **n** = RPM (cutter spindle)
- **Z** = Number of effective teeth
- **Vc** = Cutting speed (SFM)
- **ae** = Radial depth of cut
- **P** = Horsepower at the cutter

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Materials	Hardness (HB)	K
Alloy Steel (4140)	85–200	1.64
	201–253	1.56
	254–286	1.28
Stainless Steel (300 Series)	135–275	1.54–.76
	286–421	.74–.50
Aluminum (2024)	Wrought	4.05
Gray Cast Iron (Class 40)	150–175	2.27
	110–190	2.00
	176–200	1.89
	201–250	1.52
Titanium	250–375	1.33–.87

Vc	$= .262 \times Dc \times n$	**Q**	$= ae \times ap \times Vf$
n	$= \frac{3.82 \times Vc}{Dc}$	**P**	$= \frac{ae \times ap \times Vf}{K}$
Vf	$= fz \times Z \times n$	**1 Hp**	$= 0.7457$ kW
fz	$= \frac{Vf}{Z \times n}$	**1 kW**	$= 1.341$ Hp
fn	$= \frac{Vf}{n}$		

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