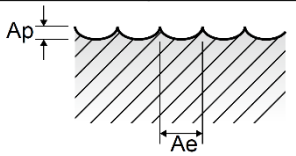


Speeds and Feeds



- 1) Select your material in the ISO colored chart with respect to material description and hardness (HRc).
- 2) Start with a middle/average value for spindle speed, n (RPM) and feed rate, V_f (mm/min). Adjust the spindle speed and/or feed rate based on your cutting conditions.

Insert Grade – **H THM**

Material				Recommended Cutting Values								
Group		Description	Width of Cut, a_e	Depth of Cut, a_p	Parameter	Tool Diameter (mm)						
ISO	VDI 3323					8 \emptyset	10, 11 \emptyset	12, 13 \emptyset	16, 17 \emptyset	20, 21 \emptyset	25, 26 \emptyset	30, 32, 33 \emptyset
					Number of Flutes	2	2	2	2	2	2	2
P	9-11 > HRc 30	Low-Alloyed Steel High-Alloyed Steel and Tool Steel			V_c	100 - 220	100 - 260	100 - 280	100 - 350	100 - 400	100 - 450	100 - 500
					f_z	0.15 - 0.20	0.15 - 0.20	0.15 - 0.20	0.20 - 0.30	0.20 - 0.40	0.20 - 0.50	0.20 - 0.60
					n	3980 - 8750	3180 - 8280	2650 - 7430	1990 - 6960	1590 - 6370	1270 - 5730	1060 - 5310
					V_f	1190 - 3500	950 - 3310	800 - 2970	800 - 4180	640 - 5090	510 - 5730	420 - 6370
K	15-20	Grey Cast Iron Nodular Cast Iron Malleable Cast Iron			V_c	160 - 320	160 - 360	160 - 400	160 - 500	160 - 550	160 - 620	160 - 720
					f_z	0.30 - 0.30	0.30 - 0.30	0.30 - 0.30	0.35 - 0.40	0.35 - 0.40	0.35 - 0.50	0.35 - 0.60
					n	6370 - 12730	5090 - 11460	4240 - 10610	3180 - 9950	2550 - 8750	2040 - 7890	1700 - 7640
					V_f	3820 - 7640	3060 - 6880	2550 - 6370	2230 - 7960	1780 - 7000	1430 - 7890	1190 - 9170
H	38	Hardened Steel			V_c	80 - 180	80 - 200	80 - 220	80 - 260	80 - 320	80 - 360	80 - 400
					f_z	0.10 - 0.20	0.10 - 0.20	0.10 - 0.20	0.15 - 0.30	0.15 - 0.40	0.15 - 0.50	0.15 - 0.60
					n	3180 - 7160	2550 - 6370	2120 - 5840	1590 - 5170	1270 - 5090	1020 - 4580	850 - 4240
					V_f	640 - 2860	510 - 2550	420 - 2330	480 - 3100	380 - 4070	310 - 4580	250 - 5090

NOTE: It is recommended to use a carbide shank holder when the length of overhang exceeds 4XD.

It is recommended to reduce feed rates by 70% to 85% of the values in the chart when the length to diameter ratio exceeds 3 to 1.



Speeds and Feeds



Feed Rate, Per Revolution (mm/min)
$v_f = f_n \cdot n$

Feed Rate, Per Tooth (mm/min)
$v_f = f_z \cdot n \cdot Z$

Feed Per Revolution (mm/rev)
$f_n = \frac{v_f}{n}$

Feed Per Tooth (mm)
$f_z = \frac{v_f}{n \cdot Z}$

Cutting Speed (m/min)
$v_c = \frac{\pi \cdot D_{tool} \cdot n}{1000}$

Spindle Speed (rev/min)
$n = \frac{v_c \cdot 1000}{\pi \cdot D_{tool}}$

Material Removal Rate (mm ³ /min)
$MMR = \frac{a_p \cdot a_e \cdot v_f}{1000}$

Metric

Symbol	Definition	Unit
v_f	Feed rate	mm/min
f_n	Feed per revolution	mm/rev
f_z	Feed per tooth	mm
v_c	Cutting speed	m/min (SMM)
n	Spindle speed	rev/min (RPM)
D_{tool}	Tool cutting diameter	mm
MMR	Material removal rate	(mm ³ /min)
a_e	Radial depth of cut	mm
a_p	Axial depth of cut	mm
Z	Number of teeth/flutes	