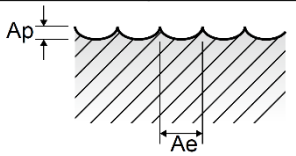


Speeds and Feeds



- 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 (in/min). Adjust the spindle speed and/or feed rate based on your cutting conditions.

Insert Grade – **HTHM**

Material				Recommended Cutting Values								
Group		Description	Width of Cut, a_e	Depth of Cut, a_p	Parameter	Tool Diameter (in)						
ISO	VDI 3323					5/16 \emptyset	3/8 \emptyset	1/2 \emptyset	5/8 \emptyset	3/4 \emptyset	1 \emptyset	1-1/4 \emptyset
P	9-11 > HRc 30	Low-Alloyed Steel High-Alloyed Steel and Tool Steel			Number of Flutes	2	2	2	2	2	2	2
					V_c	328 - 722	328 - 853	328 - 919	328 - 1148	328 - 1312	328 - 1476	328 - 1640
					f_z	0.006 - 0.008	0.006 - 0.008	0.006 - 0.008	0.008 - 0.012	0.008 - 0.016	0.008 - 0.02	0.008 - 0.024
					n	4009 - 8826	3341 - 8689	2506 - 7021	2005 - 7017	1671 - 6682	1253 - 5638	1002 - 5012
K	15-20	Grey Cast Iron Nodular Cast Iron Malleable Cast Iron			V_c	48 - 138	40 - 136	30 - 110	32 - 166	27 - 210	20 - 226	16 - 241
					V_c	525 - 1050	525 - 1180	525 - 1312	525 - 1640	525 - 1804	525 - 2034	525 - 2362
					f_z	0.012 - 0.012	0.012 - 0.012	0.012 - 0.012	0.014 - 0.016	0.014 - 0.016	0.014 - 0.02	0.014 - 0.024
					n	6418 - 12835	5348 - 12020	4011 - 10024	3209 - 10024	2674 - 9188	2006 - 7770	1604 - 7218
H	38	Hardened Steel			V_c	154 - 308	128 - 288	96 - 241	90 - 321	75 - 294	56 - 311	45 - 346
					V_c	262 - 591	262 - 656	262 - 722	262 - 853	262 - 1050	262 - 1181	262 - 1312
					f_z	0.004 - 0.008	0.004 - 0.008	0.004 - 0.008	0.006 - 0.012	0.006 - 0.016	0.006 - 0.02	0.006 - 0.002
					n	3203 - 7224	2669 - 6682	2002 - 5516	1601 - 5214	1334 - 5348	1001 - 4511	801 - 4009
					V_f	26 - 116	21 - 107	16 - 88	19 - 125	16 - 171	12 - 180	10 - 19

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 (in/min)
$v_f = f_n \cdot n$

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

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

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

Cutting Speed (ft/min)
$v_c = \frac{\pi \cdot D_{tool} \cdot n}{12}$

Spindle Speed (rev/min)
$n = \frac{v_c \cdot 12}{\pi \cdot D_{tool}}$

Material Removal Rate (in ³ /min)
$MMR = a_p \cdot a_e \cdot v_f$

Inch

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