

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 – **HTM1**

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 Ø	3/8 Ø	1/2 Ø	5/8 Ø	3/4 Ø	1 Ø	1-1/4 Ø												
P	1-4 < HRc 30	Non-Alloyed Steel			Number of Flutes	2	2	2	2	2	2	2												
					V _c	525 - 1050	525 - 1180	525 - 1246	525 - 1574	525 - 1902	525 - 1968	525 - 2296												
	f _z				0.008 - 0.008	0.008 - 0.008	0.008 - 0.008	0.01 - 0.012	0.01 - 0.016	0.01 - 0.02	0.01 - 0.023													
	n				6418 - 12835	5348 - 12020	4011 - 9519	3209 - 9620	2674 - 9688	2006 - 7518	1604 - 7017													
	V _f				100 - 200	83 - 188	63 - 149	63 - 227	52 - 304	39 - 301	31 - 323													
	V _c				394 - 918	394 - 984	394 - 1148	394 - 1246	394 - 1377	394 - 1574	394 - 1804													
	f _z				0.008 - 0.008	0.008 - 0.008	0.008 - 0.008	0.01 - 0.012	0.01 - 0.016	0.01 - 0.02	0.01 - 0.023													
	n				4816 - 11222	4014 - 10024	3010 - 8771	2408 - 7616	2007 - 7014	1505 - 6013	1204 - 5513													
	5 > HRc 30	Low-Alloyed Steel				V _f	75 - 175	63 - 156	47 - 137	47 - 180	39 - 220	29 - 241	24 - 254											
						V _c	525 - 1050	525 - 1180	525 - 1246	525 - 1574	525 - 1902	525 - 1968	525 - 2296											
	f _z					0.008 - 0.008	0.008 - 0.008	0.008 - 0.008	0.01 - 0.012	0.01 - 0.016	0.01 - 0.02	0.01 - 0.023												
	n					6418 - 12835	5348 - 12020	4011 - 9519	3209 - 9620	2674 - 9688	2006 - 7518	1604 - 7017												
	V _f					100 - 200	83 - 188	63 - 149	63 - 227	52 - 304	39 - 301	31 - 323												
	V _c					394 - 918	394 - 984	394 - 1148	394 - 1246	394 - 1377	394 - 1574	394 - 1804												
	f _z					0.008 - 0.008	0.008 - 0.008	0.008 - 0.008	0.01 - 0.012	0.01 - 0.016	0.01 - 0.02	0.01 - 0.023												
	n					4816 - 11222	4014 - 10024	3010 - 8771	2408 - 7616	2007 - 7014	1505 - 6013	1204 - 5513												
6-7 < HRc 30	Stainless Steel																							
													V _f	75 - 175	63 - 156	47 - 137	47 - 180	39 - 220	29 - 241	24 - 254				
V _c													328 - 984	328 - 1050	328 - 1148	328 - 1312	328 - 1312	328 - 1476	328 - 1476					
f _z													0.004 - 0.006	0.006 - 0.008	0.006 - 0.008	0.01 - 0.012	0.012 - 0.014	0.012 - 0.014	0.012 - 0.014					
n													4009 - 12028	3341 - 10696	2506 - 8771	2005 - 8019	1671 - 6682	1253 - 5638	1002 - 4511					
V _f													32 - 144	40 - 171	30 - 140	40 - 192	40 - 187	30 - 158	24 - 126					
8 > HRc 30													M	12-14	Stainless Steel									

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	