

Speeds and Feeds



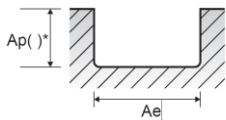
- 1) Select your material in the ISO colored chart with respect to material description.
- 2) Start with a middle/average value for spindle speed, n (RPM) and feed rate, V_f (mm/min). Adjust the spindle speed and/or feed rate based on your cutting conditions.

End Mill Series – **FPCHH**

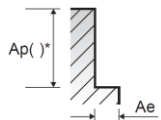
Material			Recommended Cutting Values – Slotting													
Group		Material Description	Width of Cut, a_e	Depth of Cut, a_p	Parameter	Tool Diameter (mm)										
ISO	VDI 3323					4	6	8	10	12	14	16	20	25		
P	1-4	Non-Alloy Steel	1.0D	0.5D	Vc, SMM	294	294	292	289	302	299	302	302	338		
					Fz, MMPT	0.020	0.022	0.030	0.038	0.045	0.042	0.048	0.045	0.050		
					n, RPM	23396	15597	11618	9199	8011	6798	6008	4806	4304		
	5		Low Alloy Steel	1.0D	0.5D	Vf, MMPM	1404	1373	1394	1398	1442	1428	1442	1298	1291	
						Vc, SMM	234	234	231	239	226	229	241	226	251	
						Fz, MMPT	0.009	0.010	0.014	0.016	0.020	0.019	0.019	0.016	0.019	
	6-7			Low Alloy Steel	1.0D	0.5D	n, RPM	18621	12414	9191	7608	5995	5207	4795	3597	3196
							Vf, MMPM	503	497	515	487	480	495	455	345	364
							Vc, SMM	294	294	292	289	302	299	302	302	338
	8-9	Low Alloy Steel			1.0D	0.5D	Fz, MMPT	0.020	0.022	0.030	0.038	0.045	0.042	0.048	0.045	0.050
							n, RPM	23396	15597	11618	9199	8011	6798	6008	4806	4304
							Vf, MMPM	1404	1373	1394	1398	1442	1428	1442	1298	1291
	10		High Alloy Steel, and Tool Steel		1.0D	0.5D	Vc, SMM	234	234	231	239	226	229	241	226	251
							Fz, MMPT	0.009	0.010	0.014	0.016	0.020	0.019	0.019	0.016	0.019
							n, RPM	18621	12414	9191	7608	5995	5207	4795	3597	3196
	11.1			High Alloy Steel, and Tool Steel	1.0D	0.5D	Vf, MMPM	503	497	515	487	480	495	455	345	364
							Vc, SMM	294	294	292	289	302	299	302	302	338
							Fz, MMPT	0.020	0.022	0.030	0.038	0.045	0.042	0.048	0.045	0.050
	11.2	High Alloy Steel, and Tool Steel			1.0D	0.5D	n, RPM	23396	15597	11618	9199	8011	6798	6008	4806	4304
							Vf, MMPM	1404	1373	1394	1398	1442	1428	1442	1298	1291
							Vc, SMM	234	234	231	239	226	229	241	226	251
			High Alloy Steel, and Tool Steel		1.0D	0.5D	Fz, MMPT	0.009	0.010	0.014	0.016	0.020	0.019	0.019	0.016	0.019
							n, RPM	18621	12414	9191	7608	5995	5207	4795	3597	3196
							Vf, MMPM	503	497	515	487	480	495	455	345	364
	High Alloy Steel, and Tool Steel			1.0D	0.5D	Vc, SMM	234	234	231	239	226	229	241	226	251	
						Fz, MMPT	0.009	0.010	0.014	0.016	0.020	0.019	0.019	0.016	0.019	
						n, RPM	18621	12414	9191	7608	5995	5207	4795	3597	3196	
		High Alloy Steel, and Tool Steel		1.0D	0.5D	Vf, MMPM	503	497	515	487	480	495	455	345	364	

NOTE: All cutting data are target values.
Maximum recommended depth shown.

Above recommendations are based on ideal conditions. Adjust parameters accordingly for smaller taper machining centers or less rigid conditions.



Slotting



Side Cutting



Speeds and Feeds



- 1) Select your material in the ISO colored chart with respect to material description.
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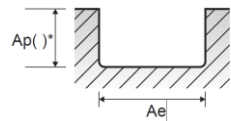
End Mill Series – **FPCHH**

Material			Recommended Cutting Values – Slotting											
Group	VDI 3323	Material Description	Width of Cut, a_e	Depth of Cut, a_p	Parameter	Tool Diameter (mm)								
						4	6	8	10	12	14	16	20	25
M	14.1	Stainless Steel	1.0D	$\varnothing 4\text{--}10:0.25D$ $\varnothing 12\text{--}16:0.15D$ $\varnothing 18\text{--}25:0.1D$	Vc, SMM	158	158	158	160	158	158	166	151	170
					Fz, MMPT	0.009	0.010	0.013	0.017	0.020	0.019	0.019	0.015	0.019
					n, RPM	12573	8382	6287	5093	4191	3592	3302	2403	2165
					Vf, MMPM	339	335	327	346	335	341	314	216	247
S	31-35	Heat Resistant Super Alloys	1.0D	0.05D	Vc, SMM	45	45	45	41	45	40	40	41	47
					Fz, MMPT	0.011	0.012	0.015	0.022	0.024	0.018	0.016	0.015	0.018
					n, RPM	3581	2387	1790	1305	1194	909	796	653	598
	36-37	Titanium Alloys	1.0D	$\varnothing 4\text{--}10:0.25D$ $\varnothing 12\text{--}16:0.15D$ $\varnothing 18\text{--}25:0.1D$	Vc, SMM	158	158	158	160	158	158	166	151	170
					Fz, MMPT	0.009	0.010	0.013	0.017	0.020	0.019	0.019	0.015	0.019
					n, RPM	12573	8382	6287	5093	4191	3592	3302	2403	2165
H	40	Chilled Cast Iron	1.0D	0.5D	Vc, SMM	234	234	231	239	226	229	241	226	251
					Fz, MMPT	0.009	0.010	0.014	0.016	0.020	0.019	0.019	0.016	0.019
					n, RPM	18621	12414	9191	7608	5995	5207	4795	3597	3196
					Vf, MMPM	503	497	515	487	480	495	455	345	364

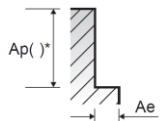
NOTE: All cutting data are target values.

Maximum recommended depth shown.

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Slotting



Side Cutting



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	