

Speeds and Feeds



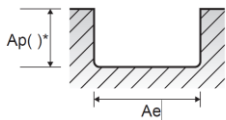
- 1) Select your material in the ISO colored chart with respect to material description.
- 2) Start with a middle/average value for spindle speed, n (RPM) and feed rate, V_f (mm/min). Adjust the spindle speed and/or feed rate based on your cutting conditions.

End Mill Series – **FPCHH**

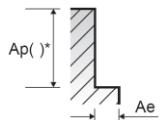
Material			Recommended Cutting Values – Side Cutting														
Group		Material Description	Width of Cut, a_e	Depth of Cut, a_p	Parameter	Tool Diameter (mm)											
ISO	VDI 3323					4	6	8	10	12	14	16	20	25			
P	1-4	Non-Alloy Steel	0.3D	1.5D	Vc, SMM	294	294	292	289	302	299	302	302	338			
					Fz, MMPT	0.033	0.037	0.050	0.063	0.075	0.071	0.080	0.075	0.083			
					n, RPM	23396	15597	11618	9199	8011	6798	6008	4806	4304			
	Vf, MMPM				2316	2308	2324	2318	2403	2413	2403	2163	2143				
	5				Low Alloy Steel	0.3D	1.5D	Vc, SMM	234	234	231	239	226	229	241	226	251
								Fz, MMPT	0.015	0.017	0.023	0.028	0.033	0.032	0.032	0.026	0.032
								n, RPM	18621	12414	9191	7608	5995	5207	4795	3597	3196
	Vf, MMPM							838	844	846	852	791	833	767	561	614	
	6-7							Low Alloy Steel	0.3D	1.5D	Vc, SMM	294	294	292	289	302	299
		Fz, MMPT	0.033	0.037							0.050	0.063	0.075	0.071	0.080	0.075	0.083
		n, RPM	23396	15597							11618	9199	8011	6798	6008	4806	4304
	Vf, MMPM	2316	2308	2324							2318	2403	2413	2403	2163	2143	
	8-9	High Alloy Steel, and Tool Steel	0.3D	1.5D							Vc, SMM	234	234	231	239	226	229
					Fz, MMPT	0.015	0.017				0.023	0.028	0.033	0.032	0.032	0.026	0.032
					n, RPM	18621	12414				9191	7608	5995	5207	4795	3597	3196
	Vf, MMPM				838	844	846				852	791	833	767	561	614	
	10				High Alloy Steel, and Tool Steel	0.3D	1.5D				Vc, SMM	294	294	292	289	302	299
								Fz, MMPT	0.033	0.037	0.050	0.063	0.075	0.071	0.080	0.075	0.083
								n, RPM	23396	15597	11618	9199	8011	6798	6008	4806	4304
	Vf, MMPM							2316	2308	2324	2318	2403	2413	2403	2163	2143	
	11.1							High Alloy Steel, and Tool Steel	0.3D	1.5D	Vc, SMM	234	234	231	239	226	229
		Fz, MMPT	0.015	0.017							0.023	0.028	0.033	0.032	0.032	0.026	0.032
		n, RPM	18621	12414							9191	7608	5995	5207	4795	3597	3196
	Vf, MMPM	838	844	846							852	791	833	767	561	614	
11.2	High Alloy Steel, and Tool Steel	0.3D	1.5D	Vc, SMM							234	234	231	239	226	229	241
				Fz, MMPT	0.015	0.017	0.023				0.028	0.033	0.032	0.032	0.026	0.032	
				n, RPM	18621	12414	9191				7608	5995	5207	4795	3597	3196	
Vf, MMPM				838	844	846	852				791	833	767	561	614		

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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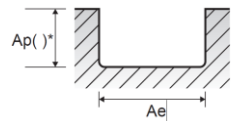
End Mill Series – **FPCHH**

Material			Recommended Cutting Values – Side Cutting											
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
M	14.1	Stainless Steel	$\varnothing 4\text{--}10:0.15D$ $\varnothing 12\text{--}16:0.10D$ $\varnothing 18\text{--}25:0.05D$	1.5D	Vc, SMM	158	158	158	160	158	158	166	151	170
					Fz, MMPT	0.015	0.017	0.023	0.028	0.034	0.032	0.031	0.025	0.032
					n, RPM	12573	8382	6287	5093	4191	3592	3302	2403	2165
					Vf, MMPM	566	570	578	570	570	575	512	360	416
S	31-35	Heat Resistant Super Alloys	0.05D	1.0D	Vc, SMM	45	45	45	41	45	40	40	41	47
					Fz, MMPT	0.018	0.020	0.025	0.037	0.040	0.029	0.028	0.025	0.031
					n, RPM	3581	2387	1790	1305	1194	909	796	653	598
	36-37	Titanium Alloys	$\varnothing 4\text{--}10:0.15D$ $\varnothing 12\text{--}16:0.10D$ $\varnothing 18\text{--}25:0.05D$	1.0D	Vc, SMM	158	158	158	160	158	158	166	151	170
					Fz, MMPT	0.015	0.017	0.023	0.028	0.034	0.032	0.031	0.025	0.032
					n, RPM	12573	8382	6287	5093	4191	3592	3302	2403	2165
H	40	Chilled Cast Iron	0.3D	1.5D	Vc, SMM	234	234	231	239	226	229	241	226	251
					Fz, MMPT	0.015	0.017	0.023	0.028	0.033	0.032	0.032	0.026	0.032
					n, RPM	18621	12414	9191	7608	5995	5207	4795	3597	3196
					Vf, MMPM	838	844	846	852	791	833	767	561	614

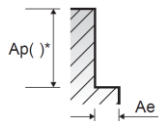
NOTE: All cutting data are target values.

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	