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 – CPR & FPR

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					6	8	10	12	16	20	25	32
					No. of Flutes	3	3	4	4	4	4	5	6
P	1	Non-Alloy Steel	0.5D	1.5D	Vc, SMM	37	35	34	37	35	35	37	35
					Fz, MMPT	0.015	0.025	0.036	0.051	0.064	0.071	0.099	0.099
					n, RPM	1940	1395	1067	970	697	558	466	349
					Vf, MMPM	89	106	152	197	177	159	231	207
	2		0.5D	1.5D	Vc, SMM	32	27	27	32	27	27	32	27
					Fz, MMPT	0.013	0.023	0.033	0.043	0.064	0.071	0.086	0.097
					n, RPM	1698	1091	873	849	546	437	407	273
					Vf, MMPM	65	75	115	147	139	124	176	158
	3-4		0.5D	1.5D	Vc, SMM	24	23	24	24	23	21	24	21
					Fz, MMPT	0.015	0.025	0.033	0.043	0.061	0.069	0.089	0.099
					n, RPM	1294	910	776	647	455	340	310	212
					Vf, MMPM	59	69	103	112	111	93	138	126
	5	Low Alloy Steel	0.5D	1.5D	Vc, SMM	15	14	14	15	14	14	14	14
					Fz, MMPT	0.013	0.020	0.033	0.046	0.064	0.071	0.097	0.102
					n, RPM	809	546	437	404	273	218	175	136
					Vf, MMPM	31	33	58	74	69	62	84	83
	6		0.5D	1.5D	Vc, SMM	32	27	27	32	27	27	32	27
					Fz, MMPT	0.013	0.023	0.033	0.043	0.064	0.071	0.086	0.097
					n, RPM	1698	1091	873	849	546	437	407	273
					Vf, MMPM	65	75	115	147	139	124	176	158
	7		0.5D	1.5D	Vc, SMM	24	23	24	24	23	21	24	21
					Fz, MMPT	0.015	0.025	0.033	0.043	0.061	0.069	0.089	0.099
					n, RPM	1294	910	776	647	455	340	310	212
					Vf, MMPM	59	69	103	112	111	93	138	126
	8-9		0.5D	1.5D	Vc, SMM	15	14	14	15	14	14	14	14
					Fz, MMPT	0.013	0.020	0.033	0.046	0.064	0.071	0.097	0.102
					n, RPM	809	546	437	404	273	218	175	136
					Vf, MMPM	31	33	58	74	69	62	84	83
	10	High Alloy Steel, and Tool Steel	0.5D	1.5D	Vc, SMM	32	27	27	32	27	27	32	27
					Fz, MMPT	0.013	0.023	0.033	0.043	0.064	0.071	0.086	0.097
					n, RPM	1698	1091	873	849	546	437	407	273
					Vf, MMPM	65	75	115	147	139	124	176	158
	11.1		0.5D	1.5D	Vc, SMM	15	14	14	15	14	14	14	14
					Fz, MMPT	0.013	0.020	0.033	0.046	0.064	0.071	0.097	0.102
					n, RPM	809	546	437	404	273	218	175	136
					Vf, MMPM	31	33	58	74	69	62	84	83

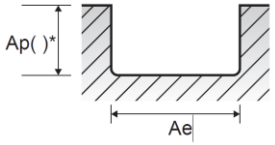
Speeds and Feeds

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.

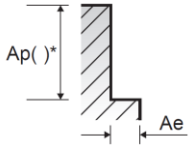
End Mill Series – CPR & FPR

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					6	8	10	12	16	20	25	32
					No. of Flutes	3	3	4	4	4	4	5	6
N	21-22	Aluminum-Wrought Alloy	0.5D	1.5D	Vc, SMM	90	78	75	79	79	76	79	79
					Fz, MMPT	0.015	0.025	0.036	0.051	0.071	0.084	0.089	0.104
					n, RPM	4770	3093	2377	2102	1577	1213	1009	788
					Vf, MMPM	218	236	338	427	449	407	449	493
	23-25	Aluminum-Cast Alloy	0.5D	1.5D	Vc, SMM	90	78	75	79	79	76	79	79
					Fz, MMPT	0.015	0.025	0.036	0.051	0.071	0.084	0.089	0.104
					n, RPM	4770	3093	2377	2102	1577	1213	1009	788
					Vf, MMPM	218	236	338	427	449	407	449	493

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

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	