Side-Cutting (HSM)

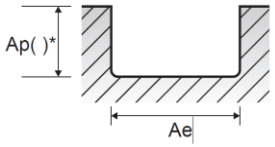
Speeds and Feeds

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

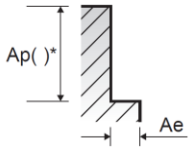
End Mill Series – HSAM2

Material			Recommended Cutting Values – Side Cutting HSM (Light)									
Group		Material Description	Width of Cut, a_e	Depth of Cut, a_p	Parameter	Tool Diameter (in)						
ISO	VDI 3323					1/8	1/4	3/8	1/2	5/8	3/4	1
N	21-22	Aluminum-Wrought Alloy	0.05D	2.0D	Vc, SFM	8000	8000	8000	8000	8000	8000	8000
					Fz, IPT	0.0021	0.0055	0.0105	0.014	0.015	0.0165	0.0195
					n, RPM	244500	122200	81500	61100	48900	40700	30600
					Vf, IPM	1540	2016	2567	2566	2201	2015	1790
	23-25	Aluminum-Cast Alloy	0.05D	2.0D	Vc, SFM	1200	1200	1200	1200	1200	1200	1200
					Fz, IPT	0.0021	0.0055	0.0105	0.014	0.015	0.0165	0.0195
					n, RPM	36670	18340	12220	9170	7330	6110	4580
					Vf, IPM	231	303	385	385	330	303	268
	26-28	Copper and Copper Alloys (Bronze/Brass)	0.05D	2.0D	Vc, SFM	1850	1850	1850	1850	1850	1850	1850
					Fz, IPT	0.0017	0.0045	0.0085	0.0115	0.013	0.014	0.016
					n, RPM	56540	28270	18850	14130	11310	9420	7070
					Vf, IPM	288	382	481	488	441	396	339
	29.1	Non-Metallic Materials (Duroplastic)	0.05D	2.0D	Vc, SFM	3350	3350	3350	3350	3350	3350	3350
					Fz, IPT	0.0034	0.009	0.017	0.023	0.025	0.0275	0.032
					n, RPM	102380	51190	34130	25590	20480	17060	12800
					Vf, IPM	1044	1382	1740	1766	1536	1408	1229

NOTE: All cutting data are target values.
Maximum recommended depth shown.
Finish cuts typically require reduced feed rates and/or higher spindle speed, with a radial depth of cut, a_e of (2%)XD or less.
Reduce speed and feed recommendations for materials harder than listed.
Reduce cut depth and feed by 50% for long-flute or long-reach tools.
Above recommendations are based on ideal conditions. Adjust parameters accordingly for smaller taper machining centers or less rigid conditions. HSM = high speed machining.



Slotting



Side Cutting

Tech Tips: *The tables above are based on common machining calculators.*
We realize that shops may not have the RPM capability shown in the tables.
To adapt the tables to the machining conditions available, use the following calculation:
(Recommended Feed IPM / Recommended RPM) X Available RPM = IPM

Side-Cutting

Speeds and Feeds

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End Mill Series – HSAM2

Material			Recommended Cutting Values – Side Cutting									
Group		Material Description	Width of Cut, a_e	Depth of Cut, a_p	Parameter	Tool Diameter (in)						
ISO	VDI 3323					1/8	1/4	3/8	1/2	5/8	3/4	1
N	21-22	Aluminum-Wrought Alloy	0.5D	1.5D	Vc, SFM	3000	3000	3000	3000	3000	3000	3000
					Fz, IPT	0.001	0.003	0.0045	0.006	0.0066	0.0075	0.01
					n, RPM	91700	45800	30600	23000	18300	15300	11500
					Vf, IPM	275	412	413	414	362	344	345
	23-25	Aluminum-Cast Alloy	0.5D	1.5D	Vc, SFM	800	800	800	800	800	800	800
					Fz, IPT	0.001	0.003	0.0045	0.006	0.0066	0.0075	0.01
					n, RPM	24450	12220	8150	6110	4890	4080	3060
					Vf, IPM	73	110	110	110	97	92	92
	26-28	Copper and Copper Alloys (Bronze/Brass)	0.5D	1.5D	Vc, SFM	1150	1150	1150	1150	1150	1150	1150
					Fz, IPT	0.0008	0.002	0.004	0.005	0.0055	0.006	0.007
					n, RPM	35140	17570	11720	8790	7030	5860	4390
					Vf, IPM	84	105	141	132	116	105	92
	29.1	Non-Metallic Materials (Duroplastic)	0.5D	1.5D	Vc, SFM	2070	2070	2070	2070	2070	2070	2070
					Fz, IPT	0.0015	0.004	0.0075	0.01	0.011	0.012	0.014
					n, RPM	63260	31630	21090	15820	12650	10540	7910
					Vf, IPM	285	380	474	474	418	380	332

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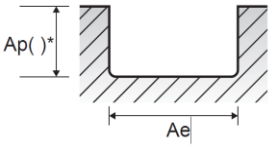
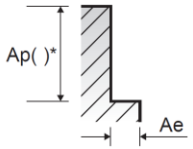


Slotting



Side Cutting

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Slotting

Speeds and Feeds

1) Select your material in the ISO colored chart with respect to material description.
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End Mill Series – HSAM2

Material			Recommended Cutting Values – Slotting									
Group		Material Description	Width of Cut, a_e	Depth of Cut, a_p	Parameter	Tool Diameter (in)						
ISO	VDI 3323					1/8	1/4	3/8	1/2	5/8	3/4	1
N	21-22	Aluminum-Wrought Alloy	1.0D	1.0D	Vc, SFM	2000	2000	2000	2000	2000	2000	2000
					Fz, IPT	0.001	0.003	0.0045	0.006	0.0066	0.0075	0.01
					n, RPM	61100	30500	20400	15300	12200	10200	7600
					Vf, IPM	183	275	275	275	242	230	228
	23-25	Aluminum-Cast Alloy	1.0D	1.0D	Vc, SFM	600	600	600	600	600	600	600
					Fz, IPT	0.001	0.003	0.0045	0.006	0.0066	0.0075	0.01
					n, RPM	18340	9170	6110	4580	3670	3060	2290
					Vf, IPM	55	83	83	83	73	69	69
	26-28	Copper and Copper Alloys (Bronze/Brass)	1.0D	1.0D	Vc, SFM	880	880	880	880	880	880	880
					Fz, IPT	0.0008	0.002	0.004	0.005	0.0055	0.006	0.007
					n, RPM	26890	13450	8960	6720	5380	4480	3360
					Vf, IPM	65	81	108	101	89	81	71
	29.1	Non-Metallic Materials (Duroplastic)	1.0D	1.0D	Vc, SFM	1670	1670	1670	1670	1670	1670	1670
					Fz, IPT	0.0015	0.004	0.0075	0.01	0.011	0.012	0.014
					n, RPM	51040	25520	17010	12760	10210	8510	6380
					Vf, IPM	230	306	383	383	337	306	268

NOTE: All cutting data are target values.
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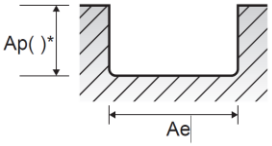
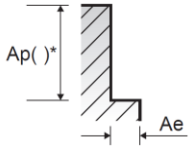


Slotting



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(Recommended Feed IPM / Recommended RPM) X Available RPM = IPM

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	