

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 – **HSAM2**

Material			Recommended Cutting Values – Side Cutting								
Group	Material Description	Width of Cut, a _e	Depth of Cut, a _p	Parameter	Tool Diameter (mm)						
					3	6	10	12	16	20	25
N	21-22 Aluminum-Wrought Alloy	0.5D	1.5D	V _c , SMM	610	610	610	610	610	610	610
				F _z , MMPT	0.025	0.076	0.114	0.152	0.168	0.191	0.254
				n, RPM	64723	32361	19417	16181	12136	9708	7767
	23-25 Aluminum-Cast Alloy	0.5D	1.5D	V _c , SMM	244	244	244	244	244	244	244
				F _z , MMPT	0.025	0.076	0.114	0.152	0.168	0.191	0.254
				n, RPM	25889	12945	7767	6472	4854	3883	3107
	26-28 Copper and Copper Alloys (Bronze/Brass)	0.5D	1.5D	V _f , MPPM	1973	2959	2663	2959	2441	2219	2367
				V _c , SMM	351	351	351	351	351	351	351
				F _z , MMPT	0.02	0.051	0.102	0.127	0.14	0.152	0.178
	29.1 Non-Metallic Materials (Duroplastic)	0.5D	1.5D	n, RPM	37242	18621	11173	9311	6983	5586	4469
				V _f , MPPM	2270	2838	3405	3547	2927	2554	2384
				V _c , SMM	625	625	625	625	625	625	625
				F _z , MMPT	0.038	0.102	0.191	0.254	0.279	0.305	0.356
				n, RPM	66314	33157	19894	16579	12434	9947	7958
				V _f , MPPM	7580	10106	11370	12633	10422	9096	8489

NOTE: All cutting data are target values.

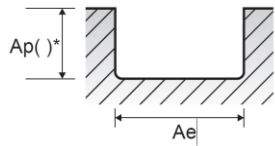
Maximum recommended depth shown.

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.

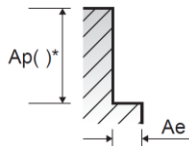
Reduce speed and feed recommendations for materials harder than listed.

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.



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:

$$(\text{Recommended Feed MPPM} / \text{Recommended RPM}) \times \text{Available RPM} = \text{MPPM}$$



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	