

Speeds and Feeds



HTM 5 Flute Radius End Mills (AlTiN Coated)

Slot Milling

ISO	Material Description	Width of Cut	Depth of Cut	Parameter	Diameter (inch)											
					3/16	1/4	5/16	3/8	1/2	5/8	3/4	1				
P	Non Alloy Steels Low Alloy Steels 125 HB - 300 HB	1.0D	1.0D	Vc, SFM	275	275	275	275	275	275	275	275	275			
				Fz, IPT	0.001	0.0013	0.0015	0.0018	0.0024	0.0029	0.0034	0.0039				
				n, RPM	5600	4200	3360	2800	2100	1680	1400	1050				
				Vf, IPM	28	27	25	25	25	24	24	20				
	Low Alloy Steels 350 HB	1.0D	1.0D	Vc, SFM	275	275	275	275	275	275	275	275	275			
				Fz, IPT	0.0006	0.001	0.0011	0.0014	0.0019	0.0023	0.0026	0.003				
				n, RPM	5600	4200	3360	2800	2100	1680	1400	1050				
				Vf, IPM	17	21	18	20	20	19	18	16				
	High Alloy Steels Tool Steels 220 HB - 325 HB	1.0D	0.75D	Vc, SFM	230	230	230	230	230	230	230	230	230			
				Fz, IPT	0.001	0.0013	0.0015	0.0018	0.0024	0.0029	0.0034	0.0039				
				n, RPM	4690	3510	2810	2340	1760	1410	1170	880				
				Vf, IPM	23	23	21	21	21	20	20	17				
1.0D		0.75D	Vc, SFM	250	250	250	250	250	250	250	250	250				
			Fz, IPT	0.0006	0.001	0.0011	0.0014	0.0019	0.0023	0.0026	0.003					
			n, RPM	5090	3820	3060	2550	1910	1530	1270	950					
			Vf, IPM	15	19	17	18	18	18	17	14					
M	Stainless Steels Ferritic/Martensitic, Annealed	1.0D	0.5D	Vc, SFM	225	225	225	225	225	225	225	225				
				Fz, IPT	0.0006	0.0008	0.0009	0.0012	0.0017	0.0019	0.0022	0.0026				
				n, RPM	4580	3440	2750	2290	1720	1380	1150	860				
	Stainless Steels Austenitic 180 HB	1.0D	0.5D	Vc, SFM	200	200	200	200	200	200	200	200				
				Fz, IPT	0.0006	0.0008	0.0009	0.0011	0.0017	0.0018	0.002	0.0023				
				n, RPM	4070	3060	2440	2040	1530	1220	1020	760				
				Vf, IPM	12	12	11	11	13	11	10	9				
				K	Grey Cast Iron Nodular Cast Iron Malleable Cast Iron 130 HB - 260 HB	1.0D	1.0D	Vc, SFM	260	260	260	260	260	260	260	260
								Fz, IPT	0.0008	0.0011	0.0013	0.0015	0.0021	0.0026	0.003	0.0034
n, RPM	5300	3970	3180					2650	1990	1590	1320	990				
Vf, IPM	21	22	21					20	21	21	20	17				
S	Heat Resistant Super Alloys 200 HB - 350 HB	1.0D	0.3D	Vc, SFM	64	64	64	64	64	64	64	64				
				Fz, IPT	0.0005	0.0008	0.001	0.0011	0.0015	0.0017	0.0019	0.0021				
				n, RPM	1300	980	780	650	490	390	330	240				
				Vf, IPM	3	4	4	4	4	3	3	3				
	Titanium Alloys	1.0D	0.5D	Vc, SFM	160	160	160	160	160	160	160	160				
				Fz, IPT	0.0005	0.0008	0.001	0.0011	0.0015	0.0017	0.0019	0.0021				
				n, RPM	3260	2440	1960	1630	1220	980	810	610				
				Vf, IPM	8	10	10	9	9	8	8	6				

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HTM 5 Flute Radius End Mills (AlTiN Coated)

Side Cutting - Peel Milling

ISO	Material Description	Width of Cut	Depth of Cut	Parameter	Diameter (inch)								
					3/16	1/4	5/16	3/8	1/2	5/8	3/4	1	
P	Non Alloy Steels Low Alloy Steels 125 HB - 300 HB	0.08D	2.0D	Vc, SFM	650	650	650	650	650	650	650	650	650
				Fz, IPT	0.0018	0.0022	0.0026	0.0031	0.0043	0.0051	0.006	0.0068	
				n, RPM	13240	9930	7950	6620	4970	3970	3310	2480	
				Vf, IPM	119	109	103	103	107	101	99	84	
	Low Alloy Steels 350 HB	0.08D	2.0D	Vc, SFM	650	650	650	650	650	650	650	650	650
				Fz, IPT	0.0011	0.0017	0.002	0.0024	0.0033	0.004	0.0046	0.0053	
				n, RPM	13240	9930	7950	6620	4970	3970	3310	2480	
				Vf, IPM	73	84	80	79	82	79	76	66	
	High Alloy Steels Tool Steels 220 HB - 325 HB	0.08D	2.0D	Vc, SFM	580	580	580	580	580	580	580	580	580
				Fz, IPT	0.0018	0.0022	0.0026	0.0031	0.0043	0.0051	0.006	0.0068	
				n, RPM	11820	8860	7090	5910	4430	3540	2950	2220	
				Vf, IPM	106	97	92	92	95	90	89	75	
0.08D		2.0D	Vc, SFM	550	550	550	550	550	550	550	550	550	
			Fz, IPT	0.0011	0.0017	0.002	0.0024	0.0033	0.004	0.0046	0.0053		
			n, RPM	11200	8400	6720	5600	4200	3360	2800	2100		
			Vf, IPM	62	71	67	67	69	67	64	56		
M	Stainless Steels Ferritic/Martensitic, Annealed Stainless Steels	0.06D	2.0D	Vc, SFM	350	350	350	350	350	350	350	350	
				Fz, IPT	0.001	0.0015	0.0016	0.0021	0.0029	0.0034	0.0039	0.0045	
				n, RPM	7130	5350	4280	3570	2670	2140	1780	1340	
				Vf, IPM	36	40	34	37	39	36	35	30	
	Stainless Steels Austenitic 180 HB	0.06D	2.0D	Vc, SFM	300	300	300	300	300	300	300	300	
				Fz, IPT	0.001	0.0014	0.0015	0.002	0.0029	0.0031	0.0035	0.0041	
K	Grey Cast Iron Nodular Cast Iron Malleable Cast Iron 130 HB - 260 HB	0.07D	2.0D	Vc, SFM	550	550	550	550	550	550	550	550	
				Fz, IPT	0.0014	0.002	0.0022	0.0027	0.0037	0.0045	0.0052	0.0059	
				n, RPM	11200	8400	6720	5600	4200	3360	2800	2100	
				Vf, IPM	78	84	74	76	78	76	73	62	
S	Heat Resistant Super Alloys 200 HB - 350 HB	0.04D	2.0D	Vc, SFM	120	120	120	120	120	120	120	120	
				Fz, IPT	0.0006	0.001	0.0012	0.0014	0.0019	0.0021	0.0023	0.0027	
				n, RPM	2440	1830	1470	1220	920	730	610	460	
				Vf, IPM	7	9	9	9	9	8	7	6	
	Titanium Alloys	0.05D	2.0D	Vc, SFM	300	300	300	300	300	300	300	300	
				Fz, IPT	0.0006	0.001	0.0012	0.0014	0.0019	0.0021	0.0023	0.0027	
				n, RPM	6110	4580	3670	3060	2290	1830	1530	1150	
				Vf, IPM	18	23	22	21	22	19	18	16	

Speeds and Feeds



HTM 5 Flute Radius End Mills (AlTiN Coated)

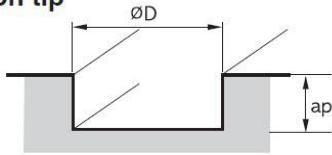
Side Cutting - Heavy Side Milling

ISO	Material Description	Width of Cut	Depth of Cut	Parameter	Diameter (inch)								
					3/16	1/4	5/16	3/8	1/2	5/8	3/4	1	
P	Non Alloy Steels Low Alloy Steels 125 HB - 300 HB	0.5D	1.5D	Vc, SFM	500	500	500	500	500	500	500	500	500
				Fz, IPT	0.0013	0.0016	0.0018	0.0022	0.0031	0.0037	0.0043	0.0049	
				n, RPM	10190	7640	6110	5090	3820	3060	2550	1910	
				Vf, IPM	66	61	55	56	59	57	55	47	
	Low Alloy Steels 350 HB	0.5D	1.5D	Vc, SFM	400	400	400	400	400	400	400	400	400
				Fz, IPT	0.0008	0.0012	0.0014	0.0017	0.0024	0.0028	0.0033	0.0038	
				n, RPM	8150	6110	4890	4070	3060	2440	2040	1530	
				Vf, IPM	33	37	34	35	37	34	34	29	
	High Alloy Steels Tool Steels 220 HB - 325 HB	0.5D	1.5D	Vc, SFM	450	450	450	450	450	450	450	450	450
				Fz, IPT	0.0013	0.0016	0.0018	0.0022	0.0031	0.0037	0.0043	0.0049	
				n, RPM	9170	6880	5500	4580	3440	2750	2290	1720	
				Vf, IPM	60	55	50	50	53	51	49	42	
0.5D		1.5D	Vc, SFM	400	400	400	400	400	400	400	400	400	
			Fz, IPT	0.0008	0.0012	0.0014	0.0017	0.0024	0.0028	0.0033	0.0038		
			n, RPM	8150	6110	4890	4070	3060	2440	2040	1530		
			Vf, IPM	33	37	34	35	37	34	34	29		
M	Stainless Steels Ferritic/Martensitic, Annealed	0.5D	1.5D	Vc, SFM	250	250	250	250	250	250	250	250	
				Fz, IPT	0.0007	0.001	0.0012	0.0015	0.0021	0.0024	0.0028	0.0032	
				n, RPM	5090	3820	3060	2550	1910	1530	1270	950	
				Vf, IPM	18	19	18	19	20	18	18	15	
	Stainless Steels Austenitic 180 HB	0.5D	1.5D	Vc, SFM	200	200	200	200	200	200	200	200	
				Fz, IPT	0.0007	0.001	0.0011	0.0014	0.0021	0.0022	0.0025	0.0029	
K	Grey Cast Iron Nodular Cast Iron Malleable Cast Iron 130 HB - 260 HB	0.5D	1.5D	Vc, SFM	370	370	370	370	370	370	370	370	
				Fz, IPT	0.001	0.0014	0.0016	0.0019	0.0026	0.0032	0.0037	0.0042	
				n, RPM	7540	5650	4520	3770	2830	2260	1880	1410	
				Vf, IPM	38	40	36	36	37	36	35	30	
S	Heat Resistant Super Alloys 200 HB - 350 HB	0.2D	1.5D	Vc, SFM	90	90	90	90	90	90	90	90	
				Fz, IPT	0.0006	0.001	0.0012	0.0014	0.0019	0.0021	0.0023	0.0027	
				n, RPM	1830	1380	1100	920	690	550	460	340	
				Vf, IPM	5	7	7	6	7	6	5	5	
	Titanium Alloys	0.5D	1.5D	Vc, SFM	160	160	160	160	160	160	160	160	
				Fz, IPT	0.0006	0.001	0.0012	0.0014	0.0019	0.0021	0.0023	0.0027	
				n, RPM	3260	2440	1960	1630	1220	980	810	610	
				Vf, IPM	10	12	12	11	12	10	9	8	

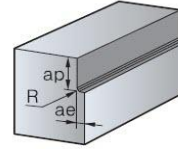
Speeds and Feeds



Application tip



- Slotting depth (a_p)
 - $a_p: \leq 1.0D$



- Shouldering depth (a_p)
 - $a_p: \leq 1.5D$ (All dia.)
 - $a_e: \leq 0.5D$ (All dia.)

※ Workpiece should be clamped rigidly. In case of vibrations, reduce R.P.M and feed rate by the same ratio

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	<i>in/min</i>
f_n	Feed per revolution	<i>in/rev</i>
f_z	Feed per tooth	<i>in</i>
v_c	Cutting speed	<i>ft/min (SFM)</i>
n	Spindle speed	<i>rev/min (RPM)</i>
D_{tool}	Tool cutting diameter	<i>in</i>
MMR	Material removal rate	<i>(in³/min)</i>
a_e	Radial depth of cut	<i>in</i>
a_p	Axial depth of cut	<i>in</i>
Z	Number of teeth/flutes	