General Purpose Carbide Endmills Speeds & Feeds

Material	Grades	SFM			Feed by Endmill Diameter (IPT)						
					1/8	1/4	3/8	1/2	5/8	3/4	1
		Uncoated	AlTiN	TiCN	(.1250)	(.2500)	(.3750)	(.5000)	(.0625)	(.7500)	(1.000)
P - Steels											
High Strength Tool Steel	A2, D2, P20, H11, H13, S2, 01	150-225	210-315	185-310	.0005-.0010	.0008-.0010	.0010-.0015	.0015-.0020	.0020-.0030	.0030-.0040	.0035-.0045
High Strength Tool Steel		60-125	85-175	75-155	.0003-.0005	.0004-.0005	.0005-.0008	.0008-.0015	.0015-.0022	.0020-.0025	.0025-.0035
>32 HRC		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Low Carbon	A36, 12L14, 12L15, 1005, 1018, 1020, 1108-1119, 1213-1215, 1513-1518, 4012, 5015, 9310	200-250	280-350	250-310	.0007-.0015	.0010-.0015	.0015-.002	.0020-.0025	.0025-.0030	.0030-.0035	.0040-.0050
Low Carbon >32HRC		125-175	175-245	155-215	.0005-.0010	.0008-.0010	.0010-.0015	.0015-.0020	.0020-.0030	.0030-.0040	.0035-.0045
Medium Carbon	1040-1095, 1140-1151, 1330-1345, 1520-1572, 4023-4063, 4120-4161, 4330-4340, 4620-4640, 8620-8660, 8740-8750, 6150, 51000, 52100	200-250	280-350	250-310	.0007-.0015	.0010-.0015	.0015-.0020	.0020-.0025	.0025-.0030	.0030-.0035	.0040-.0050
Medium Carbon >32 HRC		125-175	175-245	155-215	.0005-.0010	.0008-.0010	.0010-.0015	.0015-.0020	.0020-.0030	.0030-.0040	.0035-.0045
M - Stainless Steels											
Austenitic	301-304L, 310, 316L, 321, 347	200-250	280-350	250-310	.0005-.0010	.0008-.0010	.0010-.0015	.0015-.0020	.0020-.0030	.0030-.0040	.0035-.0045
Austenitic >32 HRC		150-200	210-350	185-250	.0003-.0005	.0004-.0005	.0005-.0008	.008-.0015	.0015-.0022	.0020-.0025	.0025-.0035
Martensitic	403, 410, 416, 420, 430, 431, 440	150-250	210-350	185-310	.0005-.0010	.0008-.0010	.0010-.0015	.0015-.0020	.0020-.0030	.0030-.0040	.0035-.0045
Martensitic >32 HRC		125-175	175-245	155-215	.0003-.0005	.0004-.0005	.0005-.0008	.008-.0015	.0015-.0022	.0020-.0025	.0025-.0035
Precipitation Hardening	12/8, 15/5, 17/4, AM-350/355 /363, PH13-8MO, PH14-8//MO	150-250	210-350	185-310	.0005-.0010	.0008-.0010	.0010-.0015	.0015-.0020	.0020-.0030	.0030-.0040	.0035-.0045
Precipitation Hardening		125-175	175-245	155-215	.0003-.0005	.0004-.0005	.0005-.0008	.008-.0015	.0015-.0022	.0020-.0025	.0025-.0035
>32 HRC		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
K - Cast Irons											
Ductile	A536, J434, 60-40-18	300-400	420-560	375-500	.0010-.0015	.0015-.0020	.0020-.0030	.0030-.0040	.0040-.0060	.0080-.0120	.0100-.0120
Gray	A48, A436, A319, Class 20, G4000	250-350	350-490	310-435	.0010-.0015	.0015-.0020	.0020-.0030	.0030-.0040	.0040-.0060	.0060-.0080	.0080-.0100
Malleable	A220, A602, J158	275-375	375-515	340-465	.0010-.0015	.0015-.0020	.0020-.0030	.0030-.0040	.0040-.0060	.0060-.0080	.0080-.0100
N - Non-Ferrous											
Aluminum Alloys		>500	>500	>500	.0010-.0015	.0015-.0020	.0020-.0030	.0030-.0040	.0040-.0060	.0060-.0080	.0080-.0100
Aluminum High Silicon		450	450	560	.0010-.0015	.0015-.002	.0020-.0030	.0030-.0040	.0040-.0060	.0060-.0080	.0080-.0100
Brass/Bronze	Aluminum Bronze , Low Silicon Bronze	250-350	350-490	310-435	.0007-.0015	.0010-.0015	.0015-.0020	.0020-.0025	.0025-.0050	.0050-.0080	.0080-.0100
Composites	G-10, Fiberglass, Graphite, Graphite Epoxy, Plastics	250-1000	350-1400	310-435	.0010-.0015	.0015-.0020	.0020-.0030	.0030-.0040	.0040-.0060	.0060-.0080	.0080-.0100
Copper		300-400	420-560	375-500	.0007-.0015	.0010-.0015	.0015-.0020	.0020-.0025	.0025-.0050	.0050-.0080	.0080-.0100
Magnesium		>500	>500	>500	.0010-.0015	.0015-.002	.0020-.0030	.0030-.0040	.0040-.0060	.0060-.0080	.0080-.0100
S - High Temp Alloys											
Cobalt Base	Stellite, HS-21, Haynes 25/188,	175-225	245-315	215-280	.0005-.0010	.0008-.0010	.0010-.0015	.0015-.0020	.0020-.0030	.0030-.0040	.0035-.0045
Cobalt Base >32HRC	X40, L605	125-175	175-245	155-215	.0003-.0005	.0004-.0005	.0005-.0008	.0080-.0015	.0015-.0022	.0020-.0025	.0025-.0035
Iron Base	Incoloy 800-802, Multmet N-155	175-225	245-315	215-280	.0005-.0010	.0008-.0010	.0010-.0015	.0015-.0020	.0020-.0030	.0030-.0040	.0035-.0045
Iron Base >32HRC	Timkin 16-25-6, Carpenter 22-b3	125-175	175-245	155-215	.0003-.0005	.0004-.0005	.0005-.0008	.0080-.0015	.0015-.0022	.0020-.0025	.0025-.0035
Nickel Base	Inconel 625/718, Inco 700, 713C, 718	125-175	175-245	155-215	.0005-.0010	.0008-.0010	.0010-.0015	.0015-.0020	.0020-.0030	.0030-.0040	.0035-.0045
Nickel Base >32HRC	Monel 400-401, 404, K401, Rene, Rene 41 & 95 Hastelloy, Waspoloy, Udimet 500 & 700	70-115	100-160	85-140	.0003-.0005	.0004-.0005	.0005-.0008	.0080-.0015	.0015-.0022	.0020-.0025	.0025-.0035
Titanium	Commercially Pure, 6Al-4V ASTM 1/2/3, 6Al-25N-4Zr-2Mo-Si Ti-8Al-1Mo, Ti-8Al-4Mo	200-300	280-420	250-375	.0007-.0015	.0010-.0015	.0015-.002	.0020-.0025	.0025-.0030	.0030-.0035	.0040-.0050

NOTES: **(1) Speeds and Feeds listed are estimated and will vary by application.**
(2) Maximize rigidity to reduce chatter and increase tool life by applying the following tips.
- **Choose the largest diameter possible**
- **Use the shortest LOC (Length of Cut) available**
- **Use the toolholder which offers the shortest gage length**

(3) To control chatter, increase feed or reduce speed.
(4) For extra long endmills, reduce SFM by 25%.
(5) Keep to a minimum at all times. As runout increases, the tools' performance decreases and tool life will be reduced.
(6) Use a coolant or air blast to evacuate chips to avoid premature damage to your carbide cutting tool, which may occur if chips are recut.

These General Purpose tools can be found on pages 106-109, 114-117, 150-159, 165-174, 180.