



### End Mills - General Purpose

Material	SFM RANGE	Chipload Per Tooth							
		1/8	1/4	5/16	3/8	1/2	5/8	3/4	1
Aluminum/Aluminum Alloys	800-1300	0.0015"	0.0020"	0.0025"	0.0030"	0.0040"	0.0050"	0.0060"	0.0080"
Brass	300-450	0.0018"	0.0020"	0.0023"	0.0025"	0.0030"	0.0035"	0.0040"	0.0050"
Bronze	250-350	0.0018"	0.0020"	0.0023"	0.0025"	0.0030"	0.0035"	0.0040"	0.0050"
Cast Iron (Malleable)	150-300	0.0008"	0.0010"	0.0013"	0.0015"	0.0020"	0.0030"	0.0040"	0.0060"
Cast Iron (Medium)	100-350	0.0005"	0.0010"	0.0015"	0.0020"	0.0030"	0.0040"	0.0050"	0.0080"
Cast Iron (Soft)	250-500	0.0009"	0.0015"	0.0022"	0.0028"	0.0040"	0.0050"	0.0060"	0.0080"
Coppers/Copper Alloys	400-900	0.0018"	0.0020"	0.0023"	0.0025"	0.0030"	0.0040"	0.0050"	0.0070"
Magnesium	1000 min	0.0015"	0.0020"	0.0025"	0.0030"	0.0040"	0.0050"	0.0060"	0.0080"
Nickel Alloys	100-300	0.0008"	0.0010"	0.0012"	0.0015"	0.0020"	0.0025"	0.0030"	0.0040"
Plastic	600-1200	0.0023"	0.0030"	0.0038"	0.0045"	0.0060"	0.0080"	0.0100"	0.0150"
Plastic (Glass Filled)	300-800	0.0015"	0.0020"	0.0025"	0.0030"	0.0040"	0.0060"	0.0080"	0.0120"
Stainless Steel (Free Machining)	300-400	0.0008"	0.0010"	0.0013"	0.0015"	0.0020"	0.0030"	0.0040"	0.0060"
Stainless Steel (Work Hardening)	150-300	0.0004"	0.0005"	0.0007"	0.0008"	0.0010"	0.0020"	0.0030"	0.0050"
Steel (High Tensile 35-40 Rc)	175-300	0.0004"	0.0005"	0.0007"	0.0008"	0.0010"	0.0015"	0.0020"	0.0030"
Steel (High Tensile 40-45 Rc)	150-250	0.0004"	0.0005"	0.0007"	0.0008"	0.0010"	0.0015"	0.0020"	0.0030"
Steel (High Tensile 45+ Rc)	75-150	0.0004"	0.0005"	0.0007"	0.0008"	0.0010"	0.0015"	0.0020"	0.0030"
Steel (Low Carbon)	300-600	0.0005"	0.0010"	0.0015"	0.0020"	0.0030"	0.0040"	0.0050"	0.0060"
Steel (Medium Carbon)	200-500	0.0005"	0.0010"	0.0015"	0.0020"	0.0030"	0.0040"	0.0050"	0.0060"
Titanium (Hard)	60-150	0.0004"	0.0005"	0.0007"	0.0008"	0.0010"	0.0015"	0.0020"	0.0040"
Titanium (Soft)	75-250	0.0008"	0.0010"	0.0012"	0.0015"	0.0020"	0.0030"	0.0040"	0.0060"
Tool Steel	150-300	0.0008"	0.0010"	0.0012"	0.0015"	0.0020"	0.0025"	0.0030"	0.0040"



### Endmills - APG 4 Flute Variable Helix

Material	SFM RANGE	Chipload Per Tooth							
		1/8	1/4	5/16	3/8	1/2	5/8	3/4	1
Cast Iron (Malleable)	165-330	0.0009"	0.0011"	0.0014"	0.0017"	0.0022"	0.0034"	0.0045"	0.0067"
Cast Iron (Medium)	110-390	0.0005"	0.0011"	0.0017"	0.0022"	0.0034"	0.0045"	0.0056"	0.009"
Cast Iron (Soft)	275-555	0.0010"	0.0017"	0.0025"	0.0031"	0.0045"	0.0056"	0.0067"	0.009"
Nickel Alloys	110-330	0.0009"	0.0011"	0.0013"	0.0017"	0.0022"	0.0028"	0.0034"	0.0045"
Stainless Steel (Free Machining)	330-445	0.0009"	0.0011"	0.0014"	0.0017"	0.0022"	0.0034"	0.0045"	0.0067"
Stainless Steel (Work Hardening)	165-330	0.0004"	0.0005"	0.0008"	0.0009"	0.0011"	0.0022"	0.0034"	0.0056"
Steel (High Tensile 35-40 Rc)	190-330	0.0004"	0.0005"	0.0008"	0.0009"	0.0011"	0.0017"	0.0022"	0.0034"
Steel (High Tensile 40-45 Rc)	165-280	0.0004"	0.0005"	0.0008"	0.0009"	0.0011"	0.0017"	0.0022"	0.0034"
Steel (High Tensile 45+ Rc)	80-165	0.0004"	0.0005"	0.0008"	0.0009"	0.0011"	0.0017"	0.0022"	0.0034"
Steel (Low Carbon)	330-665	0.0005"	0.0011"	0.0017"	0.0022"	0.0034"	0.0045"	0.0056"	0.0067"
Steel (Medium Carbon)	220-555	0.0005"	0.0011"	0.0017"	0.0022"	0.0034"	0.0045"	0.0056"	0.0067"
Titanium (Hard)	65-165	0.0004"	0.0005"	0.0008"	0.0009"	0.0011"	0.0017"	0.0022"	0.0045"
Titanium (Soft)	80-280	0.0009"	0.0011"	0.0013"	0.0017"	0.0022"	0.0034"	0.0045"	0.0067"
Tool Steel	165-330	0.0009"	0.0011"	0.0013"	0.0017"	0.0022"	0.0028"	0.0034"	0.0045"



### Endmills - HP 2 & 3 FLUTE 45° Helix

Material	SFM		Chipload per tooth							
	Uncoated	ZrN	1/8	1/4	5/16	3/8	1/2	5/8	3/4	1
Aluminum	800-2300	1000-2875	0.0015"	0.0030"	0.0040"	0.0050"	0.0060"	0.0087"	0.0093"	0.0100"
Aluminum Alloys (6061, 7075)	800-2300	1000-2875	0.0015"	0.0030"	0.0040"	0.0050"	0.0060"	0.0087"	0.0093"	0.0100"
Brass/Bronze	300-400	375-500	0.0010"	0.0020"	0.0023"	0.0026"	0.0028"	0.0045"	0.0062"	0.0080"
Copper	300-500	375-625	0.0010"	0.0020"	0.0023"	0.0026"	0.0028"	0.0045"	0.0062"	0.0080"
Copper Alloys	300-400	375-500	0.0010"	0.0020"	0.0023"	0.0026"	0.0028"	0.0045"	0.0062"	0.0080"
Magnesium	300-400	375-500	0.0015"	0.0030"	0.0035"	0.0040"	0.0045"	0.0066"	0.0087"	0.0100"
Plastic/Acrylic	450-1200	560-1500	0.0015"	0.0030"	0.0040"	0.0050"	0.0060"	0.0087"	0.0093"	0.0100"
Titanium Alloys (Pure)	200-400	250-500	0.0010"	0.0015"	0.0019"	0.0025"	0.0030"	0.0038"	0.0043"	0.0050"



### Endmills - HP 5 Flute - 40° Helix

Material	SFM		LIGHT PERIPHERAL - Chipload per tooth						
	<32Rc	>32Rc	1/8	1/4	3/8	1/2	5/8	3/4	1
Cast Iron (Ductile)	120-350	80-140	0.0007"	0.0014"	0.0021"	0.0030"	0.0036"	0.0043"	0.0080"
Cast Iron (Gray)	250-450	130-300	0.0007"	0.0014"	0.0021"	0.0030"	0.0036"	0.0043"	0.0080"
High Temp Alloys	70-120	40-90	0.0005"	0.0010"	0.0014"	0.0020"	0.0024"	0.0029"	0.0080"
Stainless Steel (Precipitation)	80-250	90-125	0.0007"	0.0014"	0.0021"	0.0030"	0.0036"	0.0043"	0.0080"
Stainless Steel (300)	150-350	80-200	0.0007"	0.0014"	0.0021"	0.0030"	0.0036"	0.0043"	0.0080"
Stainless Steel (400)	200-450	100-250	0.0007"	0.0014"	0.0021"	0.0030"	0.0036"	0.0043"	0.0080"
Steel (Alloys)	150-300	80-200	0.0007"	0.0014"	0.0021"	0.0030"	0.0036"	0.0043"	0.0080"
Steel (Carbon)	200-450	100-250	0.0008"	0.0017"	0.0025"	0.0035"	0.0042"	0.0050"	0.0090"
Titanium (Cast/Wrought Iron)	140-200	90-160	0.0007"	0.0014"	0.0021"	0.0030"	0.0036"	0.0043"	0.0080"
Titanium (Pure)	140-220	90-160	0.0007"	0.0014"	0.0021"	0.0030"	0.0036"	0.0043"	0.0080"

Material	SFM		HEAVY PERIPHERAL - Chipload per tooth						
	<32Rc	>32Rc	1/8	1/4	3/8	1/2	5/8	3/4	1
Cast Iron (Ductile)	120-350	80-140	0.0010"	0.0019"	0.0029"	0.0040"	0.0048"	0.0057"	0.0080"
Cast Iron (Gray)	250-450	130-300	0.0010"	0.0019"	0.0029"	0.0040"	0.0048"	0.0057"	0.0080"
High Temp Alloys	70-120	40-90	0.0010"	0.0014"	0.0021"	0.0030"	0.0036"	0.0043"	0.0080"
Stainless Steel (Precipitation)	80-250	90-125	0.0010"	0.0019"	0.0029"	0.0040"	0.0048"	0.0057"	0.0080"
Stainless Steel (300)	150-350	80-200	0.0010"	0.0019"	0.0029"	0.0040"	0.0048"	0.0057"	0.0080"
Stainless Steel (400)	200-450	100-250	0.0010"	0.0019"	0.0029"	0.0040"	0.0048"	0.0057"	0.0080"
Steel (Alloys)	150-300	80-200	0.0010"	0.0019"	0.0029"	0.0040"	0.0048"	0.0057"	0.0080"
Steel (Carbon)	200-450	100-250	0.0011"	0.0021"	0.0032"	0.0045"	0.0053"	0.0064"	0.0090"
Titanium (Cast/Wrought Iron)	140-200	90-160	0.0010"	0.0019"	0.0029"	0.0040"	0.0048"	0.0057"	0.0080"
Titanium (Pure)	140-220	90-160	0.0010"	0.0019"	0.0029"	0.0040"	0.0048"	0.0057"	0.0080"



### Endmills - Miniature

Material	SFM RANGE	Chipload Per Tooth					
		.020"	.040"	.060"	.080"	.100"	.120"
Aluminum/Aluminum Alloys	1480-1640	0.0015"-0.0023"	0.0018"-0.0025"	0.0020"-0.0027"	0.0023"-0.0031"	0.0027"-0.0035"	0.0031"-0.0041"
Brass/Bronze	665-720	0.0008"-0.0021"	0.0011"-0.0024"	0.0014"-0.0027"	0.0016"-0.0031"	0.0018"-0.0036"	0.0021"-0.0041"
Cast Iron (Malleable)	325-360	0.0007"-0.0018"	0.0008"-0.0020"	0.0009"-0.0023"	0.0010"-0.0025"	0.0012"-0.0030"	0.0014"-0.0034"
Cast Iron (Medium)	230-300	0.0007"-0.0018"	0.0008"-0.0020"	0.0009"-0.0023"	0.0010"-0.0025"	0.0012"-0.0030"	0.0014"-0.0034"
Cast Iron (Soft)	360-430	0.0007"-0.0018"	0.0008"-0.0020"	0.0009"-0.0023"	0.0010"-0.0025"	0.0012"-0.0030"	0.0014"-0.0034"
Copper/Copper Alloys	520-720	0.0008"-0.0014"	0.0010"-0.0016"	0.0011"-0.0018"	0.0013"-0.0021"	0.0015"-0.0024"	0.0017"-0.0028"
Nickel Alloys	180-215	0.0003"-0.0005"	0.0004"-0.0006"	0.0005"-0.0007"	0.0005"-0.0008"	0.0006"-0.0009"	0.0007"-0.0010"
Nickel Alloys (Inconel)	080-120	0.0002"-0.0004"	0.0002"-0.0004"	0.0002"-0.0005"	0.0006"-0.0005"	0.0003"-0.0006"	0.0003"-0.0007"
Nickel Alloys (Monel)	060-175	0.0003"-0.0005"	0.0004"-0.0006"	0.0005"-0.0007"	0.0005"-0.0008"	0.0006"-0.0009"	0.0007"-0.0010"
Plastic	590-700	0.0015"-0.0090"	0.0020"-0.0100"	0.0030"-0.0115"	0.0025"-0.0130"	0.0030"-0.0150"	0.0035"-0.0175"
Stainless Steel (Precipitation)	215-250	0.0002"-0.0004"	0.0002"-0.0006"	0.0002"-0.0007"	0.0003"-0.0008"	0.0003"-0.0009"	0.0003"-0.0014"
Stainless Steel (300)	230-260	0.0002"-0.0007"	0.0002"-0.0010"	0.0002"-0.0011"	0.0002"-0.0013"	0.0003"-0.0015"	0.0003"-0.0017"
Stainless Steel (400)	200-250	0.0002"-0.0005"	0.0002"-0.0008"	0.0002"-0.0009"	0.0003"-0.0010"	0.0003"-0.0009"	0.0003"-0.0014"
Steel (High Tensile 35-40 Rc)	255-330	0.0004"-0.0012"	0.0005"-0.0014"	0.0005"-0.0016"	0.0005"-0.0018"	0.0007"-0.0021"	0.0008"-0.0024"
Steel (High Tensile 40-45 Rc)	230-300	0.0003"-0.0008"	0.0004"-0.0010"	0.0005"-0.0011"	0.0004"-0.0008"	0.0003"-0.0009"	0.0005"-0.0010"
Steel (High Tensile 45+ Rc)	200-250	0.0002"-0.0004"	0.0003"-0.0005"	0.0003"-0.0007"	0.0004"-0.0008"	0.0003"-0.0009"	0.0005"-0.0010"
Steel (Low Carbon)	330-390	0.0003"-0.0005"	0.0003"-0.0006"	0.0003"-0.0007"	0.0004"-0.0008"	0.0003"-0.0009"	0.0005"-0.0010"
Steel (Medium Carbon)	490-615	0.0004"-0.0012"	0.0005"-0.0014"	0.0005"-0.0016"	0.0006"-0.0018"	0.0007"-0.0021"	0.0008"-0.0024"
Titanium (Cast/Wrought Iron)	235-300	0.0002"-0.0008"	0.0003"-0.0010"	0.0003"-0.0011"	0.0004"-0.0013"	0.0004"-0.0015"	0.0005"-0.0017"
Titanium (Hard)	230-250	0.0002"-0.0008"	0.0003"-0.0010"	0.0003"-0.0011"	0.0004"-0.0013"	0.0004"-0.0015"	0.0005"-0.0017"
Titanium (Soft)	260-330	0.0002"-0.0008"	0.0003"-0.0010"	0.0003"-0.0011"	0.0004"-0.0013"	0.0004"-0.0015"	0.0005"-0.0017"
Tool Steel	230-305	0.0003"-0.0008"	0.0004"-0.0010"	0.0005"-0.0011"	0.0004"-0.0008"	0.0003"-0.0009"	0.0005"-0.0010"