

Series *XP, XP-NB, MXP, MXP-NB, XPR, XPR-NB, XPB & XPB-NB*

Cutting Parameters

Suggested Starting Speeds & Feed Rates

Material Group	ISO Code	Material Examples	Finishing Cuts		Medium Cuts		Heavy Cuts		Slotting	
			.1D Radial x 2D Axial		.25D Radial x 1.5D Axial		.5D Radial x 1.5D Axial		.5D Axial	
			SFM	IPM	SFM	IPM	SFM	IPM	SFM	IPM
Steel	P	1018 thru 1095, 12L14, A-36, Hot Rolled	600	60.00	600	50.00	600	45.00	600	40.00
Steel Alloys	P	4140 thru 8820	500	50.00	500	45.00	500	40.00	500	35.00
		Steel Alloys <45 HRC, Cobalt Chrome	200	30.00	200	25.00	200	20.00	200	15.00
Tool & Mold Steels	P	H-13, O-1, A-2, D-2, S7, P20	250	30.00	250	25.00	250	20.00	250	15.00
	H*	AR-450, steels > 45 HRC	100	6.00	100	5.00	100	4.00	80	3.00
Stainless Steel	M	303,304, 316	450	40.00	450	35.00	450	30.00	450	25.00
		410, 420, 440, 13-8, 15-5, 17-4 Ph	350	35.00	350	30.00	350	25.00	350	20.00
High Temp - Titanium	S	6Al4V, 5553, 99	200	10.00	200	8.00	200	7.00	200	6.00
High Temp - Nickel Based Alloys	S	Inconel 100, 718, Hastelloy-B, Rene 77, Jethete M252, Haynes 75	80	8.00	80	7.00	80	6.00	80	4.00
		Inconel 625, Waspalloy	120	10.00	120	9.00	120	8.00	120	6.00
		Monel 400	250	20.00	250	18.00	250	16.00	250	12.00
High Temp - Iron Based Alloys	S	Aeromet 100, A286, Jethete M152	100	8.00	100	7.00	100	6.00	100	5.00
High Temp - Cobalt Based Alloys	S	Kovar, L-405, L-605, Stellite SF12	70	7.00	70	6.00	70	5.00	70	4.00
Cast Iron	K	Gray Cast, Malleable and Ductile Irons	600	60.00	600	50.00	600	45.00	600	40.00

**When machining Hardened Materials > 45 RC, use the Series with "NB." Having an AlTiN coating will result in much longer tool life*

Series *XP, XP-NB, MXP, MXP-NB, XPR, XPR-NB, XPB & XPB-NB*

Cutting Parameters

Chip Loads

Material Group	ISO Code	Material Examples	Cutting Diameter							
			1/8	3/16	1/4	3/8	1/2	5/8	3/4	1
Steel	P	1018 thru 1095, 12L14, A-36, Hot Rolled	0.0007	0.0010	0.0020	0.0030	0.0040	0.0050	0.0060	0.0070
Steel Alloys	P	4140 thru 8820	0.0005	0.0007	0.0015	0.0020	0.0030	0.0040	0.0050	0.0060
		Cobalt Chrome	0.0008	0.0010	0.0020	0.0030	0.0050	0.0070	0.0080	0.0100
		Steel Alloys <45 HRC	0.0003	0.0003	0.0005	0.0008	0.0010	0.0015	0.0020	0.0030
Tool & Mold Steels	P	H-13, O-1, A-2, D-2, S7, P20	0.0005	0.0010	0.0015	0.0020	0.0030	0.0040	0.0050	0.0050
	H*	AR-450, steels >45 HRC	0.0002	0.0003	0.0005	0.0008	0.0010	0.0015	0.0020	0.0030
Stainless Steel	M	303,304, 316	0.0007	0.0010	0.0015	0.0020	0.0030	0.0040	0.0050	0.0060
		410, 420, 440, 13-8, 15-5, 17-4 Ph	0.0005	0.0008	0.0010	0.0015	0.0025	0.0030	0.0040	0.0050
High Temp - Titanium	S	6Al4V, 5553, 99	0.0005	0.0008	0.0010	0.0012	0.0015	0.0020	0.0030	0.0040
High Temp - Nickel Based Alloys	S	Inconel 100, 718, Hastelloy-B, Rene 77, Jethete M252, Haynes 75	0.0005	0.0007	0.0010	0.0015	0.0020	0.0025	0.0030	0.0030
		Inconel 625, Waspalloy	0.0005	0.0007	0.0010	0.0015	0.0020	0.0025	0.0030	0.0030
		Monel 400	0.0005	0.0010	0.0015	0.0020	0.0025	0.0030	0.0040	0.0050
High Temp - Iron Based Alloys	S	Aeromet 100, A286, Jethete M152	0.0005	0.0007	0.0010	0.0015	0.0020	0.0025	0.0030	0.0030
High Temp - Cobalt Based Alloys	S	Kovar, L-405, L-605, Stellite SF12	0.0005	0.0007	0.0010	0.0015	0.0020	0.0025	0.0030	0.0030
Cast Iron	K	Gray Cast, Malleable and Ductile Iron	0.0050	0.0007	0.0010	0.0015	0.0020	0.0030	0.0040	0.0050

**When machining Hardened Materials > 45 RC, use the Series with "NB."
Having an AlTiN coating will result in much longer tool life*

Series SM3F & SR3F

Cutting Parameters

Suggested Starting Speeds & Feed Rates

Material Group	ISO Code	Material Examples	Finishing Cuts		Medium Cuts		Heavy Cuts		Slotting		Facing		Ramping	
			.1D Radial x 2D Axial		.25D Radial x 1.5D Axial		.5D Radial x 1.5D Axial		.5D Axial		.75D Radial x .25D Axial		Max. Ramp Angle - 10°	
			SFM	IPM	SFM	IPM	SFM	IPM	SFM	IPM	SFM	IPM	SFM	IPM
Stainless Steel	M	303,304, 316	450	40.00	450	35.00	450	30.00	450	25.00	400	35.00	400	30.00
		410, 420, 440, 13-8, 15-5, 17-4 Ph	350	35.00	350	30.00	350	25.00	350	20.00	300	30.00	300	25.00
Non-Ferrous	N	Aluminum	1000	100.00	800	80.00	700	70.00	600	60.00	600	60.00	600	50.00
		Copper, Brass, Bronze, Plastics, Fibreglass	500	45.00	450	40.00	400	35.00	400	25.00	400	35.00	450	30.00

Recommended Chip Loads

Material Group	ISO Code	Material Examples	Cutting Diameter						
			3/16	1/4	3/8	1/2	5/8	3/4	1
Stainless Steel	M	303,304, 316	0.0012	0.0016	0.0023	0.0032	0.0042	0.0053	0.0065
		410, 420, 440, 13-8, 15-5, 17-4 Ph	0.0012	0.0016	0.0023	0.0032	0.0042	0.0053	0.0065
Non-Ferrous	N	Aluminum, Copper, Brass, Bronze	0.0016	0.0021	0.0032	0.0043	0.0055	0.0065	0.0085
		Plastics, Fibreglass	0.0015	0.0019	0.0029	0.0038	0.0048	0.0058	0.0078

Series *SM4F & SR4F*

Cutting Parameters

Suggested Starting Speeds & Feed Rates

Material Group	ISO Code	Material Examples	Finishing Cuts		Medium Cuts		Heavy Cuts		Slotting		Facing		Ramping	
			.1D Radial x 2D Axial		.25D Radial x 1.5D Axial		.5D Radial x 1.5D Axial		.5D Axial		.75D Radial x .25D Axial		Max. Ramp Angle - 7°	
			SFM	IPM	SFM	IPM	SFM	IPM	SFM	IPM	SFM	IPM	SFM	IPM
Steel	P	1018 thru 1095, 12L14, A-36, Hot Rolled	600	60.00	600	50.00	600	45.00	600	40.00	600	50.00	600	45.00
Steel Alloys	P	4140 thru 8820 Steel Alloys <45 HRC, Cobalt Chromes	500	50.00	500	45.00	500	40.00	500	35.00	500	45.00	500	40.00
Tool & Mold Steels	P	H-13, O-1, A-2, D-2, S7, P20	250	30.00	250	25.00	250	20.00	250	15.00	250	25.00	250	20.00
Stainless Steel	M	303,304, 316	450	40.00	450	35.00	450	30.00	450	25.00	450	35.00	450	30.00
		410, 420, 440, 13-8, 15-5, 17-4 Ph	350	35.00	350	30.00	350	25.00	350	20.00	350	30.00	350	25.00
Cast Iron	K	Gray Cast, Malleable, Ductile	600	60.00	600	50.00	600	45.00	600	40.00	600	50.00	600	45.00

Series *SM4F & SR4F*

Cutting Parameters

Recommended Chip Loads

Material Group	ISO Code	Material Examples	Cutting Diameter						
			3/16	1/4	3/8	1/2	5/8	3/4	1
Steel	P	1018 thru 1095, 12L14, A-36, Hot Rolled	0.0010	0.0014	0.0020	0.0027	0.0034	0.0044	0.0055
Steel Alloys	P	4140 thru 8820, Cobalt Chromes Steel Alloys <45 HRC	0.0011	0.0015	0.0022	0.0030	0.0036	0.0048	0.0060
Tool & Mold Steels	P	H-13, O-1, A-2, D-2, S7, P20	0.0012	0.0016	0.0024	0.0032	0.0038	0.0050	0.0062
Stainless Steel	M	303,304, 316	0.0009	0.0012	0.0019	0.0025	0.0031	0.0038	0.0051
		410, 420, 440, 13-8, 15-5, 17-4 Ph	0.0010	0.0014	0.0020	0.0027	0.0034	0.0044	0.0055
Cast Iron	K	Gray Cast, Malleable, Ductile	0.0010	0.0014	0.0020	0.0027	0.0034	0.0044	0.0055

Series *SM5F, SM5F-NB, MSM5F, MSM5F-NB*

Cutting Parameters

Suggested Starting Speeds & Feed Rates

Material Group	ISO Code	Material Examples	Finishing Cuts		Medium Cuts		Heavy Cuts		Facing	
			.1D Radial x 2D Axial		.25D Radial x 1.5D Axial		.5D Radial x 1.5D Axial		.75D Radial x .25D Axial	
			SFM	IPM	SFM	IPM	SFM	IPM	SFM	IPM
Steel	P	1018 thru 1095, 12L14, A-36, Hot Rolled	600	75.00	600	70.00	600	60.00	600	70.00
Steel Alloys	P	4140 thru 8820	500	60.00	500	55.00	500	50.00	500	55.00
		Steel Alloys <45 HRC, Cobalt Chrome	300	30.00	300	25.00	300	20.00	300	25.00
Tool & Mold Steels	P	H-13, O-1, A-2, D-2, S7, P20	250	40.00	250	35.00	250	30.00	250	35.00
	H*	AR-450, Steels >45 HRC	100	8.00	100	6.00	100	5.00	100	6.00
Stainless Steel	M	303,304, 316	450	45.00	450	40.00	450	35.00	450	35.00
		410, 420, 440, 13-8, 15-5, 17-4 Ph	350	40.00	350	35.00	350	30.00	350	35.00
High Temp - Titanium	S	6Al4V, 5553, 99	200	15.00	200	12.00	200	10.00	200	12.00
High Temp - Nickel Based Alloys	S	Inconel 100, 718, Hastelloy-B, Rene 77, Jethete M252, Haynes 75	80	7.00	80	6.00	80	5.00	80	6.00
		Inconel 625, Waspalloy	120	10.00	120	8.00	120	7.00	120	8.00
		Monel 400	250	16.00	250	12.00	250	10.00	250	12.00
High Temp - Iron Based Alloys	S	Aeromet 100, A286, Jethete M152	100	8.00	100	6.00	100	5.00	100	6.00
High Temp - Cobalt Based Alloys	S	Kovar, L-405, L-605, Stellite SF12	70	6.00	70	5.00	70	4.00	70	5.00
Cast Iron	K	Gray Cast, Malleable and Ductile Iron	600	75.00	600	70.00	600	60.00	600	70.00

**When machining Hardened Materials > 45 RC, use the Series with "NB."
Having an AlTiN coating will result in much longer tool life*

Series *SM5F, SM5F-NB, MSM5F, MSM5F-NB*

Cutting Parameters

Recommended Chip Loads

Material Group	ISO Code	Material Examples	Cutting Diameter							
			1/8	3/16	1/4	3/8	1/2	5/8	3/4	1
Steel	P	1018 thru 1095, 12L14, A-36, Hot Rolled	0.0007	0.0010	0.0020	0.0030	0.0040	0.0050	0.0060	0.0070
Steel Alloys	P	4140 thru 8820	0.0005	0.0007	0.0015	0.0020	0.0030	0.0040	0.0050	0.0060
		Cobalt Chrome	0.0008	0.0010	0.0020	0.0030	0.0050	0.0070	0.0080	0.0100
		Steel Alloys <45 HRC	0.0003	0.0003	0.0005	0.0008	0.0010	0.0015	0.0020	0.0030
Tool & Mold Steels	P	H-13, O-1, A-2, D-2, S7, P20	0.0005	0.0010	0.0015	0.0020	0.0030	0.0040	0.0050	0.0050
	H*	AR-450, Steels >45 HRC	0.0002	0.0003	0.0005	0.0008	0.0010	0.0015	0.0020	0.0030
Stainless Steel	M	303,304, 316	0.0007	0.0010	0.0015	0.0020	0.0030	0.0040	0.0050	0.0060
		410, 420, 440, 13-8, 15-5, 17-4 Ph	0.0005	0.0008	0.0010	0.0015	0.0025	0.0030	0.0040	0.0050
High Temp - Titanium	S	6Al4V, 5553, 99	0.0005	0.0008	0.0010	0.0012	0.0015	0.0020	0.0030	0.0040
High Temp - Nickel Based Alloys	S	Inconel 100, 718, Hastelloy-B, Rene 77, Jethete M252, Haynes 75	0.0005	0.0007	0.0010	0.0015	0.0020	0.0025	0.0030	0.0030
		Inconel 625, Waspalloy	0.0005	0.0007	0.0010	0.0015	0.0020	0.0025	0.0030	0.0030
		Monel 400	0.0005	0.0010	0.0015	0.0020	0.0025	0.0030	0.0040	0.0050
High Temp - Iron Based Alloys	S	Aeromet 100, A286, Jethete M152	0.0005	0.0007	0.0010	0.0015	0.0020	0.0025	0.0030	0.0030
High Temp - Cobalt Based Alloys	S	Kovar, L-405, L-605, Stellite SF12	0.0005	0.0007	0.0010	0.0015	0.0020	0.0025	0.0030	0.0030
Cast Iron	K	Gray Cast, Malleable and Ductile Iron	0.0050	0.0007	0.0010	0.0015	0.0020	0.0030	0.0040	0.0050

**When machining Hardened Materials > 45 RC, use the Series with "NB."
Having an AlTiN coating will result in much longer tool life*

Series *SM6F & SM6F-NB*

Cutting Parameters

Suggested Starting Speeds & Feed Rates

Material Group	ISO Code	Material Examples	Finishing Cuts		Medium Cuts		Heavy Cuts		High Feed	
			.1D Radial x 2D Axial		.25D Radial x 1.5D Axial		.5D Radial x 1.5D Axial		.05D Radial x 2D Axial	
			SFM	IPM	SFM	IPM	SFM	IPM	SFM	IPM
Steel	P	1018 thru 1095, 12L14, A-36, Hot Rolled	600	90.00	n/a	n/a	n/a	n/a	n/a	n/a
Steel Alloys	P	4140 thru 8820	500	70.00	n/a	n/a	n/a	n/a	n/a	n/a
		Steel Alloys <45 HRC, Cobalt Chrome	300	35.00	n/a	n/a	n/a	n/a	n/a	n/a
Tool & Mold Steels	P	H-13, O-1, A-2, D-2, S7, P20	250	45.00	n/a	n/a	n/a	n/a	n/a	n/a
	H*	AR-450, Steels >45 HRC	100	12.00	n/a	n/a	n/a	n/a	n/a	n/a
High Temp - Titanium	S	6Al4V, 5553, 99	200	20.00	200	16.00	200	12.00	n/a	n/a
High Temp - Nickel Based Alloys	S	Inconel 100, 718, Hastelloy-B, Rene 77, Jethete M252, Haynes 75	80	8.00	80	7.00	80	6.00	250	25
		Inconel 625, Waspalloy	120	12.00	120	10.00	120	8.00	350	35
		Monel 400	250	20.00	250	16.00	250	12.00	500	50
High Temp - Iron Based Alloys	S	Aeromet 100, A286, Jethete M152	100	9.00	100	7.00	100	6.00	300	30
High Temp - Cobalt Based Alloys	S	Kovar, L-405, L-605, Stellite SF12	70	7.00	70	6.00	70	5.00	200	20
Cast Iron	K	Gray Cast, Malleable and Ductile Iron	600	90.00	600	80.00	600	70.00	n/a	n/a

**When machining Hardened Materials > 45 RC, use the Series with "NB."
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Series *SM6F & SM6F-NB*

Cutting Parameters

Recommended Chip Loads

Material Group	ISO Code	Material Examples	Cutting Diameter							
			1/8	3/16	1/4	3/8	1/2	5/8	3/4	1
Steel	P	1018 thru 1095, 12L14, A-36, Hot Rolled	0.0007	0.0010	0.0020	0.0030	0.0040	0.0050	0.0060	0.0070
Steel Alloys	P	4140 thru 8820	0.0005	0.0007	0.0015	0.0020	0.0030	0.0040	0.0050	0.0060
		Cobalt Chromes	0.0008	0.0010	0.0020	0.0030	0.0050	0.0070	0.0080	0.0100
		Steel Alloys <45 HRC	0.0003	0.0003	0.0005	0.0008	0.0010	0.0015	0.0020	0.0030
Tool & Mold Steels	P	H-13, O-1, A-2, D-2, S7, P20	0.0005	0.0010	0.0015	0.0020	0.0030	0.0040	0.0050	0.0050
	H*	AR-450, Steels >45 HRC	0.0002	0.0003	0.0005	0.0008	0.0010	0.0015	0.0020	0.0030
High Temp - Titanium	S	6Al4V, 5553, 99	0.0005	0.0008	0.0010	0.0012	0.0015	0.0020	0.0030	0.0040
High Temp - Nickel Based Alloys	S	Inconel 100, 718, Hastelloy-B, Rene 77, Jethete M252, Haynes 75	0.0005	0.0007	0.0010	0.0015	0.0020	0.0025	0.0030	0.0030
		Inconel 625, Waspalloy	0.0005	0.0007	0.0010	0.0015	0.0020	0.0025	0.0030	0.0030
		Monel 400	0.0005	0.0010	0.0015	0.0020	0.0025	0.0030	0.0040	0.0050
High Temp - Iron Based Alloys	S	Aeromet 100, A286, Jethete M152	0.0005	0.0007	0.0010	0.0015	0.0020	0.0025	0.0030	0.0030
High Temp - Cobalt Based Alloys	S	Kovar, L-405, L-605, Stellite SF12	0.0005	0.0007	0.0010	0.0015	0.0020	0.0025	0.0030	0.0030
Iron	K	Gray Cast, Malleable and Ductile Iron	0.0050	0.0007	0.0010	0.0015	0.0020	0.0030	0.0040	0.0050

**When machining Hardened Materials > 45 RC, use the Series with "NB."
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Series AL3F

Cutting Parameters

Suggested Starting Speeds & Feed Rates

Material Group	ISO Code	Material Examples	Finishing Cuts		Medium Cuts		Heavy Cuts		Slotting		Facing		Ramping		High Feed	
			.1D Radial x 2D Axial		.25D Radial x 1.5D Axial		.5D Radial x 1.5D Axial		.5D Axial		.75D Radial x .25D Axial		Max. Ramp Angle - 10°		.05D Radial x 3D Axial	
			SFM	IPM	SFM	IPM	SFM	IPM	SFM	IPM	SFM	IPM	SFM	IPM	SFM	IPM
Non-Ferrous	N	Aluminum 6061, 6063, 7050, 7075	1500	400.00	1500	350.00	1500	300.00	1200	250.00	1200	350	1200	350.00	2000	500
		Copper, Brass, Bronze, Plastics, Fibreglass	500	70.00	500	50.00	500	40.00	500	30.00	500	50	500	40.00	n/a	n/a

Recommended Chip Loads

Material Group	ISO Code	Material Examples	Cutting Diameter						
			3/16	1/4	3/8	1/2	5/8	3/4	1
Non-Ferrous	N	Aluminium, Copper, Brass, Bronze	0.0040	0.0050	0.0070	0.0090	0.0100	0.0120	0.0150
		Plastics, Fibreglass	0.0020	0.0025	0.0035	0.0045	0.0055	0.0065	0.0080