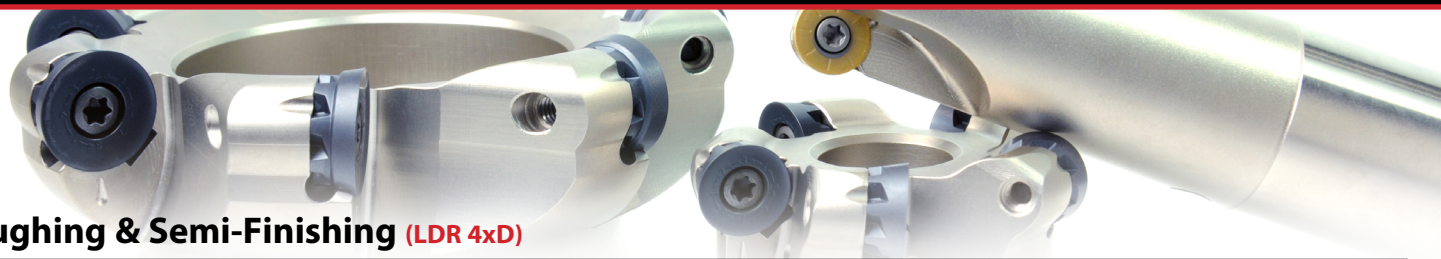




PRC Radius Cutter
MS Machining Guide



Roughing & Semi-Finishing (LDR 4xD)

For LDR Greater See LDR Notes

High Speed Machining Guide (Aggressive Parameters)

Material				Stainless Steel (annealed)				Stainless Steel (hardened)				Titanium Alloys				Heat Resistant Alloys (annealed)				Heat Resistant Alloys (hardened)			
Insert Size	Tool Dia. (Inch)	Tool Dia. (mm)	No. Teeth	RPM	Feed per Tooth	Feed Rate (IPM)	Axial Cut Depth (aa)	RPM	Feed per Tooth	Feed Rate (IPM)	Axial Cut Depth (aa)	RPM	Feed per Tooth	Feed Rate (IPM)	Axial Cut Depth (aa)	RPM	Feed per Tooth	Feed Rate (IPM)	Axial Cut Depth (aa)	RPM	Feed per Tooth	Feed Rate (IPM)	Axial Cut Depth (aa)
RPHT10	1.000	25	3	3060	0.012	110.16	0.040	2445	0.010	73.35	0.040	1205	0.010	36.15	0.030	705	0.006	12.69	0.030	590	0.005	8.85	0.030
	1.250	32	4	2445	0.012	117.36	0.040	1955	0.010	78.20	0.040	965	0.010	38.60	0.030	565	0.006	13.56	0.030	470	0.005	9.40	0.030
	2.000	50	5	1530	0.012	91.80	0.040	1225	0.010	61.25	0.040	600	0.010	30.00	0.030	355	0.006	10.65	0.030	295	0.005	7.37	0.030
	2.500	63	6	1225	0.012	88.20	0.040	980	0.010	58.80	0.040	480	0.010	28.80	0.030	285	0.006	10.26	0.030	235	0.005	7.05	0.030
RPHT12	1.250	32	2	2445	0.014	68.46	0.050	1955	0.012	46.92	0.050	965	0.012	23.16	0.040	565	0.009	10.17	0.040	470	0.0075	7.05	0.040
	1.500	40	3	2040	0.014	85.68	0.050	1630	0.012	58.68	0.050	805	0.012	28.98	0.040	470	0.009	12.69	0.040	395	0.0075	8.89	0.040
	2.000	50	4	1530	0.014	85.68	0.050	1225	0.012	58.80	0.050	600	0.012	28.80	0.040	355	0.009	12.78	0.040	295	0.0075	8.85	0.040
			5	1530	0.014	107.10	0.050	1225	0.012	73.50	0.050	600	0.012	36.00	0.040	355	0.009	15.98	0.040	295	0.0075	11.06	0.040
	2.500	63	4	1225	0.014	68.60	0.050	980	0.012	47.04	0.050	480	0.012	23.04	0.040	285	0.009	10.26	0.040	235	0.0075	7.05	0.040
			6	1225	0.014	102.90	0.050	980	0.012	70.56	0.050	480	0.012	34.56	0.040	285	0.009	15.39	0.040	235	0.0075	10.58	0.040
	3.000	80	5	1020	0.014	71.40	0.050	815	0.012	48.90	0.050	400	0.012	24.00	0.040	235	0.009	10.58	0.040	195	0.0075	7.31	0.040
			8	1020	0.014	114.24	0.050	815	0.012	78.24	0.050	400	0.012	38.40	0.040	235	0.009	16.92	0.040	195	0.0075	11.70	0.040
	4.000	100	6	765	0.014	64.26	0.050	610	0.012	43.92	0.050	300	0.012	21.60	0.040	175	0.009	9.45	0.040	150	0.0075	6.75	0.040
			10	765	0.014	107.10	0.050	610	0.012	73.20	0.050	300	0.012	36.00	0.040	175	0.009	15.75	0.040	150	0.0075	11.25	0.040
5.000	125	12	610	0.014	102.48	0.050	490	0.012	70.56	0.050	240	0.012	34.56	0.040	140	0.009	15.12	0.040	120	0.0075	10.80	0.040	
RPHT16	1.500	40	3	2040	0.018	110.16	0.065	1630	0.016	78.24	0.065	805	0.015	36.23	0.050	470	0.012	16.92	0.050	395	0.010	11.85	0.050
	2.000	50	3	1530	0.018	82.62	0.065	1225	0.016	58.80	0.065	600	0.015	27.00	0.050	355	0.012	12.78	0.050	295	0.010	8.85	0.050
	2.500	63	5	1225	0.018	110.25	0.065	980	0.016	78.40	0.065	480	0.015	36.00	0.050	285	0.012	17.10	0.050	235	0.010	11.75	0.050
	3.000	80	6	1020	0.018	110.16	0.065	815	0.016	78.24	0.065	400	0.015	36.00	0.050	235	0.012	16.92	0.050	200	0.010	12.00	0.050
	4.000	100	7	765	0.018	96.39	0.065	610	0.016	68.32	0.065	300	0.015	31.50	0.050	175	0.012	14.70	0.050	150	0.010	10.50	0.050
	5.000	125	8	610	0.018	87.84	0.065	490	0.016	62.72	0.065	240	0.015	28.80	0.050	140	0.012	13.44	0.050	120	0.010	9.60	0.050
6.000	160	10	510	0.018	91.80	0.065	410	0.016	65.60	0.065	200	0.015	30.00	0.050	120	0.012	14.40	0.050	100	0.010	10.00	0.050	

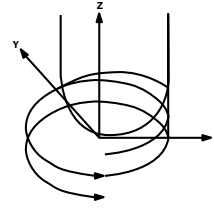
Machining Guide (Moderate Parameters)

Material				Stainless Steel (annealed)				Stainless Steel (hardened)				Titanium Alloys				Heat Resistant Alloys (annealed)				Heat Resistant Alloys (hardened)			
Insert Size	Tool Dia. (Inch)	Tool Dia. (mm)	No. Teeth	RPM	Feed per Tooth	Feed Rate (IPM)	Axial Cut Depth (aa)	RPM	Feed per Tooth	Feed Rate (IPM)	Axial Cut Depth (aa)	RPM	Feed per Tooth	Feed Rate (IPM)	Axial Cut Depth (aa)	RPM	Feed per Tooth	Feed Rate (IPM)	Axial Cut Depth (aa)	RPM	Feed per Tooth	Feed Rate (IPM)	Axial Cut Depth (aa)
RPHT10	1.000	25	3	2520	0.010	75.60	0.040	2025	0.008	48.60	0.040	1015	0.008	24.36	0.040	590	0.005	8.85	0.040	500	0.004	6.00	0.040
	1.250	32	4	2015	0.010	80.60	0.040	1620	0.008	51.84	0.040	810	0.008	25.92	0.040	470	0.005	9.40	0.040	400	0.004	6.40	0.040
	2.000	50	5	1260	0.010	63.00	0.040	1015	0.008	40.60	0.040	510	0.008	20.40	0.040	295	0.005	7.37	0.040	250	0.004	5.00	0.040
	2.500	63	6	1010	0.010	60.60	0.040	810	0.008	38.88	0.040	405	0.008	19.44	0.040	235	0.005	7.05	0.040	200	0.004	4.80	0.040
RPHT12	1.250	32	2	2015	0.012	48.36	0.050	1620	0.009	29.16	0.050	810	0.010	16.20	0.050	470	0.0075	7.05	0.050	400	0.006	4.80	0.050
	1.500	40	3	1680	0.012	60.48	0.050	1350	0.009	36.45	0.050	675	0.010	20.25	0.050	395	0.0075	8.89	0.050	330	0.006	5.94	0.050
	2.000	50	4	1260	0.012	60.48	0.050	1015	0.009	36.54	0.050	510	0.010	20.40	0.050	295	0.0075	8.85	0.050	250	0.006	6.00	0.050
			5	1260	0.012	75.60	0.050	1015	0.009	45.68	0.050	510	0.010	25.50	0.050	295	0.0075	11.06	0.050	250	0.006	7.50	0.050
	2.500	63	4	1010	0.012	48.48	0.050	810	0.009	29.16	0.050	405	0.010	16.20	0.050	235	0.0075	7.05	0.050	200	0.006	4.80	0.050
			6	1010	0.012	72.72	0.050	810	0.009	43.74	0.050	405	0.010	24.30	0.050	235	0.0075	10.58	0.050	200	0.006	7.20	0.050
	3.000	80	5	840	0.012	50.40	0.050	675	0.009	30.38	0.050	340	0.010	17.00	0.050	195	0.0075	7.31	0.050	165	0.006	4.95	0.050
			8	840	0.012	80.64	0.050	675	0.009	48.60	0.050	340	0.010	27.20	0.050	195	0.0075	11.70	0.050	165	0.006	7.92	0.050
	4.000	100	6	630	0.012	45.36	0.050	510	0.009	27.54	0.050	255	0.010	15.30	0.050	150	0.0075	6.75	0.050	125	0.006	4.50	0.050
			10	630	0.012	75.60	0.050	510	0.009	45.90	0.050	255	0.010	25.50	0.050	150	0.0075	11.25	0.050	125	0.006	7.50	0.050
5.000	125	12	505	0.012	72.72	0.050	405	0.009	43.74	0.050	200	0.010	24.00	0.050	120	0.0075	10.80	0.050	100	0.006	7.20	0.050	
RPHT16	1.500	40	3	1680	0.016	80.64	0.065	1350	0.012	48.60	0.065	675	0.012	24.30	0.065	395	0.010	11.85	0.065	330	0.008	7.92	0.065
	2.000	50	3	1260	0.016	60.48	0.065	1015	0.012	36.54	0.065	510	0.012	18.36	0.065	295	0.010	8.85	0.065	250	0.008	6.00	0.065
	2.500	63	5	1010	0.016	80.80	0.065	810	0.012	48.60	0.065	405	0.012	24.30	0.065	235	0.010	11.75	0.065	200	0.008	8.00	0.065
	3.000	80	6	840	0.016	80.64	0.065	675	0.012	48.60	0.065	340	0.012	24.48	0.065	200	0.010	12.00	0.065	165	0.008	7.92	0.065
	4.000	100	7	630	0.016	70.56	0.065	510	0.012	42.84	0.065	255	0.012	21.42	0.065	150	0.010	10.50	0.065	125	0.008	7.00	0.065
	5.000	125	8	505	0.016	64.64	0.065	405	0.012	38.88	0.065	200	0.012	19.20	0.065	120	0.010	9.60	0.065	100	0.008	6.40	0.065
6.000	160	10	420	0.016	67.20	0.065	340	0.012	40.80	0.065	170	0.012	20.40	0.065	100	0.010	10.00	0.065	85	0.008	6.80	0.065	

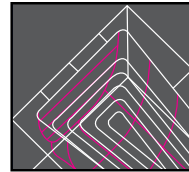
High Speed Machining Guide

Machining Tips

- Use Z-Level climb cutting for roughing operations.
- Use Helical for material engagement whenever possible for material entry (See Helical chart for ramp angles and arc limits depending on tool diameter).
- Add radiuses larger than cutter to corner of tool path for smooth operation.
- LDR should always be as short as possible.
- LDR of 4xD or less use chart on reverse side.
- LDR of 6xD to 10xD reduce spindle speed by 35% and feed rate by 25% to get started.
- LDR of 10xD and over reduce RPM by 50% and depth of cut by 65% to get started. **Machining is very difficult over 10xD.**
- Leave extra stock for semi-finishing to prevent gouging of surface when using long reach tools.
- Use air or oil mist for all applications except those involving gummy or sticky materials such as stainless, which machines well with water based coolant.



Helical Interpolation



Corner Rounding on Tool Path

Formulas

$$\text{RPM} = (3.82 \times \text{SFM}) / \text{Tool Diameter}$$

$$\text{SFM} = 0.262 \times \text{RPM} \times \text{Tool Diameter}$$

$$\text{IPM} = \text{RPM} \times \# \text{ Flutes} \times \text{Chip Load}$$

$$\text{Chip Load} = \text{IPM} / (\text{RPM} \times \# \text{ Flutes})$$

Depth of Cut

Adjusting depths of cuts based on LDR (Length Diameter Ratio)

Axial Depths of Cuts

- Depth of cut should be reduced by 5% per increment of LDR.

Radial Depths of Cuts

- This cutter performs best with step over amounts 100% to 50% of cutter diameter. Lesser amounts will result in less stability and reduce performance overall.

Diagnosing Problems

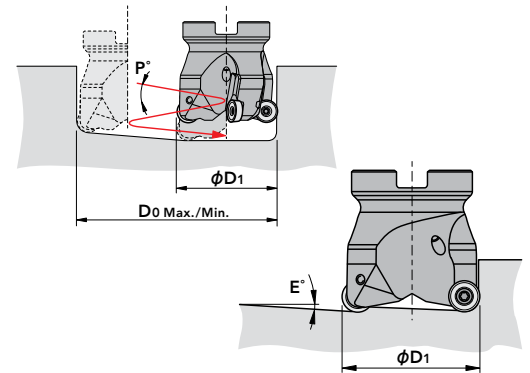
Insert Chipping - early during use means chip load too high, please reduce feed rate in increments of 20% until problem is resolved or shorten the length of the tool.

Insert Burning - of coating or glowing at the tip means RPM is too high. Reduce RPM by 20% increments until problem is resolved along with feed rate until excessive heat is subdued.

Chatter - excessive tool length is a primary cause. After reducing tool length if possible, lower RPM and feed rate until chatter is minimized.

Maximum Helical Ramping Angle

Insert Size	RPHT10				RPHT12				RPHT16			
	Diameter (Inch)	Ramping Angle	Helical Milling (Inch)		Helical Angle		Ramping Angle		Helical Milling (Inch)		Helical Angle	
D1	E	D ₀ Min	D ₀ Max	P	E	D ₀ Min	D ₀ Max	P	E	D ₀ Min	D ₀ Max	P
1.000	2.0°	1.488	1.606	1.8°	-	-	-	-	-	-	-	-
1.250	3.0°	1.988	2.106	1.5°	4.0°	1.752	2.028	1.7°	-	-	-	-
1.500	3.3°	2.488	2.606	1.1°	2.8°	2.252	2.528	1.4°	3.0°	2.016	2.370	2.0°
2.000	2.3°	3.488	3.606	0.9°	2.5°	3.252	3.528	1.1°	4.0°	3.016	3.370	1.5°
2.500	2.2°	4.488	4.606	0.7°	1.8°	4.252	4.528	0.9°	2.8°	4.016	4.370	1.1°
3.000	-	-	-	-	1.3°	5.252	5.528	0.7°	2.0°	5.016	5.370	0.9°
4.000	-	-	-	-	0.9°	7.252	7.528	0.5°	1.5°	7.016	7.370	0.7°
5.000	-	-	-	-	1.0°	9.252	9.528	0.4°	1.1°	9.016	9.370	0.45°
6.000	-	-	-	-	-	-	-	-	1.0°	11.016	11.370	0.4°



Recommended Materials by Application

Insert Grade	Chip Breaker	Coolant	Carbon Steels	Stainless Steels	Cast Irons	Non-Ferrous	Hi-Temp Alloys	Hardened Steels
			P	M	K	N	S	H
CK010	NM	Yes				⊙		
XP3035	-	-	⊙	○	○			
XP2040	GL	-	○					⊙
		Yes		⊙			○	
XC1015	GM	-			⊙			
XC5035	SM	-		⊙				○
		Yes		○			○	
XC5040	SM	Yes		○			⊙	○
XP6015	HR	-	○		○			⊙

GL: Light Cutting GM: Medium Cutting NM: Aluminum SM: Heat Resistant Alloy HR: Hardened Steel

○ good ⊙ best

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