



PRC Radius Cutter
PH Machining Guide



Roughing & Semi-Finishing (LDR 4xD)

For LDR Greater See LDR Notes

High Speed Machining Guide (Aggressive Parameters)

Material				Carbon/Alloy Steel (30-40 HRC)				Tool Steel (40-50 HRC)				Tool Steel (50-60 HRC)*			
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)
RPHT10	1.000	25	3	2370	0.010	71.10	0.040	1260	0.0075	28.35	0.020	480	0.005	7.20	0.010
	1.250	32	4	1895	0.010	75.80	0.040	1010	0.0075	30.30	0.020	385	0.005	7.70	0.010
	2.000	50	5	1185	0.010	59.25	0.040	630	0.0075	23.62	0.020	240	0.005	6.00	0.010
	2.500	63	6	950	0.010	57.00	0.040	505	0.0075	22.72	0.020	190	0.005	5.70	0.010
RPHT12	1.250	32	2	1895	0.0125	47.38	0.050	1010	0.0125	25.25	0.030	385	0.007	5.39	0.010
	1.500	40	3	1580	0.0125	59.25	0.050	840	0.0125	31.50	0.030	320	0.007	6.72	0.010
	2.000	50	4	1185	0.0125	59.25	0.050	630	0.0125	31.50	0.030	240	0.007	6.72	0.010
			5	1185	0.0125	74.06	0.050	630	0.0125	39.38	0.030	240	0.007	8.40	0.010
	2.500	63	4	950	0.0125	47.50	0.050	505	0.0125	25.25	0.030	190	0.007	5.32	0.010
			6	950	0.0125	71.25	0.050	505	0.0125	37.88	0.030	190	0.007	7.98	0.010
	3.000	80	5	790	0.0125	49.38	0.050	420	0.0125	26.25	0.030	160	0.007	5.60	0.010
			8	790	0.0125	79.00	0.050	420	0.0125	42.00	0.030	160	0.007	8.96	0.010
	4.000	100	6	595	0.0125	44.63	0.050	315	0.0125	23.63	0.030	120	0.007	5.04	0.010
			10	595	0.0125	74.38	0.050	315	0.0125	39.38	0.030	120	0.007	8.40	0.010
5.000	125	12	475	0.0125	71.25	0.050	255	0.0125	38.25	0.030	95	0.007	7.98	0.010	
RPHT16	1.500	40	3	1580	0.015	71.10	0.065	840	0.014	35.28	0.035	320	0.009	8.64	0.010
	2.000	50	3	1185	0.015	53.33	0.065	630	0.014	26.46	0.035	240	0.009	6.48	0.010
	2.500	63	5	950	0.015	71.25	0.065	505	0.014	35.35	0.035	190	0.009	8.55	0.010
	3.000	80	6	790	0.015	71.10	0.065	420	0.014	35.28	0.035	160	0.009	8.64	0.010
	4.000	100	7	595	0.015	62.48	0.065	315	0.014	30.87	0.035	120	0.009	7.56	0.010
	5.000	125	8	475	0.015	57.00	0.065	255	0.014	28.56	0.035	95	0.009	6.84	0.010
6.000	160	10	395	0.015	59.25	0.065	210	0.014	29.40	0.035	80	0.009	7.20	0.010	

*Materials hardened to 50-60HRC are very difficult to machine and not recommended.

Machining Guide (Moderate Parameters)

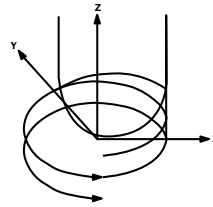
Material				Carbon/Alloy Steel (30-40 HRC)				Tool Steel (40-50 HRC)				Tool Steel (50-60 HRC)*			
Insert Size	Tool Dia. (Inch)	Tool Dia. (mm)	No. Teeth	RPM	Feed per Tooth	Feed Rate (IPM)	Axial Cut Depth (aa)	RPM	Feed per Tooth	Feed Rate (IPM)	Axial Cut Depth (aa)	RPM	Feed per Tooth	Feed Rate (IPM)	Axial Cut Depth (aa)
RPHT10	1.000	25	3	1890	0.008	45.36	0.040	1030	0.006	18.54	0.020	385	0.004	4.62	0.010
	1.250	32	4	1515	0.008	48.48	0.040	825	0.006	19.80	0.020	305	0.004	4.88	0.010
	2.000	50	5	945	0.008	37.80	0.040	515	0.006	15.45	0.020	190	0.004	3.80	0.010
	2.500	63	6	760	0.008	36.48	0.040	415	0.006	14.94	0.020	155	0.004	3.72	0.010
RPHT12	1.250	32	2	1515	0.010	30.30	0.050	825	0.010	16.50	0.030	305	0.006	3.66	0.010
	1.500	40	3	1260	0.010	37.80	0.050	690	0.010	20.70	0.030	255	0.006	4.59	0.010
	2.000	50	4	945	0.010	37.80	0.050	515	0.010	20.60	0.030	190	0.006	4.56	0.010
			5	945	0.010	47.25	0.050	515	0.010	25.75	0.030	190	0.006	5.70	0.010
	2.500	63	4	760	0.010	30.40	0.050	415	0.010	16.60	0.030	155	0.006	3.72	0.010
			6	760	0.010	45.60	0.050	415	0.010	24.90	0.030	155	0.006	5.58	0.010
	3.000	80	5	630	0.010	31.50	0.050	345	0.010	17.25	0.030	130	0.006	3.90	0.010
			8	630	0.010	50.40	0.050	345	0.010	27.60	0.030	130	0.006	6.24	0.010
	4.000	100	6	475	0.010	28.50	0.050	260	0.010	15.60	0.030	95	0.006	3.42	0.010
			10	475	0.010	47.50	0.050	260	0.010	26.00	0.030	95	0.006	5.70	0.010
5.000	125	12	380	0.010	45.60	0.050	210	0.010	25.20	0.030	80	0.006	5.76	0.010	
RPHT16	1.500	40	3	1260	0.012	45.36	0.065	690	0.012	24.84	0.035	255	0.008	6.12	0.010
	2.000	50	3	945	0.012	34.02	0.065	515	0.012	18.54	0.035	190	0.008	4.56	0.010
	2.500	63	5	760	0.012	45.60	0.065	415	0.012	24.90	0.035	155	0.008	6.20	0.010
	3.000	80	6	630	0.012	45.36	0.065	345	0.012	24.84	0.035	130	0.008	6.24	0.010
	4.000	100	7	475	0.012	39.90	0.065	260	0.012	21.84	0.035	95	0.008	5.32	0.010
	5.000	125	8	380	0.012	36.48	0.065	210	0.012	20.16	0.035	80	0.008	5.12	0.010
6.000	160	10	315	0.012	37.80	0.065	170	0.012	20.40	0.035	65	0.008	5.20	0.010	

*Materials hardened to 50-60HRC are very difficult to machine and not recommended.

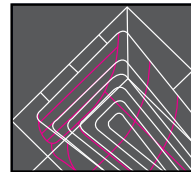
High Speed Machining Guide

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 radii 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

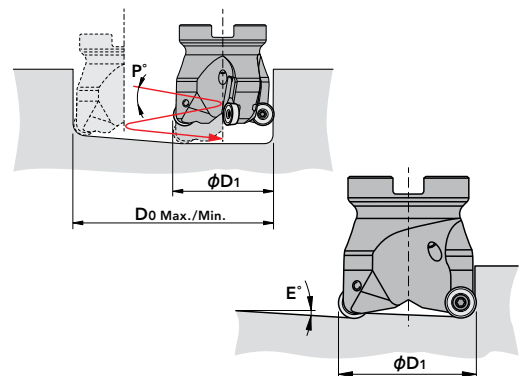
Insert Chipping - early during use means chip load too high, please reduce feed rate in increments of 20% until problem is resolved or shorten the length of the tool.

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 Diameter (Inch)	RPHT10				RPHT12				RPHT16			
	Ramping Angle	Helical Milling (Inch)		Helical Angle	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 St	Cast Irons	Non-Ferrous	Hi-Temp Alloys	Hardened Steels
			P	M	K	N	S	H
CK010	NM	Yes				⊙		
XC3030	- / GL / GM	-	⊙		⊙			
XP3035	-	-	⊙	⊙	⊙			
XP2025	GL	Yes	⊙	⊙			⊙	
XP2040	GL	-	⊙					⊙
XP2040	GL	Yes		⊙			⊙	
XC1015	GM	-			⊙			
XC5035	SM	-		⊙				⊙
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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