



## 5-Flute, High Performance Endmills, Square and Corner Radius, 38 Degree Helix



- RedLine HP Variable 5-Flute tools offer optimum metal removal rates. By controlling the vibration and chatter through a unique dampening geometry, and through the application of our advanced heat resistant coating over a fine micro-grain carbide substrate, our tools can handle faster speeds and feeds with excellent tool life in even the most difficult to machine materials like Stainless and Titanium.
- Used to Ramp, Plunge, Slot, Rough and Finish Profiles and can be found on pages 59-61.

### HP Variable Index 5-Flute Tools Speeds & Feeds

Material	Grades	Cut Type	Axial DOC	Radial DOC	Stub/Regular		Long/X-Long		Feed by Endmill Diameter (IPT)						
					SFM		SFM		1/8	1/4	1/2	3/4	1		
					AlTiN	AlCrN	AlTiN	AlCrN	(.1250)	(.2500)	(.3750)	(.5000)	(.6250)	(.7500)	(1.000)
<b>P - Steels</b>															
High Strength Tool Steel	A2, D2, P20, H11, H13, S2, O1	Slotting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		Peripheral - Rough	1.25 x D	.3 x D	350-550	420-660	200-385	240-460	.0004-.0008	.0014-.0016	.0017-.0019	.0026-.0028	.0029-.0031	.0035-.0037	.0039-.0041
		Peripheral - HEM	2 x D	.15 x D	550-625	660-750	385-440	460-520	.0008-.0016	.0018-.0032	.0024-.0038	.0032-.0056	.0038-.0062	.0048-.0074	.0058-.0082
		Finish	1.5 x D	.020 x D	550-625	660-750	385-440	460-520	.0004-.0008	.0014-.0016	.0017-.0019	.0026-.0028	.0029-.0031	.0035-.0037	.0039-.0041
High Strength Tool Steel > 32 HRC	Reduce SFM by 40%	N/A	N/A	N/A	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	Slotting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		Peripheral - Rough	1.25 x D	.5 x D	350-550	420-660	200-385	240-460	.0004-.0008	.0018-.0020	.0030-.0032	.0035-.0037	.0039-.0041	.0041-.0043	.0054-.0056
		Peripheral - HEM	2 x D	.15 x D	550-625	660-750	385-440	460-520	.0008-.0016	.0036-.0040	.0060-.0064	.0070-.0074	.0078-.0082	.0082-.0086	.0108-.0112
		Finish	1.5 x D	.020 x D	550-625	660-750	385-440	460-520	.0004-.0008	.0018-.0020	.0030-.0032	.0035-.0037	.0039-.0041	.0041-.0043	.0054-.0056
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	Slotting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		Peripheral - Rough	1.25 x D	.5 x D	350-550	420-660	200-385	240-460	.0004-.0008	.0018-.0020	.0030-.0032	.0035-.0037	.0039-.0041	.0041-.0043	.0054-.0056
		Peripheral - HEM	2 x D	.15 x D	550-625	660-750	385-440	460-520	.0008-.0016	.0036-.0040	.0060-.0064	.0070-.0074	.0078-.0082	.0082-.0086	.0108-.0112
		Finish	1.5 x D	.020 x D	550-625	660-750	385-440	460-520	.0004-.0008	.0018-.0020	.0030-.0032	.0035-.0037	.0039-.0041	.0041-.0043	.0054-.0056
<b>M - Stainless Steels</b>															
Austenitic	301-304L, 310, 316L, 321, 347	Slotting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		Peripheral - Rough	1.25 x D	.3 x D	350-550	420-660	200-385	240-460	.0004-.0008	.0014-.0016	.0017-.0019	.0026-.0028	.0029-.0031	.0035-.0037	.0039-.0041
		Peripheral - HEM	2 x D	.10 x D	550-625	660-750	385-440	460-520	.0008-.0016	.0018-.0032	.0024-.0038	.0032-.0056	.0038-.0062	.0048-.0074	.0058-.0082
		Finish	1.5 x D	.020 x D	550-625	660-750	385-440	460-520	.0004-.0008	.0014-.0016	.0017-.0019	.0026-.0028	.0029-.0031	.0035-.0037	.0039-.0041
Austenitic > 32 HRC	Reduce SFM by 20%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Martensitic	403, 410, 416, 420, 430, 431, 440	Slotting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		Peripheral - Rough	1.25 x D	.3 x D	350-550	420-660	200-385	240-460	.0004-.0008	.0014-.0016	.0017-.0019	.0026-.0028	.0029-.0031	.0035-.0037	.0039-.0041
		Peripheral - HEM	2 x D	.15 x D	550-625	660-750	385-440	460-520	.0008-.0016	.0018-.0032	.0024-.0038	.0032-.0056	.0038-.0062	.0048-.0074	.0058-.0082
		Finish	1.5 x D	.020 x D	550-625	660-750	385-440	460-520	.0004-.0008	.0014-.0016	.0017-.0019	.0026-.0028	.0029-.0031	.0035-.0037	.0039-.0041
Precipitation Hardening	12/8, 15/5, 17/4, AM-350/355/363, PH13-8M0, PH14-8/M0	Slotting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		Peripheral - Rough	1.25 x D	.3 x D	350-550	420-660	200-385	240-460	.0004-.0008	.0014-.0016	.0017-.0019	.0026-.0028	.0029-.0031	.0035-.0037	.0039-.0041
		Peripheral - HEM	1.5 x D	.10 x D	550-625	660-750	385-440	460-520	.0008-.0016	.0018-.0032	.0024-.0038	.0032-.0056	.0038-.0062	.0048-.0074	.0058-.0082
		Finish	1.5 x D	.020 x D	550-625	660-750	385-440	460-520	.0004-.0008	.0014-.0016	.0017-.0019	.0026-.0028	.0029-.0031	.0035-.0037	.0039-.0041
Precipitation Hardening > 32 HRC	Reduce SFM by 20%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
<b>K - Cast Irons</b>															
Ductile	A536, J434, 60-40-18	Slotting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		Peripheral - Rough	1.25 x D	.5 x D	600-800	720-960	425-600	510-720	.0004-.0008	.0018-.0020	.0030-.0032	.0035-.0037	.0039-.0041	.0041-.0043	.0054-.0056
		Peripheral - HEM	2 x D	.15 x D	800-850	960-1000	560-600	670-720	.0008-.0016	.0036-.0040	.0060-.0064	.0070-.0074	.0078-.0082	.0082-.0086	.0108-.0112
		Finish	1.5 x D	.020 x D	800-850	960-1000	560-600	670-720	.0004-.0008	.0018-.0020	.0030-.0032	.0035-.0037	.0039-.0041	.0041-.0043	.0054-.0056
Gray	A48, A436, A319, Class 20, G4000	Slotting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		Peripheral - Rough	1.25 x D	.5 x D	600-800	720-960	425-600	510-720	.0004-.0008	.0018-.0020	.0030-.0032	.0035-.0037	.0039-.0041	.0041-.0043	.0054-.0056
		Peripheral - HEM	2 x D	.15 x D	800-850	960-1000	560-600	670-720	.0008-.0016	.0036-.0040	.0060-.0064	.0070-.0074	.0078-.0082	.0082-.0086	.0108-.0112
		Finish	1.5 x D	.020 x D	800-850	960-1000	560-600	670-720	.0004-.0008	.0018-.0020	.0030-.0032	.0035-.0037	.0039-.0041	.0041-.0043	.0054-.0056
Malleable	A220, A602, J158	Slotting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		Peripheral - Rough	1.25 x D	.3 x D	400-800	480-960	325-600	390-720	.0004-.0008	.0018-.0020	.0030-.0032	.0035-.0037	.0039-.0041	.0041-.0043	.0054-.0056
		Peripheral - HEM	2 x D	.15 x D	800-850	960-1000	560-600	670-720	.0008-.0016	.0036-.0040	.0060-.0064	.0070-.0074	.0078-.0082	.0082-.0086	.0108-.0112
		Finish	1.5 x D	.020 x D	800-850	960-1000	560-600	670-720	.0004-.0008	.0018-.0020	.0030-.0032	.0035-.0037	.0039-.0041	.0041-.0043	.0054-.0056
<b>N - Non-Ferrous</b>															
Brass/Bronze	Aluminum Bronze, Low Silicon Bronze	Slotting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Composites	G-10, Fiberglass, Graphite, Graphite Epoxy, Plastics	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Copper		Slotting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		Peripheral - Rough	1.25 x D	.5 x D	600-800	720-960	425-600	510-720	.0004-.0008	.0018-.0020	.0030-.0032	.0035-.0037	.0039-.0041	.0041-.0043	.0054-.0056
		Peripheral - HEM	2 x D	.15 x D	800-850	960-1000	560-600	670-720	.0008-.0016	.0036-.0040	.0060-.0064	.0070-.0074	.0078-.0082	.0082-.0086	.0108-.0112
		Finish	1.5 x D	.020 x D	800-850	960-1000	560-600	670-720	.0004-.0008	.0018-.0020	.0030-.0032	.0035-.0037	.0039-.0041	.0041-.0043	.0054-.0056
Magnesium		Slotting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
<b>S - High Temp Alloys</b>															
Cobalt Base	Stellite, HS-21, Haynes 25/188, X40, L605	Slotting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		Peripheral - Rough	1.25 x D	.25 x D	100-175	120-210	80-125	100-150	.0004-.0008	.0009-.0016	.0012-.0019	.0016-.0028	.0019-.0031	.0024-.0037	.0029-.0041
		Peripheral - HEM	1.5 x D	.10 x D	200-225	240-270	140-160	170-200	.0008-.0016	.0018-.0032	.0024-.0038	.0032-.0056	.0038-.0062	.0048-.0074	.0058-.0082
		Finish	1.5 x D	.020 x D	200-225	240-270	140-160	170-200	.0004-.0008	.0009-.0016	.0012-.0019	.0016-.0028	.0019-.0031	.0024-.0037	.0029-.0041
Cobalt Base > 32 HRC	Reduce SFM by 40%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Iron Base	Incoloy 800-802, Multmet N-155, Timkin 16-25-6, Carpenter 22-b3	Slotting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		Peripheral - Rough	1.25 x D	.25 x D	100-175	120-210	80-125	100-150	.0004-.0008	.0009-.0016	.0012-.0019	.0016-.0028	.0019-.0031	.0024-.0037	.0029-.0041
		Peripheral - HEM	1.5 x D	.10 x D	200-225	240-270	140-160	170-200	.0008-.0016	.0018-.0032	.0024-.0038	.0032-.0056	.0038-.0062	.0048-.0074	.0058-.0082
		Finish	1.5 x D	.020 x D	200-225	240-270	140-160	170-200	.0004-.0008	.0009-.0016	.0012-.0019	.0016-.0028	.0019-.0031	.0024-.0037	.0029-.0041
Iron Base > 32 HRC	Reduce SFM by 40%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Nickel Base	Inconel 625/718, Inco 700, 713C, 718, Monel 400-401, 404, K401, Rene, Rene 41 & 95 Hastelloy, Waspoly, Udimet 500 & 700	Slotting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		Peripheral - Rough	1.25 x D	.25 x D	100-175	120-210	80-125	100-150	.0004-.0008	.0009-.0016	.0012-.0019	.0016-.0028	.0019-.0031	.0024-.0037	.0029-.0041
		Peripheral - HEM	1.5 x D	.10 x D	200-225	240-270	140-160	170-200	.0008-.0016	.0018-.0032	.0024-.0038	.0032-.0056	.0038-.0062	.0048-.0074	.0058-.0082
		Finish	1.5 x D	.020 x D	200-225	240-270	140-160	170-200	.0004-.0008	.0009-.0016	.0012-.0019	.0016-.0028	.0019-.0031	.0024-.0037	.0029-.0041
Nickel Base > 32 HRC	Reduce SFM by 40%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Titanium	Commercially Pure, 6Al-4V ASTM 1/2/3, 6Al-25N-4Zr-2Mo-Si Ti-8Al-1Mo, Ti-8Al-4Mo	Slotting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		Peripheral - Rough	1.25 x D	.3 x D	350-550	420-660	200-385	240-460	.0004-.0008	.0014-.0016	.0017-.0019	.0026-.0028	.0029-.0031	.0035-.0037	.0039-.0041
		Peripheral - HEM	1.5 x D	.10 x D	550-570	660-690	385-400	460-480	.0008-.0016	.0018-.0032	.0024-.0038	.0032-.0056	.0038-.0062	.0048-.0074	.0058-.0082
		Finish	1.5 x D	.020 x D	550-570	660-690	385-400	460-480	.0004-.0008	.000					