Helical

HXVR-4

SPEEDS & FEEDS

4 Flute - Knuckle Rougher - Variable Pitch

HXVR / HXVR-RN (4 Flute)

Material Guide		Hardness	SFM	Inches per Tooth (IPT)													
				1/8		3/16		1/4		3/8		1/2		3/4		1	
				Slot	Rgh	Slot	Rgh	Slot	Rgh	Slot	Rgh	Slot	Rgh	Slot	Rgh	Slot	Rgh
CARBON STEEL	10XX, 11XX, 12XX, 12LXX, ASTM A27, ASTM A36	< 75 HRB	455	.0007	.0010	.0010	.0015	.0015	.0023	.0022	.0034	.0028	.0044	.0040	.0063	.0051	.0081
		75 - 98 HRB	445	.0005	.0009	.0008	.0013	.0012	.0019	.0018	.0028	.0024	.0037	.0034	.0053	.0043	.0067
		21 - 36 HRC	400	.0004	.0006	.0005	.0008	.0008	.0012	.0012	.0018	.0015	.0024	.0022	.0034	.0028	.0043
LOW ALLOY STEEL	13XX, 41XX, 43XX, 51XX, 86XX, 93XX	75 - 98 HRB	390	.0005	.0007	.0007	.0011	.0011	.0016	.0016	.0024	.0020	.0032	.0029	.0045	.0037	.0058
		21 - 36 HRC	340	.0004	.0006	.0005	.0008	.0008	.0012	.0012	.0018	.0015	.0024	.0022	.0034	.0028	.0043
		36 - 50 HRC	260	.0003	.0005	.0005	.0007	.0007	.0011	.0010	.0016	.0013	.0021	.0019	.0030	.0024	.0038
		> 50 HRC	155	.0003	.0004	.0004	.0006	.0005	.0008	.0008	.0013	.0010	.0016	.0015	.0023	.0019	.0030
TOOL STEEL	A2, H13, L6, P20, S7	75 - 98 HRB	340	.0005	.0007	.0007	.0011	.0011	.0016	.0016	.0024	.0020	.0032	.0029	.0045	.0037	.0058
		21 - 36 HRC	250	.0004	.0006	.0006	.0009	.0008	.0013	.0012	.0019	.0016	.0025	.0023	.0036	.0029	.0046
		36 - 50 HRC	145	.0003	.0005	.0004	.0007	.0007	.0010	.0010	.0015	.0013	.0020	.0018	.0028	.0023	.0036
		> 50 HRC	85	.0002	.0004	.0004	.0006	.0005	.0008	.0008	.0012	.0010	.0016	.0015	.0023	.0019	.0029
SPECIALTY STEEL	300M, Invar 36, Kovar, Maraging 200, Maraging 250, Maraging 300, Maraging 350	< 75 HRB	290	.0003	.0005	.0005	.0008	.0008	.0012	.0011	.0018	.0015	.0023	.0021	.0034	.0027	.0043
		75 - 98 HRB	255	.0005	.0008	.0008	.0012	.0011	.0018	.0017	.0026	.0022	.0035	.0032	.0050	.0040	.0063
		21 - 36 HRC	175	.0003	.0004	.0004	.0006	.0006	.0009	.0009	.0014	.0011	.0018	.0016	.0025	.0021	.0032
		36 - 50 HRC	150	.0003	.0005	.0005	.0008	.0008	.0012	.0011	.0018	.0015	.0023	.0021	.0033	.0027	.0042
		> 50 HRC	55	.0002	.0003	.0003	.0005	.0005	.0007	.0007	.0011	.0009	.0014	.0013	.0020	.0016	.0026
AUSTENITIC STAINLESS STEEL	Nitronic 50, Nitronic 60, 301, 303, 304, 304L, Incoloy 27-7MO, 316, 316L, 321, 347	75 - 98 HRB	265	.0005	.0008	.0008	.0012	.0012	.0019	.0018	.0027	.0023	.0036	.0033	.0051	.0042	.0065
		21 - 36 HRC	225	.0004	.0006	.0006	.0009	.0009	.0014	.0013	.0020	.0017	.0026	.0024	.0038	.0031	.0048
		36 - 50 HRC	180	.0003	.0005	.0005	.0007	.0007	.0010	.0010	.0016	.0013	.0020	.0019	.0029	.0024	.0037
MARTENSITIC & FERRITIC STAINLESS STEEL	403, 410, 416, 420, 440, 430, 446	75 - 98 HRB	300	.0005	.0007	.0007	.0011	.0011	.0016	.0016	.0024	.0020	.0032	.0029	.0046	.0037	.0058
		21 - 36 HRC	280	.0004	.0006	.0006	.0009	.0009	.0014	.0014	.0021	.0018	.0028	.0025	.0040	.0032	.0051
PH STAINLESS STEEL	15-5, 17-4, Carpenter 450, Carpenter 465	21 - 36 HRC	200	.0003	.0005	.0005	.0008	.0008	.0012	.0011	.0018	.0015	.0023	.0021	.0034	.0027	.0043
		36 - 50 HRC	145	.0003	.0005	.0004	.0007	.0006	.0010	.0010	.0015	.0012	.0019	.0018	.0028	.0023	.0036
GRAY CAST IRON	SAE J431, ASTM A48	75 - 98 HRB	410	.0008	.0012	.0011	.0018	.0017	.0026	.0025	.0039	.0033	.0052	.0047	.0074	.0060	.0094
		21 - 36 HRC	370	.0004	.0007	.0006	.0010	.0009	.0014	.0014	.0021	.0018	.0028	.0026	.0040	.0033	.0051
MALLEABLE CAST IRON	ASTM A47, ASTM A220, ASTM A602	75 - 98 HRB	345	.0005	.0008	.0007	.0011	.0011	.0017	.0016	.0025	.0021	.0033	.0030	.0047	.0038	.0060
		21 - 36 HRC	335	.0004	.0007	.0006	.0010	.0009	.0015	.0014	.0022	.0018	.0028	.0026	.0040	.0033	.0051
NODULAR (DUCTILE) CAST IRON	ASTM A536, ASTM 897	75 - 98 HRB	310	.0005	.0008	.0008	.0012	.0011	.0017	.0017	.0026	.0022	.0034	.0031	.0049	.0040	.0062
		21 - 36 HRC	260	.0003	.0005	.0005	.0008	.0007	.0012	.0011	.0017	.0014	.0023	.0021	.0032	.0026	.0041
		36 - 50 HRC	135	.0002	.0003	.0003	.0005	.0005	.0007	.0007	.0011	.0009	.0014	.0013	.0020	.0017	.0026
PURE NICKEL	Nickel 200, Nickel 201	< 75 HRB	285	.0007	.0010	.0010	.0015	.0014	.0022	.0021	.0033	.0028	.0044	.0040	.0063	.0051	.0080
		75 - 98 HRB	250	.0005	.0009	.0008	.0013	.0012	.0019	.0018	.0028	.0023	.0037	.0033	.0052	.0043	.0067
NICKEL ALLOY	Hastelloy C-22, Inconel 625, Waspaloy, René 41, Inconel 718, Incoloy 20	75 - 98 HRB	80	.0004	.0006	.0005	.0008	.0008	.0013	.0012	.0019	.0016	.0025	.0022	.0035	.0028	.0045
		21 - 36 HRC	75	.0004	.0006	.0006	.0009	.0008	.0013	.0012	.0019	.0016	.0025	.0023	.0036	.0029	.0046
		36 - 50 HRC	70	.0003	.0005	.0004	.0007	.0007	.0010	.0010	.0015	.0013	.0020	.0018	.0029	.0023	.0036
PURE TITANIUM	Ti Grade 1, Ti Grade 2, Ti Grade 3, Ti Grade 4, Ti Grade 7, Ti Grade 12	< 75 HRB	300	.0009	.0014	.0013	.0021	.0020	.0031	.0029	.0046	.0039	.0060	.0055	.0086	.0070	.0110
		75 - 98 HRB	275	.0008	.0012	.0011	.0017	.0017	.0026	.0025	.0039	.0032	.0051	.0046	.0072	.0059	.0092
		21 - 36 HRC	250	.0006	.0009	.0008	.0013	.0012	.0020	.0019	.0029	.0024	.0038	.0035	.0054	.0044	.0069
TITANIUM ALLOY	Ti 3Al-2.5V, Ti 6Al-4V, Ti 10V-2Fe-3Al	21 - 36 HRC	180	.0004	.0007	.0007	.0010	.0010	.0015	.0015	.0023	.0019	.0030	.0027	.0043	.0035	.0054
		36 - 50 HRC	160	.0004	.0006	.0006	.0009	.0009	.0014	.0013	.0021	.0017	.0027	.0025	.0039	.0032	.0050
COBALT ALLOY	ASTM F562, ASTM F90, ASTM F75, ASTM F799	75 - 98 HRB	210	.0004	.0006	.0006	.0009	.0008	.0013	.0012	.0019	.0016	.0025	.0023	.0036	.0030	.0046
		21 - 36 HRC	170	.0004	.0006	.0005	.0008	.0008	.0013	.0012	.0019	.0016	.0025	.0022	.0035	.0028	.0045
		36 - 50 HRC	65	.0003	.0004	.0004	.0006	.0005	.0009	.0008	.0013	.0011	.0017	.0015	.0024	.0019	.0030

Milling Process	Hardness	ADOC	RDOC
Slot (Full Slotting)	< 35 HRC	75%-125% Diameter	100% Diameter
	≥ 35 HRC	60%-75% Diameter	100% Diameter
Rgh (Traditional Roughing)	< 35 HRC	Up to Max LOC	20%-40% Diameter
	≥ 35 HRC	Up to Max LOC	20%-40% Diameter

NOTES:

Hardness Scales: HRB = Rockwell B
HRC = Rockwell C

IPT values shown are for 2.5xD length of cut tools, and should be adjusted for longer or shorter lengths of cut. Values shown are for non-reached tools. For tools with reaches greater than 3xD, IPT should be reduced. For more accurate running parameters, please refer to Machining Advisor Pro.