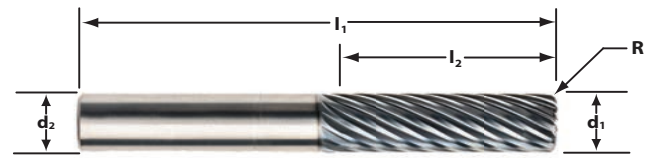


IPT13 POW•R•PATH



For high-efficiency machining (HEM) in materials ranging from low carbon steels to hi-temp alloys. The IPT13 offers the most cutting edges available in the POW•R•PATH line. The 13 flutes yield incredible metal removal rates and tool life. Engineered specifically for HEM tool paths, the IPT13 has a very thick core for extra stability when machining materials up to 3.5 x the tool diameter deep.



in: d1: +0.000 / -0.002 d2: -0.0001 / -0.0004
mm: d1: +0.000 / -0.050 d2: -0.0025 / -0.0100

Note that the IPT13 is not designed for light-duty machines and should only be run in machines with adequate spindle torque and horsepower.



Cutter Dia d1	Shank Dia d2	Max Axial Depth xD	Length of Cut L2	Overall Length L1	Order Code by Corner Radius		
					.030 CR	.060 CR	.125 CR
1/2	1/2	2	1	3	0340701	0340702	-
		2.5	1-1/4	3-1/4	0340703	0340704	-
		3	1-1/2	3-1/2	0340705	0340706	-
		3.5	1-3/4	4	0340707	0340708	-
5/8	5/8	2	1-1/4	3-1/2	0340709	0340710	-
		2.5	1-9/16	4	0340711	0340712	-
		3	1-7/8	4	0340713	0340714	-
		3.5	2-3/16	4-1/2	0340715	0340716	-
3/4	3/4	2	1-1/2	4	0340717	0340718	0340719
		2.5	1-7/8	4-1/2	0340720	0340721	0340722
		3	2-1/4	5	0340723	0340724	0340725
		3.5	2-5/8	5	0340726	0340727	0340728
1	1	2	2	5	0340729	0340730	0340731
		2.5	2-1/2	5-1/2	0340732	0340733	0340734
		3	3	6	0340735	0340736	0340737
		3.5	3-1/2	6-1/2	0340738	0340739	0340740
1-1/4	1-1/4	2	2-1/2	5-1/2	0340741	0340742	0340743
		2.5	3-1/8	6-1/2	0340744	0340745	0340746

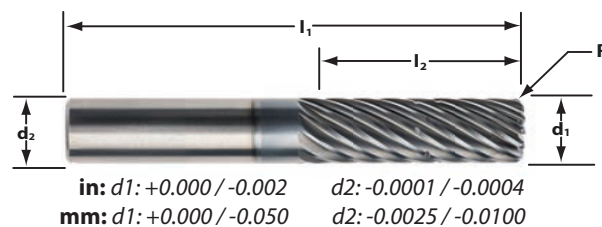
Cutter Dia d1	Shank Dia d2	Max Axial Depth xD	Length of Cut L2	Overall Length L1	Order Code by Corner Radius		
					1.0 CR	1.5 CR	3.0 CR
12	12	2	24	75	0340904	0340905	-
		2.5	30	83	0340906	0340907	-
		3	36	88	0340908	0340909	-
		3.5	42	93	0340910	0340911	-
16	16	2	32	92	0340912	0340913	-
		2.5	40	100	0340914	0340915	-
		3	48	110	0340916	0340917	-
		3.5	56	110	0340918	0340919	-
20	20	2	40	104	0340920	0340921	0340922
		2.5	50	115	0340923	0340924	0340925
		3	60	125	0340926	0340927	0340928
		3.5	70	135	0340929	0340930	0340931

D = Tool Diameter

IPC13 POW•R•PATH



For high-efficiency machining (HEM) in materials ranging from low carbon steels to hi-temp alloys. Adds the benefits of the unique **Chip Management System (CMS)** to the versatility of the IPT13 design. Breaks up long, stringy chips, which eliminates recutting chips and chip packing, and allows for deep, free cutting tool movement in a variety of materials. The results are great chip control and very high metal removal rates.



Note that the IPT13 is not designed for light-duty machines and should only be run in machines with adequate spindle torque and horsepower.

Cutter Dia d1	Shank Dia d2	Max Axial Depth xD	Length of Cut L2	Overall Length L1	Order Code by Corner Radius		
					.030 CR	.060 CR	.125 CR
1/2	1/2	3	1-1/2	3-1/2	0340747	0340748	-
		3.5	1-3/4	4	0340749	0340750	-
5/8	5/8	2.5	1-9/16	4	0340751	0340752	-
		3	1-7/8	4	0340753	0340754	-
		3.5	2-3/16	4-1/2	0340755	0340756	-
3/4	3/4	2	1-1/2	4	0340757	0340758	0340759
		2.5	1-7/8	4-1/2	0340760	0340761	0340762
		3	2-1/4	5	0340763	0340764	0340765
		3.5	2-5/8	5	0340766	0340767	0340768
1	1	2	2	5	0340769	0340770	0340771
		2.5	2-1/2	5-1/2	0340772	0340773	0340774
		3	3	6	0340775	0340776	0340777
		3.5	3-1/2	6-1/2	0340778	0340779	0340780
1-1/4	1-1/4	2	2-1/2	5-1/2	0340781	0340782	0340783
		2.5	3-1/8	6-1/2	0340784	0340785	0340786

Cutter Dia d1	Shank Dia d2	Max Axial Depth xD	Length of Cut L2	Overall Length L1	Order Code by Corner Radius		
					1.0 CR	1.5 CR	3.0 CR
12	12	3	36	88	0340932	0340933	-
		3.5	42	93	0340934	0340935	-
16	16	2.5	40	100	0340936	0340937	-
		3	48	110	0340938	0340939	-
		3.5	56	110	0340940	0340941	-
20	20	2	40	104	0340942	0340943	0340944
		2.5	50	115	0340945	0340946	0340947
		3	60	125	0340948	0340949	0340950
		3.5	70	135	0340951	0340952	0340953

D = Tool Diameter

IPT13/IPC13 Application Guide – Speed & Feed (inch)

ISO Code	Work Material	Type of Cut	Axial DOC	Radial DOC	No. of Flutes	Speed (SFM)	Feed (Inches per Tooth)				
							1/2	5/8	3/4	1	1-1/4
	Gray ASTM-A48 Class 20, 25, 30, 35 & 40	Peripheral - HEM	≤ 2 x D	.07 x D	13	370	.0045	.0056	.0068	.0090	.0113
		Peripheral - HEM	> 2 - 3 x D	.07 x D	13	370	.0040	.0050	.0060	.0080	.0100
		Peripheral - HEM	> 3 - 3.5 x D	.07 x D	13	360	.0034	.0043	.0051	.0068	.0085
		Peripheral - HEM	> 3.5 - 4 x D	.06 x D	13	360	.0030	.0038	.0045	.0060	.0075
		Finish	3 x D	.01 x D	13	365	.0020	.0025	.0030	.0040	.0050
	Cast Iron Malleable	Peripheral - HEM	≤ 2 x D	.07 x D	13	380	.0048	.0060	.0072	.0096	.0120
		Peripheral - HEM	> 2 - 3 x D	.07 x D	13	380	.0042	.0053	.0063	.0084	.0105
		Peripheral - HEM	> 3 - 3.5 x D	.07 x D	13	365	.0039	.0049	.0059	.0078	.0098
		Peripheral - HEM	> 3.5 - 4 x D	.07 x D	13	365	.0036	.0045	.0054	.0072	.0090
		Finish	3 x D	.01 x D	13	340	.0017	.0021	.0026	.0034	.0043
	Low Carbon Steels ≤ 38 Rc 1018, 1020, 12L14, 5120, 8620	Peripheral - HEM	≤ 2 x D	.07 x D	13	450	.0044	.0055	.0066	.0088	.0110
		Peripheral - HEM	> 2 - 3 x D	.07 x D	13	430	.0039	.0049	.0059	.0078	.0098
		Peripheral - HEM	> 3 - 3.5 x D	.07 x D	13	420	.0036	.0045	.0054	.0072	.0090
		Peripheral - HEM	> 3.5 - 4 x D	.07 x D	13	410	.0034	.0043	.0051	.0068	.0085
		Finish	3 x D	.01 x D	13	395	.0017	.0021	.0026	.0034	.0043
	Medium Carbon Steels ≤ 48 HRC 1045, 4140, 4340, 5140	Peripheral - HEM	≤ 2 x D	.06 x D	13	405	.0044	.0055	.0066	.0088	.0110
		Peripheral - HEM	> 2 - 3 x D	.06 x D	13	405	.0041	.0051	.0062	.0082	.0103
		Peripheral - HEM	> 3 - 3.5 x D	.05 x D	13	405	.0039	.0049	.0059	.0078	.0098
		Peripheral - HEM	> 3.5 - 4 x D	.05 x D	13	405	.0036	.0045	.0054	.0072	.0090
		Finish	3 x D	.01 x D	13	370	.0017	.0021	.0026	.0034	.0043
	Tool and Die Steels ≤ 48 Rc A2, D2, O1, S7, P20, H13	Peripheral - HEM	≤ 2 x D	.06 x D	13	420	.0045	.0056	.0068	.0090	.0113
		Peripheral - HEM	> 2 - 3 x D	.06 x D	13	420	.0040	.0050	.0060	.0080	.0100
		Peripheral - HEM	> 3 - 3.5 x D	.05 x D	13	415	.0037	.0046	.0056	.0074	.0093
		Peripheral - HEM	> 3.5 - 4 x D	.05 x D	13	415	.0035	.0044	.0053	.0070	.0088
		Finish	3 x D	.01 x D	13	385	.0015	.0019	.0023	.0030	.0038
	Martensitic & Ferritic Stainless Steels 410, 416, 440	Peripheral - HEM	≤ 2 x D	.06 x D	13	460	.0050	.0063	.0075	.0100	.0125
		Peripheral - HEM	> 2 - 3 x D	.06 x D	13	460	.0048	.0060	.0072	.0096	.0120
		Peripheral - HEM	> 3 - 3.5 x D	.06 x D	13	450	.0040	.0050	.0060	.0080	.0100
		Peripheral - HEM	> 3.5 - 4 x D	.06 x D	13	445	.0035	.0044	.0053	.0070	.0088
		Finish	3 x D	.01 x D	13	390	.0018	.0023	.0027	.0036	.0045
	Austenitic Stainless Steels, FeNi Alloys 303, 304, 316, Invar, Kovar	Peripheral - HEM	≤ 2 x D	.06 x D	13	450	.0041	.0051	.0062	.0082	.0103
		Peripheral - HEM	> 2 - 3 x D	.06 x D	13	450	.0040	.0050	.0060	.0080	.0100
		Peripheral - HEM	> 3 - 3.5 x D	.05 x D	13	450	.0037	.0046	.0056	.0074	.0093
		Peripheral - HEM	> 3.5 - 4 x D	.05 x D	13	445	.0035	.0044	.0053	.0070	.0088
		Finish	3 x D	.01 x D	13	415	.0015	.0019	.0023	.0030	.0038
	Precipitation Hardening Stainless Steels 17-4, 15-5	Peripheral - HEM	> 2 - 3 x D	.06 x D	13	440	.0041	.0051	.0062	.0082	.0103
		Peripheral - HEM	> 3 - 3.5 x D	.05 x D	13	435	.0038	.0048	.0057	.0076	.0095
		Peripheral - HEM	> 3.5 - 4 x D	.05 x D	13	435	.0034	.0043	.0051	.0068	.0085
		Finish	3 x D	.01 x D	13	400	.0017	.0021	.0026	.0034	.0043
	Titanium Alloys 6Al-4V, 6-2-4	Peripheral - HEM	≤ 2 x D	.08 x D	13	395	.0050	.0063	.0075	.0100	.0125
		Peripheral - HEM	> 2 - 3 x D	.07 x D	13	390	.0045	.0056	.0068	.0090	.0113
		Peripheral - HEM	> 3 - 3.5 x D	.06 x D	13	380	.0041	.0051	.0062	.0082	.0103
		Peripheral - HEM	> 3.5 - 4 x D	.06 x D	13	380	.0034	.0043	.0051	.0068	.0085
		Finish	3 x D	.015 x D	13	355	.0022	.0028	.0033	.0044	.0055
	Difficult-to-Machine Titanium Alloys 10-2-3	Peripheral - HEM	≤ 2 x D	.06 x D	13	350	.0050	.0063	.0075	.0100	.0125
		Peripheral - HEM	> 2 - 3 x D	.06 x D	13	330	.0036	.0045	.0054	.0072	.0090
		Peripheral - HEM	> 3 - 3.5 x D	.055 x D	13	315	.0035	.0044	.0053	.0070	.0088
		Peripheral - HEM	> 3.5 - 4 x D	.05 x D	13	310	.0032	.0040	.0048	.0064	.0080
		Finish	3 x D	.01 x D	13	300	.0017	.0021	.0026	.0034	.0043
	Precipitation Hardening Stainless Steels  13-8	Peripheral - HEM	≤ 2 x D	.07 x D	13	105	.0071	.0089	.0107	.0142	.0178
		Peripheral - HEM	> 2 - 3 x D	.065 x D	13	100	.0064	.0080	.0096	.0128	.0160
		Peripheral - HEM	> 3 - 3.5 x D	.055 x D	13	90	.0062	.0078	.0093	.0124	.0155
		Peripheral - HEM	> 3.5 - 4 x D	.05 x D	13	90	.0057	.0071	.0086	.0114	.0143
		Finish	3 x D	.01 x D	13	90	.0044	.0055	.0066	.0088	.0110
	Hastalloy, Waspalloy	Peripheral - HEM	≤ 2 x D	.07 x D	13	105	.0071	.0089	.0107	.0142	.0178
		Peripheral - HEM	> 2 - 3 x D	.065 x D	13	100	.0064	.0080	.0096	.0128	.0160
		Peripheral - HEM	> 3 - 3.5 x D	.055 x D	13	90	.0062	.0078	.0093	.0124	.0155
		Peripheral - HEM	> 3.5 - 4 x D	.05 x D	13	90	.0057	.0071	.0086	.0114	.0143
		Finish	3 x D	.01 x D	13	90	.0044	.0055	.0066	.0088	.0110
	Inconel 718, Rene 88	Peripheral - HEM	≤ 2 x D	.06 x D	13	100	.0052	.0065	.0078	.0104	.0130
		Peripheral - HEM	> 2 - 3 x D	.05 x D	13	95	.0052	.0065	.0078	.0104	.0130
		Peripheral - HEM	> 3 - 3.5 x D	.05 x D	13	95	.0048	.0060	.0072	.0096	.0120
		Peripheral - HEM	> 3.5 - 4 x D	.04 x D	13	95	.0048	.0060	.0072	.0096	.0120
		Finish	3 x D	.01 x D	13	90	.0023	.0029	.0035	.0046	.0058

D = Tool Diameter HEM = High-efficiency machining (chip thinning calculations have already been applied to HEM parameters)

≈ Approximately Equals < Less Than
 ≤ Less Than or Equal To > Greater Than
 ≥ Greater Than or Equal To = Equals
 x Multiply

IPT13/IPC13 Application Guide – Speed & Feed (metric)

ISO Code	Work Material	Type of Cut	Axial DOC	Radial DOC	No. of Flutes	Speed (M/min)	Feed (MM per Tooth)		
							12.0	16.0	20.0
	Gray ASTM-A48 Class 20, 25, 30, 35 & 40	Peripheral - HEM	≤ 2 x D	.07 x D	13	113	.1080	.1436	.1793
		Peripheral - HEM	> 2 - 3 x D	.07 x D	13	113	.0960	.1277	.1593
		Peripheral - HEM	> 3 - 3.5 x D	.07 x D	13	110	.0816	.1085	.1354
		Peripheral - HEM	> 3.5 - 4 x D	.06 x D	13	110	.0720	.0958	.1195
		Finish	3 x D	.01 x D	13	111	.0480	.0638	.0797
	Cast Iron Malleable	Peripheral - HEM	≤ 2 x D	.07 x D	13	116	.1152	.1532	.1912
		Peripheral - HEM	> 2 - 3 x D	.07 x D	13	116	.1008	.1341	.1673
		Peripheral - HEM	> 3 - 3.5 x D	.07 x D	13	111	.0936	.1245	.1554
		Peripheral - HEM	> 3.5 - 4 x D	.07 x D	13	111	.0864	.1149	.1434
		Finish	3 x D	.01 x D	13	104	.0408	.0543	.0677
	Low Carbon Steels ≤ 38 Rc 1018, 1020, 12L14, 5120, 8620	Peripheral - HEM	≤ 2 x D	.07 x D	13	137	.1056	.1404	.1753
		Peripheral - HEM	> 2 - 3 x D	.07 x D	13	131	.0936	.1245	.1554
		Peripheral - HEM	> 3 - 3.5 x D	.07 x D	13	128	.0864	.1149	.1434
		Peripheral - HEM	> 3.5 - 4 x D	.07 x D	13	125	.0816	.1085	.1354
		Finish	3 x D	.01 x D	13	120	.0408	.0543	.0677
	Medium Carbon Steels ≤ 48 HRC 1045, 4140, 4340, 5140	Peripheral - HEM	≤ 2 x D	.06 x D	13	123	.1056	.1404	.1753
		Peripheral - HEM	> 2 - 3 x D	.06 x D	13	123	.0984	.1309	.1633
		Peripheral - HEM	> 3 - 3.5 x D	.05 x D	13	123	.0936	.1245	.1554
		Peripheral - HEM	> 3.5 - 4 x D	.05 x D	13	123	.0864	.1149	.1434
		Finish	3 x D	.01 x D	13	113	.0408	.0543	.0677
	Tool and Die Steels ≤ 48 Rc A2, D2, O1, S7, P20, H13	Peripheral - HEM	≤ 2 x D	.06 x D	13	128	.1080	.1436	.1793
		Peripheral - HEM	> 2 - 3 x D	.06 x D	13	128	.0960	.1277	.1593
		Peripheral - HEM	> 3 - 3.5 x D	.05 x D	13	126	.0888	.1181	.1474
		Peripheral - HEM	> 3.5 - 4 x D	.05 x D	13	126	.0840	.1117	.1394
		Finish	3 x D	.01 x D	13	117	.0360	.0479	.0598
	Martensitic & Ferritic Stainless Steels 410, 416, 440	Peripheral - HEM	≤ 2 x D	.06 x D	13	140	.0984	.1309	.1633
		Peripheral - HEM	> 2 - 3 x D	.06 x D	13	140	.0960	.1277	.1593
		Peripheral - HEM	> 3 - 3.5 x D	.06 x D	13	137	.0888	.1181	.1474
		Peripheral - HEM	> 3.5 - 4 x D	.06 x D	13	136	.0840	.1117	.1394
		Finish	3 x D	.01 x D	13	119	.0360	.0479	.0598
	Austenitic Stainless Steels, FeNi Alloys 303, 304, 316, Invar, Kovar	Peripheral - HEM	≤ 2 x D	.06 x D	13	137	.1200	.1596	.1992
		Peripheral - HEM	> 2 - 3 x D	.06 x D	13	137	.1152	.1532	.1912
		Peripheral - HEM	> 3 - 3.5 x D	.05 x D	13	137	.0960	.1277	.1593
		Peripheral - HEM	> 3.5 - 4 x D	.05 x D	13	136	.0840	.1117	.1394
		Finish	3 x D	.01 x D	13	126	.0432	.0575	.0717
	Precipitation Hardening Stainless Steels 17-4, 15-5	Peripheral - HEM	≤ 2 x D	.06 x D	13	134	.1080	.1436	.1793
		Peripheral - HEM	> 2 - 3 x D	.06 x D	13	134	.0984	.1309	.1633
		Peripheral - HEM	> 3 - 3.5 x D	.05 x D	13	133	.0912	.1213	.1514
		Peripheral - HEM	> 3.5 - 4 x D	.05 x D	13	133	.0816	.1085	.1354
		Finish	3 x D	.01 x D	13	122	.0408	.0543	.0677
	Titanium Alloys 6Al-4V, 6-2-4	Peripheral - HEM	≤ 2 x D	.08 x D	13	120	.1200	.1596	.1992
		Peripheral - HEM	> 2 - 3 x D	.07 x D	13	119	.1080	.1436	.1793
		Peripheral - HEM	> 3 - 3.5 x D	.06 x D	13	116	.0984	.1309	.1633
		Peripheral - HEM	> 3.5 - 4 x D	.06 x D	13	116	.0816	.1085	.1354
		Finish	3 x D	.015 x D	13	108	.0528	.0702	.0876
	Difficult-to-Machine Titanium Alloys 10-2-3	Peripheral - HEM	≤ 2 x D	.06 x D	13	107	.1200	.1596	.1992
		Peripheral - HEM	> 2 - 3 x D	.06 x D	13	101	.0864	.1149	.1434
		Peripheral - HEM	> 3 - 3.5 x D	.055 x D	13	96	.0840	.1117	.1394
		Peripheral - HEM	> 3.5 - 4 x D	.05 x D	13	94	.0768	.1021	.1275
		Finish	3 x D	.01 x D	13	91	.0408	.0543	.0677
	Precipitation Hardening Stainless Steel  13-8	Peripheral - HEM	≤ 2 x D	.07 X D	13	32	.1704	.2266	.2828
		Peripheral - HEM	> 2 - 3 x D	.065 x D	13	30	.1536	.2043	.2550
		Peripheral - HEM	> 3 - 3.5 x D	.055 x D	13	27	.1488	.1979	.2470
		Peripheral - HEM	> 3.5 - 4 x D	.05 x D	13	27	.1368	.1819	.2271
		Finish	3 x D	.01 x D	13	27	.1056	.1404	.1753
	Hastalloy, Waspalloy	Peripheral - HEM	≤ 2 x D	.06 x D	13	30	.1248	.1660	.2072
		Peripheral - HEM	> 2 - 3 x D	.05 x D	13	29	.1248	.1660	.2072
		Peripheral - HEM	> 3 - 3.5 x D	.05 x D	13	29	.1152	.1532	.1912
		Peripheral - HEM	> 3.5 - 4 x D	.04 x D	13	29	.1152	.1532	.1912
		Finish	3 x D	.01 x D	13	27	.0552	.0734	.0916
Inconel 718, Rene 88	Peripheral - HEM	≤ 2 x D	.06 x D	13	30	.1248	.1660	.2072	
	Peripheral - HEM	> 2 - 3 x D	.05 x D	13	29	.1248	.1660	.2072	
	Peripheral - HEM	> 3 - 3.5 x D	.05 x D	13	29	.1152	.1532	.1912	
	Peripheral - HEM	> 3.5 - 4 x D	.04 x D	13	29	.1152	.1532	.1912	
	Finish	3 x D	.01 x D	13	27	.0552	.0734	.0916	

D = Tool Diameter HEM = High-efficiency machining (chip thinning calculations have already been applied to HEM parameters)

Information on tips and adjustments can be found in our Technical Resources section beginning on page 134.