



# HARVI™ I TE DUO-ΛΟCCK™ MODULAR END MILLS



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A Never Before Seen  
Cutting Experience

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**HARVI I TE for DUO-LOCK** is introducing modular tool users to a highly versatile, productive and never before seen cutting experience that includes exceptional tool life on a broad range of applications and target materials. HARVI I TE has an award-winning design with proprietary flute gashes and eccentric faceted relief that delivers increased tool life, higher MRRs and application flexibility and the DUO-LOCK connection provides 3 stable points of contact.

**DUO-LOCK connection features 3 points of contact** for superior runout accuracy, very tight cylindrical grind for increased stability and 25% greater torque transmission compared to competitors

**Proprietary twisted end face** for improved corner/edge stability, higher ramping and helical interpolation capabilities and increased tool life

**Proprietary flute gashes** for reduced energy during chip formation and evacuation while optimizing coolant penetration

**Proprietary eccentric faceted relief** for high flexibility on target materials with lower cutting forces, increased edge stability and vibration dampening

**Proprietary parabolic core** for reduced deflection and risk of breakage and improved process security and tool life



# Industries



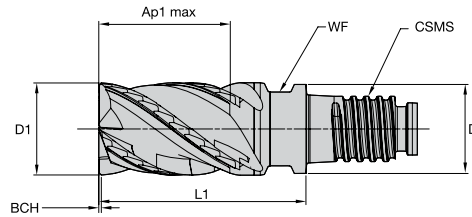
Medical



Aerospace



General Engineering



- Primary
- Secondary

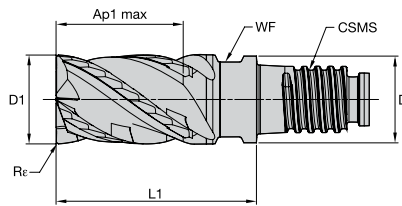
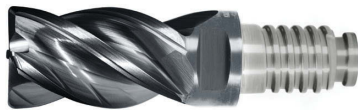
P	Blue	●
M	Yellow	●
K	Red	●
N	Green	○
S	Orange	○
H	Grey	○

## DUO-LOCK • HARVI I TE

Chamfered • 4 Flutes **METRIC**

order number	catalogue number	D1	D	Ap1 max	L1	CSMS system size	WF	BCH	
6953204	H1TE4CH1000R015DLM	10,00	9,60	15,00	22,50	DL10	8,00	0,50	●
6953205	H1TE4CH1200R018DLM	12,00	11,50	18,00	27,00	DL12	9,50	0,50	●
6953206	H1TE4CH1600R024DLM	16,00	15,50	24,00	36,00	DL16	13,00	0,50	●
6953207	H1TE4CH2000R030DLM	20,00	19,30	30,00	45,00	DL20	16,00	0,50	●
6953208	H1TE4CH2500R038DLM	25,00	24,00	37,50	56,50	DL25	21,00	0,50	●
6953209	H1TE4CH3200R048DLM	32,00	31,00	48,00	72,00	DL32	28,00	0,50	●

KCPM15



- Primary
- Secondary

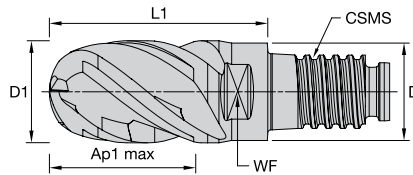
P	Blue	●
M	Yellow	●
K	Red	○
N	Green	○
S	Orange	●
H	Grey	○

## DUO-LOCK • HARVI I TE

Radiused • 4 Flutes **METRIC**

order number	catalogue number	D1	D	Ap1 max	L1	CSMS system size	WF	Rε	
6953210	H1TE4RA1000R015DLR050M	10,00	9,60	15,00	22,50	DL10	8,00	0,50	●
6953261	H1TE4RA1200R018DLR050M	12,00	11,50	18,00	27,00	DL12	9,50	0,50	●
6953262	H1TE4RA1200R018DLR100M	12,00	11,50	18,00	27,00	DL12	9,50	1,00	●
7136482	H1TE4RA1200R018DLR150M	12,00	11,50	18,00	27,00	DL12	9,50	1,50	●
6953263	H1TE4RA1600R024DLR100M	16,00	15,50	24,00	36,00	DL16	13,00	1,00	●
7136484	H1TE4RA1600R024DLR150M	16,00	15,50	24,00	36,00	DL16	13,00	1,50	●
7136483	H1TE4RA1600R024DLR250M	16,00	15,50	24,00	36,00	DL16	13,00	2,50	●
6953264	H1TE4RA1600R024DLR300M	16,00	15,50	24,00	36,00	DL16	13,00	3,00	●
7136488	H1TE4RA2000R030DLR100M	20,00	19,30	30,00	45,00	DL20	16,00	1,00	●
7136485	H1TE4RA2000R030DLR200M	20,00	19,30	30,00	45,00	DL20	16,00	2,00	●
7136487	H1TE4RA2000R030DLR250M	20,00	19,30	30,00	45,00	DL20	16,00	2,50	●
6953265	H1TE4RA2000R030DLR300M	20,00	19,30	30,00	45,00	DL20	16,00	3,00	●
7136489	H1TE4RA2500R038DLR100M	25,00	24,00	37,50	56,50	DL25	21,00	1,00	●
7136490	H1TE4RA2500R038DLR250M	25,00	24,00	37,50	56,50	DL25	21,00	2,50	●
7136491	H1TE4RA2500R038DLR400M	25,00	24,00	37,50	56,50	DL25	21,00	4,00	●
7136492	H1TE4RA3200R048DLR100M	32,00	31,00	48,00	72,00	DL32	28,00	1,00	●
7136493	H1TE4RA3200R048DLR250M	32,00	31,00	48,00	72,00	DL32	28,00	2,50	●

KCSM15



- Primary
- Secondary

P	Blue	●
M	Yellow	●
K	Red	●
N	Green	●
S	Orange	○
H	Grey	○

## DUO-LOCK • HARVI I TE

Ball Nose • 4 Flutes **METRIC**

KCPM15

order number	catalog number	D1	D	Ap1 max	L1	CSMS system size	WF	
7136718	H1TE4BN1000R015DLM	10,00	9,60	15,00	22,50	DL10	8,00	●
7136719	H1TE4BN1200R018DLM	12,00	11,50	18,00	27,00	DL12	9,50	●
7136720	H1TE4BN1600R024DLM	16,00	15,50	24,00	36,00	DL16	13,00	●
7136731	H1TE4BN2000R030DLM	20,00	19,30	30,00	45,00	DL20	16,00	●
7136732	H1TE4BN2500R038DLM	25,00	24,00	37,50	56,50	DL25	21,00	●

## DUO-LOCK HARVI I TE APPLICATION DATA

DUO-LOCK • HARVI I TE • SIDE MILLING/SLOTING • APPLICATION DATA **METRIC**




Material Group	A		B		adapter reach						Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.										
					short		medium		long		D1 — Diameter										
					Cutting Speed — Vc m/min		Cutting Speed — Vc m/min		Cutting Speed — Vc m/min												
	Ap	Ae	Ap		min	max	min	max	min	max	mm	10,0	12,0	16,0	18,0	20,0	25,0	32,0			
P	0	1,5 x D	0,5 x D	1 x D	150	—	200	135	—	180	135	—	180	fz	0,072	0,083	0,101	0,108	0,114	0,124	0,125
	1	1,5 x D	0,5 x D	1 x D	150	—	200	135	—	180	135	—	180	fz	0,072	0,083	0,101	0,108	0,114	0,124	0,125
	2	1,5 x D	0,5 x D	1 x D	140	—	190	126	—	171	126	—	171	fz	0,072	0,083	0,101	0,108	0,114	0,124	0,125
	3	1,5 x D	0,5 x D	1 x D	120	—	160	108	—	144	108	—	144	fz	0,061	0,070	0,087	0,095	0,101	0,114	0,123
	4	1,5 x D	0,5 x D	0,75 x D	90	—	150	81	—	135	81	—	135	fz	0,054	0,062	0,077	0,083	0,088	0,098	0,102
	5	1,5 x D	0,5 x D	1 x D	60	—	100	51	—	85	48	—	80	fz	0,048	0,056	0,070	0,076	0,081	0,091	0,099
M	6	1,5 x D	0,5 x D	0,75 x D	50	—	75	43	—	64	40	—	60	fz	0,040	0,047	0,057	0,061	0,065	0,071	0,073
	1	1,5 x D	0,5 x D	1 x D	90	—	115	72	—	92	63	—	81	fz	0,061	0,070	0,087	0,095	0,101	0,114	0,123
	2	1,5 x D	0,5 x D	1 x D	60	—	80	48	—	64	42	—	56	fz	0,048	0,056	0,070	0,076	0,081	0,091	0,099
K	3	1,5 x D	0,5 x D	1 x D	60	—	70	48	—	56	42	—	49	fz	0,040	0,047	0,057	0,061	0,065	0,071	0,073
	1	1,5 x D	0,5 x D	1 x D	120	—	150	108	—	135	108	—	135	fz	0,072	0,083	0,101	0,108	0,114	0,124	0,125
	2	1,5 x D	0,5 x D	1 x D	110	—	140	99	—	126	99	—	126	fz	0,061	0,070	0,087	0,095	0,101	0,114	0,123
S	3	1,5 x D	0,5 x D	1 x D	110	—	130	99	—	117	99	—	117	fz	0,048	0,056	0,070	0,076	0,081	0,091	0,099
	1	1,5 x D	0,3 x D	0,3 x D	50	—	90	40	—	72	30	—	54	fz	0,061	0,070	0,087	0,095	0,101	0,114	0,123
	2	1,5 x D	0,3 x D	0,3 x D	50	—	80	40	—	64	30	—	48	fz	0,048	0,056	0,070	0,076	0,081	0,091	0,099
	3	1,5 x D	0,3 x D	0,3 x D	50	—	80	40	—	64	30	—	48	fz	0,032	0,037	0,046	0,050	0,054	0,061	0,067
H	4	1,5 x D	0,5 x D	1 x D	50	—	60	40	—	48	30	—	36	fz	0,045	0,052	0,064	0,069	0,074	0,084	0,090
	1	1,5 x D	0,5 x D	0,75 x D	80	—	140	64	—	112	48	—	84	fz	0,054	0,062	0,077	0,083	0,088	0,098	0,102
	2	1,5 x D	0,2 x D	0,5 x D	70	—	120	56	—	96	42	—	72	fz	0,040	0,047	0,057	0,061	0,065	0,071	0,073

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.  
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.  
Above parameters are based on ideal conditions. For smaller taper machining centers, please adjust parameters accordingly on diameters greater than 12mm.  
For side milling with Ap larger than 1 x D, reduce Fz by 20%.  
Cylindrical shanks not recommended for full slotting.

**DUO-LOCK • HARVI I TE • RAMPING 0°-15° • APPLICATION DATA** **METRIC**




Material Group	Ap	 <b>KCPM15-KCSM15</b>		<b>Recommended feed per tooth (fz = mm/z) for Helical Interpolation and Ramping — z<sub>eff</sub> = 2</b>							
		<b>Cutting Speed — Vc</b> <b>m/min</b>		<b>Diameter — D1 [Ømin-Ømax] for helical interpolation</b>							
		min	max	mm	10,0	12,0	16,0	20,0	25,0	32,0	
P	0	1 x D	125	175	fz	0,055	0,065	0,075	0,087	0,095	0,105
	1	1 x D	125	175	fz	0,055	0,065	0,075	0,087	0,095	0,105
	2	1 x D	125	175	fz	0,055	0,065	0,075	0,087	0,095	0,105
	3	1 x D	110	150	fz	0,047	0,054	0,067	0,078	0,088	0,095
	4	1 x D	75	140	fz	0,041	0,048	0,059	0,068	0,075	0,080
	5	0,75 x D	50	90	fz	0,037	0,043	0,054	0,062	0,070	0,075
M	6	0,75 x D	40	70	fz	0,031	0,036	0,044	0,050	0,055	0,060
	1	0,75 x D	75	105	fz	0,047	0,054	0,067	0,078	0,088	0,095
K	2	0,75 x D	45	70	fz	0,037	0,043	0,054	0,062	0,070	0,075
	3	0,5 x D	40	65	fz	0,031	0,036	0,044	0,050	0,055	0,060
	1	1 x D	110	140	fz	0,055	0,065	0,075	0,087	0,095	0,105
S	2	1 x D	100	130	fz	0,047	0,054	0,067	0,078	0,088	0,095
	3	0,75 x D	90	120	fz	0,037	0,043	0,054	0,062	0,070	0,075
	1	0,5 x D	40	80	fz	0,047	0,054	0,067	0,078	0,088	0,095
	2	0,5 x D	40	70	fz	0,037	0,043	0,054	0,062	0,070	0,075
H	3	0,3 x D	20	35	fz	0,024	0,029	0,036	0,041	0,047	0,050
	4	0,75 x D	40	50	fz	0,034	0,040	0,050	0,057	0,064	0,070
	1	0,75 x D	70	120	fz	0,041	0,048	0,059	0,068	0,075	0,080
2	0,75 x D	60	110	fz	0,029	0,034	0,041	0,048	0,053	0,056	

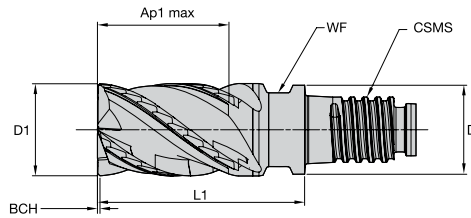
NOTE: Ø min and Ø max to be calculated with formula for helical ramping above.

**DUO-LOCK • HARVI I TE • PLUNGING/DRILLING • APPLICATION DATA** **METRIC**



Material Group	 <b>KCPM15-KCSM15</b>			<b>Recommended feed per revolution (fn =mm/rev) for plunging and drilling</b>									
	Ap	Applicable	Coolant	<b>Cutting Speed — Vc</b> <b>m/min</b>		<b>D1 — Diameter</b>							
				min	max	mm	10,0	12,0	16,0	20,0	25,0	32,0	
P	0	1 x D	●	Preferred	110	150	fn	0,056	0,067	0,084	0,112	0,126	0,150
	1	1 x D	●	Required	110	150	fn	0,056	0,067	0,084	0,112	0,126	0,150
	2	1 x D	●	Required	110	150	fn	0,056	0,067	0,084	0,112	0,126	0,150
	3	1 x D	●	Required	100	120	fn	0,042	0,049	0,075	0,088	0,105	0,135
	4	1 x D	●	Required	70	100	fn	0,042	0,049	0,075	0,088	0,105	0,135
	5	0,75 x D	○	Required	45	65	fn	0,028	0,035	0,046	0,060	0,070	0,076
M	6	0,75 x D	○	Required	40	60	fn	0,028	0,035	0,046	0,060	0,070	0,076
	1	0,75 x D	●	Required	60	80	fn	0,042	0,049	0,075	0,088	0,105	0,135
K	2	0,75 x D	○	Required	40	60	fn	0,028	0,035	0,046	0,060	0,070	0,076
	3	0,5xD	○	Required	35	50	fn	0,028	0,035	0,046	0,060	0,070	0,076
	1	1 x D	●	Preferred	100	120	fn	0,056	0,067	0,084	0,112	0,126	0,150
S	2	1 x D	●	Required	90	110	fn	0,042	0,049	0,075	0,088	0,105	0,135
	3	0,75 x D	○	Required	75	100	fn	0,042	0,049	0,075	0,088	0,105	0,135
	1	0,5 x D	○	Required	35	55	fn	0,042	0,049	0,075	0,088	0,105	0,135
	2	0,5 x D	○	Required	30	45	fn	0,028	0,035	0,046	0,060	0,070	0,076
H	3	0,3 x D	○	Required	15	28	fn	0,019	0,023	0,031	0,042	0,049	0,058
	4	0,75 x D	○	Required	30	40	fn	0,031	0,035	0,045	0,058	0,070	0,076
	1	0,75 x D	○	Required	60	80	fn	0,042	0,049	0,075	0,088	0,105	0,135
2	0,75 x D	○	Required	50	70	fn	0,029	0,034	0,053	0,062	0,074	0,095	

NOTE: Other available diameters are not recommended for plunging applications.



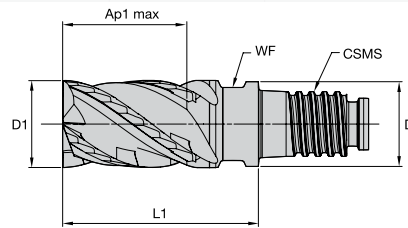
- Primary
- Secondary

P	Blue	●
M	Yellow	●
K	Red	●
N	Green	○
S	Orange	○
H	Grey	○

## DUO-LOCK • HARVI I TE

Chamfered • 4 Flutes **INCH**

Order Number	Catalog Number	D1	D	Ap1 Max	L1	CSMS System Size	WF	BCH	
7136410	H1TE4CH0375R056DL	3/8	.359	9/16	.843	DL10	.315	.020	●
7136461	H1TE4CH0500R075DL	1/2	.480	3/4	1.126	DL12	.374	.020	●
7136462	H1TE4CH0625R094DL	5/8	.605	15/16	1.406	DL16	.512	.020	●
7136463	H1TE4CH0750R113DL	3/4	.730	1 1/8	1.689	DL20	.630	.020	●
7136466	H1TE4CH1000R150DL	1	.961	1 1/2	2.252	DL25	.827	.020	●
7136467	H1TE4CH1250R188DL	1 1/4	1.211	1 7/8	2.815	DL32	1.102	.020	●



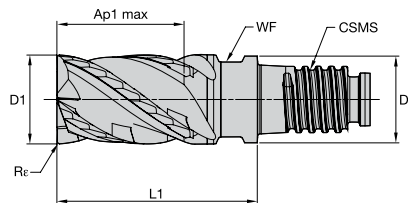
- Primary
- Secondary

P	Blue	●
M	Yellow	●
K	Red	●
N	Green	○
S	Orange	○
H	Grey	○

## DUO-LOCK • HARVI I TE

Square End • 4 Flutes **INCH**

order number	catalog number	D1	D	Ap1 max	L1	CSMS system size	WF	
6953266	H1TE4SE0375R056DL	3/8	.359	9/16	.843	DL10	.315	●
6953267	H1TE4SE0500R075DL	1/2	.480	3/4	1.126	DL12	.374	●
6953268	H1TE4SE0625R094DL	5/8	.605	15/16	1.406	DL16	.512	●
6953269	H1TE4SE0750R113DL	3/4	.730	1 1/8	1.689	DL20	.630	●
6953270	H1TE4SE1000R150DL	1	.961	1 1/2	2.252	DL25	.827	●
6953291	H1TE4SE1250R188DL	1 1/4	1.211	1 7/8	2.815	DL32	1.102	●



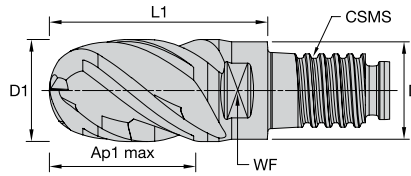
- Primary
- Secondary

P	Blue	●
M	Yellow	●
K	Red	○
N	Green	○
S	Orange	●
H	Grey	○

## DUO-LOCK • HARVI I TE

Radiused • 4 Flutes **INCH**

order number	catalog number	D1	D	Ap1 max	L1	CSMS system size	WF	Rε	
6953292	H1TE4RA0375R056DLR015	3/8	0.359	9/16	0.843	DL10	0.315	0.015	●
7136468	H1TE4RA0375R056DLR030	3/8	0.359	9/16	0.843	DL10	0.315	0.03	●
7136469	H1TE4RA0375R056DLR060	3/8	0.359	9/16	0.843	DL10	0.315	0.06	●
7136470	H1TE4RA0500R075DLR015	1/2	0.48	3/4	1.126	DL12	0.374	0.015	●
6953293	H1TE4RA0500R075DLR030	1/2	0.48	3/4	1.126	DL12	0.374	0.03	●
6953294	H1TE4RA0500R075DLR060	1/2	0.48	3/4	1.126	DL12	0.374	0.06	●
7136471	H1TE4RA0500R075DLR090	1/2	0.48	3/4	1.126	DL12	0.374	0.09	●
7136472	H1TE4RA0500R075DLR120	1/2	0.48	3/4	1.126	DL12	0.374	0.12	●
6953295	H1TE4RA0625R094DLR030	5/8	0.605	15/16	1.406	DL16	0.512	0.03	●
7136473	H1TE4RA0625R094DLR060	5/8	0.605	15/16	1.406	DL16	0.512	0.06	●
7136474	H1TE4RA0625R094DLR120	5/8	0.605	15/16	1.406	DL16	0.512	0.12	●
6953296	H1TE4RA0750R113DLR030	3/4	0.73	1 1/8	1.689	DL20	0.63	0.03	●
7136475	H1TE4RA0750R113DLR060	3/4	0.73	1 1/8	1.689	DL20	0.63	0.06	●
7136476	H1TE4RA0750R113DLR120	3/4	0.73	1 1/8	1.689	DL20	0.63	0.12	●
6953297	H1TE4RA1000R150DLR030	1	0.961	1 1/2	2.252	DL25	0.827	0.03	●
6953298	H1TE4RA1000R150DLR060	1	0.961	1 1/2	2.252	DL25	0.827	0.06	●
7136477	H1TE4RA1000R150DLR120	1	0.961	1 1/2	2.252	DL25	0.827	0.12	●
7136478	H1TE4RA1000R150DLR250	1	0.961	1 1/2	2.252	DL25	0.827	0.25	●
7136479	H1TE4RA1250R188DLR250	1 1/4	1.211	1 7/8	2.815	DL32	1.102	0.25	●



- Primary
- Secondary

P		●
M		●
K		●
N		●
S		○
H		○

## DUO-LOCK • HARVI I TE

Ball Nose • 4 Flutes **INCH**

order number	catalog number	D1	D	Ap1 max	L1	CSMS system size	WF	
7136713	H1TE4BN0375R056DL	3/8	.359	9/16	.843	DL10	.315	●
7136714	H1TE4BN0500R075DL	1/2	.480	3/4	1.126	DL12	.374	●
7136715	H1TE4BN0625R094DL	5/8	.605	15/16	1.406	DL16	.512	●
7136716	H1TE4BN0750R113DL	3/4	.730	1 1/8	1.689	DL20	.630	●
7136717	H1TE4BN1000R150DL	1	.961	1 1/2	2.252	DL25	.827	●

KCPM15

## DUO-LOCK HARVI I TE APPLICATION DATA

DUO-LOCK • HARVI I TE • SIDE MILLING/SLOTING • APPLICATION DATA **INCH**




Material Group	A		B		adapter reach						Recommended feed per tooth (IPT = inch/th) for side milling (A). For slotting (B), reduce IPT by 20%.									
	short		medium		long		D1 — Diameter													
	KCPM15 - KCSM15																			
	Cutting Speed — Vc SFM		Cutting Speed — Vc SFM		Cutting Speed — Vc SFM		frac.	3/8	1/2	5/8	3/4	1	1 1/4							
P	0	1.5 x D	0.5 x D	1 x D	490	—	660	441	—	594	441	—	594	IPT	0.0027	0.0034	0.0039	0.0044	0.0049	0.0049
	1	1.5 x D	0.5 x D	1 x D	490	—	660	441	—	594	441	—	594	IPT	0.0027	0.0034	0.0039	0.0044	0.0049	0.0049
	2	1.5 x D	0.5 x D	1 x D	460	—	620	414	—	558	414	—	558	IPT	0.0027	0.0034	0.0039	0.0044	0.0049	0.0049
	3	1.5 x D	0.5 x D	1 x D	390	—	520	351	—	468	351	—	468	IPT	0.0023	0.0029	0.0034	0.0039	0.0045	0.0048
	4	1.5 x D	0.5 x D	0.75 x D	300	—	490	270	—	441	270	—	441	IPT	0.0020	0.0026	0.0030	0.0034	0.0039	0.0040
	5	1.5 x D	0.5 x D	1 x D	200	—	330	170	—	281	160	—	264	IPT	0.0018	0.0023	0.0027	0.0031	0.0036	0.0039
6	1.5 x D	0.5 x D	0.75 x D	160	—	250	136	—	213	128	—	200	IPT	0.0015	0.0019	0.0022	0.0025	0.0028	0.0029	
M	1	1.5 x D	0.5 x D	1 x D	300	—	380	240	—	304	210	—	266	IPT	0.0023	0.0029	0.0034	0.0039	0.0045	0.0048
	2	1.5 x D	0.5 x D	1 x D	200	—	260	160	—	208	140	—	182	IPT	0.0018	0.0023	0.0027	0.0031	0.0036	0.0039
	3	1.5 x D	0.5 x D	1 x D	200	—	230	160	—	184	140	—	161	IPT	0.0015	0.0019	0.0022	0.0025	0.0028	0.0029
K	1	1.5 x D	0.5 x D	1 x D	390	—	490	351	—	441	351	—	441	IPT	0.0027	0.0034	0.0039	0.0044	0.0049	0.0049
	2	1.5 x D	0.5 x D	1 x D	360	—	460	324	—	414	324	—	414	IPT	0.0023	0.0029	0.0034	0.0039	0.0045	0.0048
	3	1.5 x D	0.5 x D	1 x D	360	—	430	324	—	387	324	—	387	IPT	0.0018	0.0023	0.0027	0.0031	0.0036	0.0039
S	1	1.5 x D	0.3 x D	0.3 x D	160	—	300	128	—	240	96	—	180	IPT	0.0023	0.0029	0.0034	0.0039	0.0045	0.0048
	2	1.5 x D	0.3 x D	0.3 x D	160	—	260	128	—	208	96	—	156	IPT	0.0018	0.0023	0.0027	0.0031	0.0036	0.0039
	3	1.5 x D	0.5 x D	1 x D	80	—	130	64	—	104	48	—	78	IPT	0.0012	0.0015	0.0018	0.0021	0.0024	0.0026
	4	1.5 x D	0.5 x D	1 x D	160	—	200	128	—	160	96	—	120	IPT	0.0017	0.0021	0.0025	0.0028	0.0033	0.0036
H	1	1.5 x D	0.5 x D	0.75 x D	260	—	460	208	—	368	156	—	276	IPT	0.0020	0.0026	0.0030	0.0034	0.0039	0.0040
	2	1.5 x D	0.2 x D	0.5 x D	230	—	390	184	—	312	138	—	234	IPT	0.0015	0.0019	0.0022	0.0025	0.0028	0.0029

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.  
 Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.  
 Above parameters are based on ideal conditions. For smaller taper machining centers, please adjust parameters accordingly on diameters greater than 1/2".  
 For side milling with Ap larger than 1 x D, reduce Fz by 20%.  
 Cylindrical shanks not recommended for full slotting.

**DUO-LOCK • HARVI I TE • RAMPING 0°-15° • APPLICATION DATA** INCH

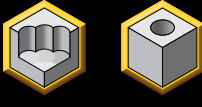


Material Group	Ap	 <b>KCPM15-KCSM15</b> Cutting Speed — Vc SFM		Recommended feed per tooth (fz = IPT) for Helical Interpolation and Ramping — z <sub>eff</sub> = 2 Diameter – D1 [Ømin-Ømax] for helical interpolation							
		min	max	frac.	3/8	1/2	5/8	3/4	1	1 1/4	
		<b>P</b>	0 1 x D	410	580	IPT	0.0022	0.0026	0.003	0.0034	0.0037
	1 1 x D	410	580	IPT	0.0022	0.0026	0.003	0.0034	0.0037	0.0041	
	2 1 x D	410	580	IPT	0.0022	0.0026	0.003	0.0034	0.0037	0.0041	
	3 1 x D	360	490	IPT	0.0019	0.0021	0.0026	0.0031	0.0035	0.0037	
	4 1 x D	250	460	IPT	0.0016	0.0019	0.0023	0.0027	0.003	0.0032	
	5 0.75 x D	160	300	IPT	0.0015	0.0017	0.0021	0.0024	0.0028	0.003	
	6 0.75 x D	130	230	IPT	0.0012	0.0014	0.0017	0.002	0.0022	0.0024	
<b>M</b>	1 0.75 x D	250	330	IPT	0.0019	0.0021	0.0026	0.0031	0.0035	0.0037	
	2 0.75 x D	150	220	IPT	0.0015	0.0017	0.0021	0.0024	0.028	0.003	
	3 0.5 x D	130	210	IPT	0.0012	0.0014	0.0017	0.002	0.0022	0.0024	
<b>K</b>	1 1 x D	360	460	IPT	0.0022	0.0026	0.003	0.0034	0.0037	0.0041	
	2 1 x D	330	430	IPT	0.0019	0.0021	0.0026	0.0031	0.0035	0.0037	
	3 0.75 x D	300	390	IPT	0.0015	0.0017	0.0021	0.0024	0.028	0.003	
<b>S</b>	1 0.5 x D	130	260	IPT	0.0019	0.0021	0.0026	0.0031	0.0035	0.0037	
	2 0.5 x D	130	230	IPT	0.0015	0.0017	0.0021	0.0024	0.028	0.003	
	3 0.3 x D	60	110	IPT	0.0009	0.0011	0.0014	0.0016	0.0019	0.002	
	4 0.75 x D	130	160	IPT	0.0013	0.0016	0.002	0.0022	0.0025	0.0028	
<b>H</b>	1 0.75 x D	230	390	IPT	0.0016	0.0019	0.0023	0.0027	0.003	0.0032	
	2 0.75 x D	185	315	IPT	0.0011	0.0013	0.0016	0.0019	0.0021	0.0022	

NOTE: Ø min and Ø max to be calculated with formula for helical ramping above.

**DUO-LOCK • HARVI I TE • PLUNGING/DRILLING • APPLICATION DATA** INCH



Material Group	 <b>KCPM15-KCSM15</b> Cutting Speed — Vc SFM			Recommended feed per revolution (fn = IPR) for plunging and drilling D1 — Diameter								
	Ap	Applicable	Coolant	min	max	frac.	3/8	1/2	5/8	3/4	1	1 1/4
	<b>P</b>	0 1 x D	●	Preferred	360	490	IPR	0.0022	0.0026	0.0033	0.0044	0.0051
	1 1 x D	●	Required	360	490	IPR	0.0022	0.0026	0.0033	0.0044	0.0051	0.006
	2 1 x D	●	Required	360	490	IPR	0.0022	0.0026	0.0033	0.0044	0.0051	0.006
	3 1 x D	●	Required	330	390	IPR	0.0017	0.0019	0.003	0.0035	0.0041	0.0053
	4 1 x D	●	Required	220	330	IPR	0.0017	0.0019	0.003	0.0035	0.0041	0.0053
	5 0.75 x D	○	Required	150	210	IPR	0.0011	0.0014	0.0018	0.0024	0.0028	0.003
	6 0.75 x D	○	Required	130	190	IPR	0.0011	0.0014	0.0018	0.0024	0.0028	0.003
<b>M</b>	1 0.75 x D	●	Required	190	260	IPR	0.0017	0.0019	0.003	0.0035	0.0041	0.0053
	2 0.75 x D	○	Required	130	190	IPR	0.0011	0.0014	0.0018	0.0024	0.0028	0.003
	3 0.5 x D	○	Required	110	160	IPR	0.0011	0.0014	0.0018	0.0024	0.0028	0.003
<b>K</b>	1 1 x D	●	Preferred	330	390	IPR	0.0022	0.0026	0.0033	0.0044	0.0051	0.006
	2 1 x D	●	Required	300	360	IPR	0.0017	0.0019	0.003	0.0035	0.0041	0.0053
	3 0.75 x D	○	Required	250	330	IPR	0.0017	0.0019	0.003	0.0035	0.0041	0.0053
<b>S</b>	1 0.5 x D	○	Required	100	180	IPR	0.0017	0.0019	0.003	0.0035	0.0041	0.0053
	2 0.5 x D	○	Required	100	150	IPR	0.0011	0.0014	0.0018	0.0024	0.0028	0.003
	3 0.3 x D	○	Required	50	90	IPR	0.0007	0.0009	0.0012	0.0017	0.0019	0.0023
	4 0.75 x D	○	Required	100	130	IPR	0.0011	0.0014	0.0018	0.0024	0.0028	0.003
<b>H</b>	1 0.75 x D	○	Required	190	260	IPR	0.0017	0.0019	0.003	0.0035	0.0041	0.0053
	2 0.75 x D	○	Required	150	210	IPR	0.0012	0.0013	0.0021	0.0025	0.0029	0.0037

NOTE: Other available diameters are not recommended for plunging applications.



Not all four cutting edges reach the center of the HARVI I TE series ball nose end mill. Due to this, certain tilt angles will engage different numbers of cutting edges and can alter the required cutting parameters. This will also be altered by the depths of cut, which will change the contact area and resulting number of edges engaged.

When surface profiling with any ball nose end mill, optimum performance will be achieved by tilting away from the center of the tool if possible. This is due to the fact that at the tip of the tool only the center cutting edges exist (two in the case of HARVI I TE ), and also the fact that the rotational velocity is zero in the center. Therefore, Kennametal recommends tilting the end mill to engage more cutting edges and avoid the zero-speed condition.

As the HARVI I TE series ball nose end mills do have two center cutting edges, it is possible to machine without tilting if the application requires this. Just factor in the reduced number of cutting edges into the cutting parameter calculations.



At the tip of the tool, only the center cutting edges exist.  
The rotational velocity is zero in the center.



When surface profiling with any ball nose end mill, optimum performance will be achieved by tilting away from the center of the tool if possible.

## HARVI I TE BALL NOSE



0°

In the case of the HARVI I TE ball nose end mill, it is possible to take much larger depths of cut than other standard ball nose end mills.

Therefore, a large depth of cut can result in partial engagement of all four edges at small- or zero-tilt angles.



24°

For tilt angles less than 24° and shallow profiling depths, only two cutting edges will be typically engaged.

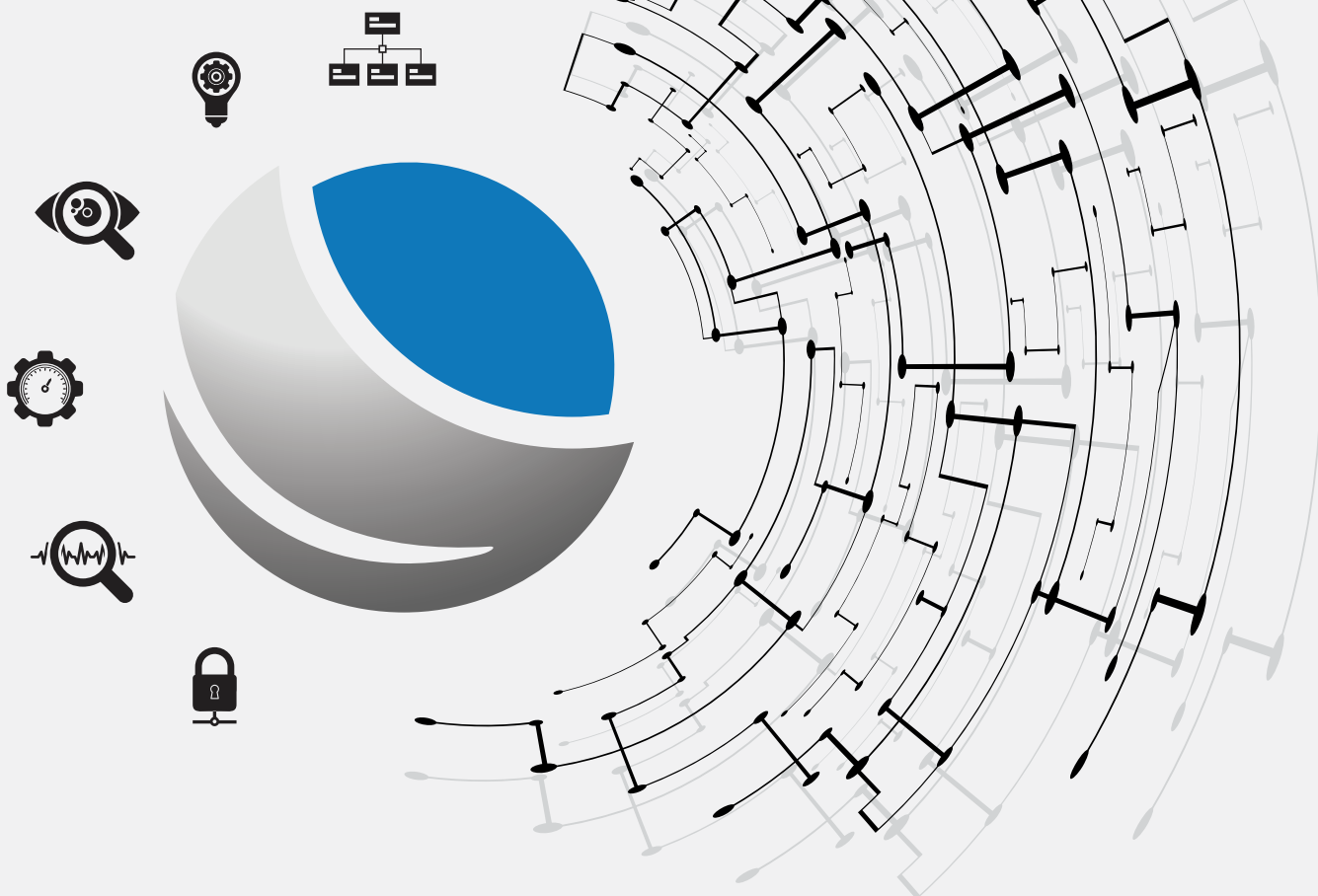
As the end mill is tilted above this, then all four edges will at least be partially engaged.



52°–55°

For maximum profiling performance, a tilt angle of 52°—55° will result in full engagement of all edges with a wide range of cutting depths.

It is important then to decide if the cutting depth is small (profiling) and important to analyze the effect of tilt, or whether the cutting depth is large (roughing/slotting) and then the effect of tilt is minimized.



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## Our Story Is One of Continuous Innovation

It starts in 1938 with our founder, metallurgist Philip M. McKenna, who after years of research created a tungsten-titanium carbide alloy specifically for cutting tools. That single development not only led to a new class of machining tools that cut faster, lasted longer and drove productivity in everything from the automobile to the airplane, but also led to the opening of McKenna Metals Company in Latrobe, Pennsylvania, United States. Today, that company is Kennametal Inc.—a recognized leader in metalworking serving customers across continents and industries including transportation, construction, aerospace, machining and cutting, energy and general engineering. We have a reputation for building innovative solutions for our customers' most challenging applications. The name Kennametal is synonymous for high-quality, high-performance tools that can withstand the most strenuous conditions and bring ease to a wide range of machining operations. We help our customers' operations run longer, faster and with greater precision. We don't cut corners. We cut metal. Your toughest materials don't stand a chance.



**HARVI I TE DUO-LOCK** delivers users higher MRRs and the lowest CPP, high-volume production, shorter cycle times, less tool changes, less setup and downtime and reduced tool inventory on multiple materials and applications. With the DUO-LOCK coupling, HARVI I TE is capable of 1xD full slot milling and/or 1.5xD side milling at up to 50% radial engagement and high ramping capabilities up to 15 degrees.

