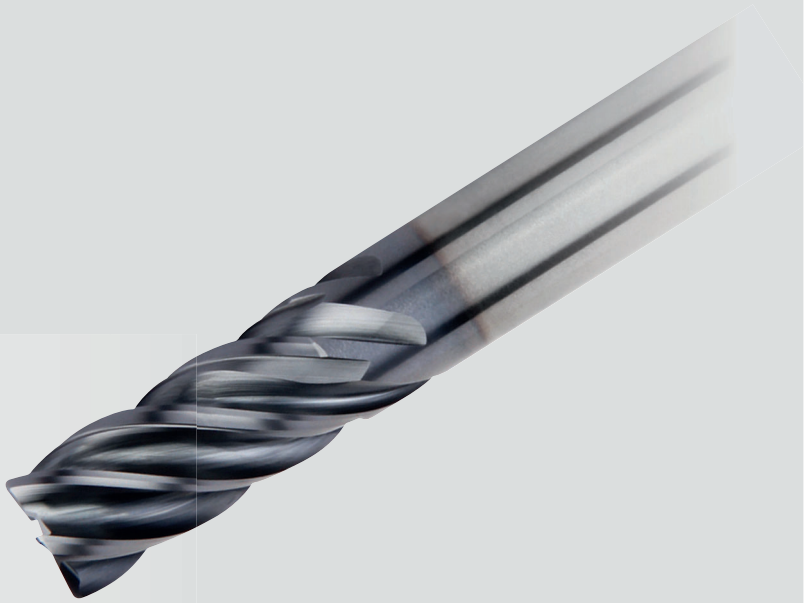
POWERED BY NOVO

HARVI™ Series

High-Performance Roughing and Finishing



Materials

P M K S

Applications

- Ramping
- Slotting: Square End
- Trochoidal Milling
- Shoulder Milling
- Profiling

Roughing and finishing in multiple materials.

Unequally spaced flutes to minimize vibrations and provide high tool life and superior surface quality. Safe-Lock™ shanks with pullout protection deliver increased process safety. Proprietary tapered-core design improves tool stability in roughing and finishing applications.

HARVI II
Five-flute end mill for high-feed roughing and finishing with one tool in multiple materials.

HARVI II Long
Five-flute end mill for semi-finishing and finishing of thin walls and deep pockets in titanium, steels, and stainless steels with excellent surface finishes.

HARVI™ II

Harvi II: Non-center cutting.

Harvi II Long: High feed rate capability for corner machining operations delivers additional productivity.

HARVI III

Harvi III & Harvi III Ball Nose: Tailored axial and radial rake angles result in lower cutting forces and lower pressure on cutting edge, providing smooth cutting action and best surface finishes.

Center cutting design enables radial and axial finishing pass after roughing operation.

Harvi III Taper Ball Nose: Six flutes in ball nose section and taper section for highest metal removal rates.

Taper angles of 4° and 6° for a broad range of applications.

HARVI III
Six-flute end mill for high-feed roughing and finishing with maximum metal removal rates in titanium and stainless steel with excellent surfaces.

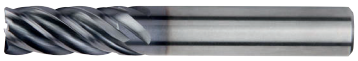
HARVI III Ball Nose
Six-flute end mill for 3D profiling with highest productivity in titanium and stainless steel.

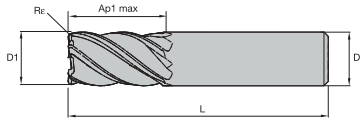
HARVI III Taper Ball Nose
Six-flute end mill for 5-axis machining of steel, stainless steel, nickel-based alloys, and titanium to significantly increase output and decrease machining time.

Solid Carbide End Milling

HARVI™ II • Radiused • 5 Flutes • Plain Shank • Metric

● first choice
○ alternate choice





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order number	catalogue number	D1	D	Ap1 max	L	Rε	KCPM15	KC643M
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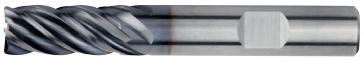
4046284	UCDE0400A5ARA	4,00	6,00	11,00	55,00	0,25	●	–
3524433	UCDE0500A5ARA	5,00	6,00	13,00	57,00	0,25	–	●
4046288	UCDE0500A5ARA	5,00	6,00	13,00	57,00	0,25	●	–
3524435	UCDE0600A5ARA	6,00	6,00	13,00	57,00	0,40	–	●
4046291	UCDE0600A5ARA	6,00	6,00	13,00	57,00	0,40	●	–
3524437	UCDE0700A5ARA	7,00	8,00	16,00	63,00	0,40	–	●
4046374	UCDE0700A5ARA	7,00	8,00	16,00	63,00	0,40	●	–
3524439	UCDE0800A5ARA	8,00	8,00	19,00	63,00	0,50	–	●
4046377	UCDE0800A5ARA	8,00	8,00	19,00	63,00	0,50	●	–
3524441	UCDE0900A5ARA	9,00	10,00	19,00	72,00	0,50	–	●
4046380	UCDE0900A5ARA	9,00	10,00	19,00	72,00	0,50	●	–
3524443	UCDE1000A5ARA	10,00	10,00	22,00	72,00	0,50	–	●
4046383	UCDE1000A5ARA	10,00	10,00	22,00	72,00	0,50	●	–
3524445	UCDE1200A5ARA	12,00	12,00	26,00	83,00	0,75	–	●
4046386	UCDE1200A5ARA	12,00	12,00	26,00	83,00	0,75	●	–
3524447	UCDE1400A5ARA	14,00	14,00	26,00	83,00	0,75	–	●
4046389	UCDE1400A5ARA	14,00	14,00	26,00	83,00	0,75	●	–
3524449	UCDE1600A5ARA	16,00	16,00	32,00	92,00	0,75	–	●
4046392	UCDE1600A5ARA	16,00	16,00	32,00	92,00	0,75	●	–
3524451	UCDE1800A5ARA	18,00	18,00	32,00	92,00	0,75	–	●
4046395	UCDE1800A5ARA	18,00	18,00	32,00	92,00	0,75	●	–
3524453	UCDE2000A5ARA	20,00	20,00	38,00	104,00	0,75	–	●
4046398	UCDE2000A5ARA	20,00	20,00	38,00	104,00	0,75	●	–
3524455	UCDE2500A5ARA	25,00	25,00	45,00	121,00	0,75	–	●
4046401	UCDE2500A5ARA	25,00	25,00	45,00	121,00	0,75	●	–

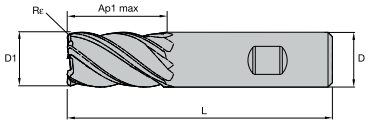
158–159	160	115–117	164

Solid Carbide End Milling

HARVI™ II • Radiused • 5 Flutes • Weldon® Shank • Metric

● first choice
○ alternate choice





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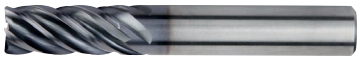
order number	catalogue number	D1	D	Ap1 max	L	Rε	KCPM15	KC643M
3524462	UCDE0400B5ARA	4,00	6,00	11,00	55,00	0,25	–	●
4046286	UCDE0400B5ARA	4,00	6,00	11,00	55,00	0,25	●	–
3524473	UCDE0500B5ARA	5,00	6,00	13,00	57,00	0,25	–	●
4046290	UCDE0500B5ARA	5,00	6,00	13,00	57,00	0,25	●	–
3524474	UCDE0600B5ARA	6,00	6,00	13,00	57,00	0,40	–	●
4046373	UCDE0600B5ARA	6,00	6,00	13,00	57,00	0,40	●	–
3524475	UCDE0700B5ARA	7,00	8,00	16,00	63,00	0,40	–	●
4046376	UCDE0700B5ARA	7,00	8,00	16,00	63,00	0,40	●	–
3524476	UCDE0800B5ARA	8,00	8,00	19,00	63,00	0,50	–	●
4046379	UCDE0800B5ARA	8,00	8,00	19,00	63,00	0,50	●	–
4046382	UCDE0900B5ARA	9,00	10,00	19,00	72,00	0,50	●	–
3524478	UCDE1000B5ARA	10,00	10,00	22,00	72,00	0,50	–	●
4046385	UCDE1000B5ARA	10,00	10,00	22,00	72,00	0,50	●	–
3524479	UCDE1200B5ARA	12,00	12,00	26,00	83,00	0,75	–	●
4046388	UCDE1200B5ARA	12,00	12,00	26,00	83,00	0,75	●	–
3524480	UCDE1400B5ARA	14,00	14,00	26,00	83,00	0,75	–	●
4046391	UCDE1400B5ARA	14,00	14,00	26,00	83,00	0,75	●	–
3524481	UCDE1600B5ARA	16,00	16,00	32,00	92,00	0,75	–	●
4046394	UCDE1600B5ARA	16,00	16,00	32,00	92,00	0,75	●	–
3524482	UCDE1800B5ARA	18,00	18,00	32,00	92,00	0,75	–	●
4046397	UCDE1800B5ARA	18,00	18,00	32,00	92,00	0,75	●	–
3524483	UCDE2000B5ARA	20,00	20,00	38,00	104,00	0,75	–	●
4046400	UCDE2000B5ARA	20,00	20,00	38,00	104,00	0,75	●	–
3524484	UCDE2500B5ARA	25,00	25,00	45,00	121,00	0,75	–	●
4046403	UCDE2500B5ARA	25,00	25,00	45,00	121,00	0,75	●	–

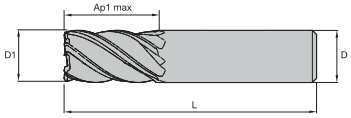
158–159	160	115–117	164

Solid Carbide End Milling

HARVI™ II • Square End • 5 Flutes • Plain Shank • Metric

● first choice
○ alternate choice





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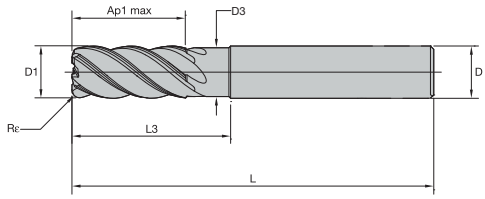
order number	catalogue number	D1	D	Ap1 max	L	KCPM15	KC643M
3524456	UCDE0400A5ASA	4,00	6,00	11,00	55,00	–	●
4046285	UCDE0400A5ASA	4,00	6,00	11,00	55,00	●	–
3524412	UCDE0500A5ASA	5,00	6,00	13,00	57,00	–	●
4046289	UCDE0500A5ASA	5,00	6,00	13,00	57,00	●	–
3524434	UCDE0600A5ASA	6,00	6,00	13,00	57,00	–	●
4046292	UCDE0600A5ASA	6,00	6,00	13,00	57,00	●	–
3524436	UCDE0700A5ASA	7,00	8,00	16,00	63,00	–	●
4046375	UCDE0700A5ASA	7,00	8,00	16,00	63,00	●	–
3524438	UCDE0800A5ASA	8,00	8,00	19,00	63,00	–	●
4046378	UCDE0800A5ASA	8,00	8,00	19,00	63,00	●	–
3524440	UCDE0900A5ASA	9,00	10,00	19,00	72,00	–	●
4046381	UCDE0900A5ASA	9,00	10,00	19,00	72,00	●	–
3524442	UCDE1000A5ASA	10,00	10,00	22,00	72,00	–	●
4046384	UCDE1000A5ASA	10,00	10,00	22,00	72,00	●	–
3524444	UCDE1200A5ASA	12,00	12,00	26,00	83,00	–	●
4046387	UCDE1200A5ASA	12,00	12,00	26,00	83,00	●	–
3524446	UCDE1400A5ASA	14,00	14,00	26,00	83,00	–	●
4046390	UCDE1400A5ASA	14,00	14,00	26,00	83,00	●	–
3524448	UCDE1600A5ASA	16,00	16,00	32,00	92,00	–	●
4046393	UCDE1600A5ASA	16,00	16,00	32,00	92,00	●	–
3524450	UCDE1800A5ASA	18,00	18,00	32,00	92,00	–	●
4046396	UCDE1800A5ASA	18,00	18,00	32,00	92,00	●	–
3524452	UCDE2000A5ASA	20,00	20,00	38,00	104,00	–	●
4046399	UCDE2000A5ASA	20,00	20,00	38,00	104,00	●	–
3524454	UCDE2500A5ASA	25,00	25,00	45,00	121,00	–	●
4046402	UCDE2500A5ASA	25,00	25,00	45,00	121,00	●	–

158–159	160	115–117	164

Solid Carbide End Milling

HARVI™ II • Radiused • 5 Flutes • Necked • Plain Shank • Metric

● first choice
○ alternate choice



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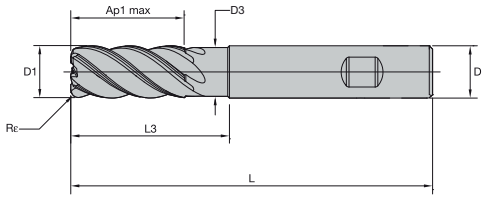
order number	catalogue number	D1	D	D3	Ap1 max	L3	L	Rε	KC643M
3524486	UDDE0600A5ARA	6,00	6,00	5,64	13,00	18,00	63,00	0,50	●
3524487	UDDE0600A5ARB	6,00	6,00	5,64	13,00	18,00	63,00	1,00	●
3524488	UDDE0600A5ARC	6,00	6,00	5,64	13,00	18,00	63,00	1,50	●
3524490	UDDE0800A5ARA	8,00	8,00	7,52	19,00	24,00	76,00	0,50	●
3524491	UDDE0800A5ARB	8,00	8,00	7,52	19,00	24,00	76,00	1,00	●
3524492	UDDE0800A5ARC	8,00	8,00	7,52	19,00	24,00	76,00	2,00	●
3524514	UDDE1000A5ARA	10,00	10,00	9,40	22,00	30,00	76,00	0,50	●
3524515	UDDE1000A5ARB	10,00	10,00	9,40	22,00	30,00	76,00	1,00	●
3524516	UDDE1000A5ARC	10,00	10,00	9,40	22,00	30,00	76,00	2,00	●
3524517	UDDE1000A5ARD	10,00	10,00	9,40	22,00	30,00	76,00	2,50	●
3524520	UDDE1200A5ARB	12,00	12,00	11,28	26,00	36,00	83,00	1,00	●
3524521	UDDE1200A5ARC	12,00	12,00	11,28	26,00	36,00	83,00	2,00	●
3524522	UDDE1200A5ARD	12,00	12,00	11,28	26,00	36,00	83,00	3,00	●
3524519	UDDE1200A5ARA	12,00	12,00	11,28	26,00	36,00	84,00	0,50	●
3873932	UDDE1400A5ARA	14,00	14,00	13,15	26,00	42,00	84,00	0,50	●
3874034	UDDE1400A5ARC	14,00	14,00	13,15	26,00	42,00	84,00	2,00	●
3874035	UDDE1400A5ARD	14,00	14,00	13,15	26,00	42,00	84,00	3,00	●
3524524	UDDE1600A5ARA	16,00	16,00	15,04	32,00	48,00	100,00	0,50	●
3524525	UDDE1600A5ARB	16,00	16,00	15,04	32,00	48,00	100,00	1,00	●
3524526	UDDE1600A5ARC	16,00	16,00	15,04	32,00	48,00	100,00	2,00	●
3524527	UDDE1600A5ARD	16,00	16,00	15,04	32,00	48,00	100,00	3,00	●
3524528	UDDE1600A5ARE	16,00	16,00	15,04	32,00	48,00	100,00	4,00	●
6063443	UDDE1600A5ARP	16,00	16,00	15,04	32,00	48,00	100,00	6,00	●
3524530	UDDE2000A5ARA	20,00	20,00	18,80	38,00	60,00	115,00	0,50	●
3524531	UDDE2000A5ARB	20,00	20,00	18,80	38,00	60,00	115,00	1,00	●
3524532	UDDE2000A5ARC	20,00	20,00	18,80	38,00	60,00	115,00	2,00	●
3524533	UDDE2000A5ARD	20,00	20,00	18,80	38,00	60,00	115,00	3,00	●
3524534	UDDE2000A5ARE	20,00	20,00	18,80	38,00	60,00	115,00	4,00	●
6063444	UDDE2000A5ARP	20,00	20,00	18,80	38,00	60,00	115,00	6,00	●
3524536	UDDE2500A5ARA	25,00	25,00	23,50	45,00	75,00	135,00	0,50	●
3524537	UDDE2500A5ARB	25,00	25,00	23,50	45,00	75,00	135,00	1,00	●
3524538	UDDE2500A5ARC	25,00	25,00	23,50	45,00	75,00	135,00	2,00	●
3524539	UDDE2500A5ARD	25,00	25,00	23,50	45,00	75,00	135,00	3,00	●
3524540	UDDE2500A5ARE	25,00	25,00	23,50	45,00	75,00	135,00	4,00	●

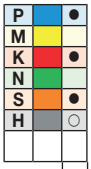
158–159	160	115–117	164

Solid Carbide End Milling

HARVI™ II • Radiused • 5 Flutes • Necked • Weldon® Shank • Metric

● first choice
○ alternate choice





order number	catalogue number	D1	D	D3	Ap1 max	L3	L	Rε	KC643M
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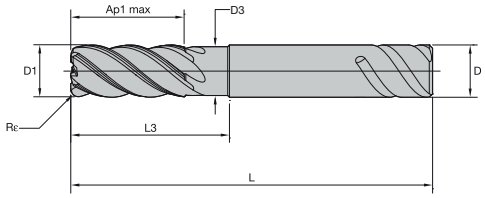
3524543	UDDE0600B5ARB	6,00	6,00	5,64	13,00	18,00	63,00	0,50	●
3524544	UDDE0600B5ARC	6,00	6,00	5,64	13,00	18,00	63,00	1,00	●
3524545	UDDE0600B5ARD	6,00	6,00	5,64	13,00	18,00	63,00	1,50	●
3524546	UDDE0800B5ARA	8,00	8,00	7,52	19,00	24,00	76,00	0,20	●
3524547	UDDE0800B5ARB	8,00	8,00	7,52	19,00	24,00	76,00	0,50	●
3524548	UDDE0800B5ARC	8,00	8,00	7,52	19,00	24,00	76,00	1,00	●
3524549	UDDE0800B5ARD	8,00	8,00	7,52	19,00	24,00	76,00	2,00	●
3524550	UDDE1000B5ARA	10,00	10,00	9,40	22,00	30,00	76,00	0,50	●
3524551	UDDE1000B5ARB	10,00	10,00	9,40	22,00	30,00	76,00	1,00	●
3524553	UDDE1000B5ARD	10,00	10,00	9,40	22,00	30,00	76,00	2,50	●
3524554	UDDE1200B5ARA	12,00	12,00	11,28	26,00	36,00	83,00	0,50	●
3524555	UDDE1200B5ARB	12,00	12,00	11,28	26,00	36,00	83,00	1,00	●
3524556	UDDE1200B5ARC	12,00	12,00	11,28	26,00	36,00	83,00	2,00	●
3524557	UDDE1200B5ARD	12,00	12,00	11,28	26,00	36,00	83,00	3,00	●
3874037	UDDE1400B5ARB	14,00	14,00	13,15	26,00	42,00	84,00	1,00	●
3524558	UDDE1600B5ARA	16,00	16,00	15,04	32,00	48,00	100,00	0,50	●
3524559	UDDE1600B5ARB	16,00	16,00	15,04	32,00	48,00	100,00	1,00	●
3524560	UDDE1600B5ARC	16,00	16,00	15,04	32,00	48,00	100,00	2,00	●
3524561	UDDE1600B5ARD	16,00	16,00	15,04	32,00	48,00	100,00	3,00	●
3524562	UDDE1600B5ARE	16,00	16,00	15,04	32,00	48,00	100,00	4,00	●
6064694	UDDE1600B5ARP	16,00	16,00	15,04	32,00	48,00	100,00	6,00	●
3524563	UDDE2000B5ARA	20,00	20,00	18,80	38,00	60,00	115,00	0,50	●
3524564	UDDE2000B5ARB	20,00	20,00	18,80	38,00	60,00	115,00	1,00	●
3524565	UDDE2000B5ARC	20,00	20,00	18,80	38,00	60,00	115,00	2,00	●
3524566	UDDE2000B5ARD	20,00	20,00	18,80	38,00	60,00	115,00	3,00	●
3524567	UDDE2000B5ARE	20,00	20,00	18,80	38,00	60,00	115,00	4,00	●
6064695	UDDE2000B5ARP	20,00	20,00	18,80	38,00	60,00	115,00	6,00	●
3524568	UDDE2500B5ARA	25,00	25,00	23,50	45,00	75,00	135,00	0,50	●
3524569	UDDE2500B5ARB	25,00	25,00	23,50	45,00	75,00	135,00	1,00	●
3524570	UDDE2500B5ARC	25,00	25,00	23,50	45,00	75,00	135,00	2,00	●
3524571	UDDE2500B5ARD	25,00	25,00	23,50	45,00	75,00	135,00	3,00	●
3524572	UDDE2500B5ARE	25,00	25,00	23,50	45,00	75,00	135,00	4,00	●
6064696	UDDE2500B5ARP	25,00	25,00	23,50	45,00	75,00	135,00	6,00	●

HARVI II • Radiused • 5 Flutes • Necked • Safe-Lock™ Shank • Metric

● first choice
○ alternate choice

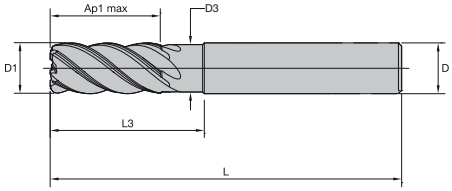


order number	catalogue number	D1	D	D3	Ap1 max	L3	L	Rε	KCSM15
5358354	UDDE1200E5AQE	12,00	12,00	11,28	26,00	36,00	83,00	0,50	●
5358358	UDDE1600E5AQE	16,00	16,00	15,04	32,00	48,00	100,00	0,50	●
5358359	UDDE1600E5AQG	16,00	16,00	15,04	32,00	48,00	100,00	1,00	●
5358390	UDDE1600E5AQK	16,00	16,00	15,04	32,00	48,00	100,00	2,00	●
5358394	UDDE2000E5AQE	20,00	20,00	18,80	38,00	60,00	115,00	0,50	●
5358399	UDDE2500E5AQE	25,00	25,00	23,50	45,00	75,00	135,00	0,50	●

Solid Carbide End Milling

HARVI™ II • Square End • 5 Flutes • Necked • Plain Shank • Metric

● first choice
○ alternate choice



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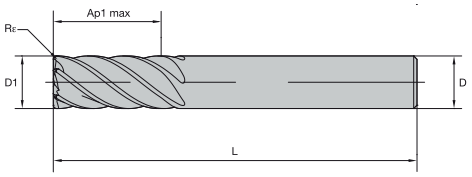
H	○

order number	catalogue number	D1	D	D3	Ap1 max	L3	L	KC643M
3524485	UDDE0600A5ASA	6,00	6,00	5,64	13,00	18,00	63,00	●
3524489	UDDE0800A5ASA	8,00	8,00	7,52	19,00	24,00	76,00	●
3524513	UDDE1000A5ASA	10,00	10,00	9,40	22,00	30,00	76,00	●
3524518	UDDE1200A5ASA	12,00	12,00	11,28	26,00	36,00	83,00	●
3873931	UDDE1400A5ASA	14,00	14,00	13,15	26,00	42,00	84,00	●
3524523	UDDE1600A5ASA	16,00	16,00	15,04	32,00	48,00	100,00	●
3524529	UDDE2000A5ASA	20,00	20,00	18,80	38,00	60,00	115,00	●

HARVI III • Radiused • 6 Flutes • Plain Shank • Metric

● first choice
○ alternate choice



P	○
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H	○

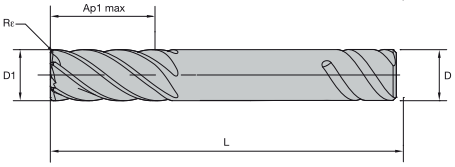
order number	catalogue number	D1	D	Ap1 max	L	Rε	KCSM15
5350287	UJDE1000A6ARE	10,00	10,00	22,00	72,00	0,50	●
5350324	UJDE1200A6ARF	12,00	12,00	26,00	83,00	0,75	●
5350336	UJDE1400A6ARF	14,00	14,00	26,00	83,00	0,75	●
5350339	UJDE1600A6ARF	16,00	16,00	32,00	92,00	0,75	●
5350613	UJDE2000A6ARF	20,00	20,00	38,00	104,00	0,75	●
5350649	UJDE2500A6ARF	25,00	25,00	45,00	121,00	0,75	●

158–159	160	115–117	164

Solid Carbide End Milling

HARVI™ III • Radiused • 6 Flutes • Safe-Lock™ Shank • Metric

● first choice
○ alternate choice



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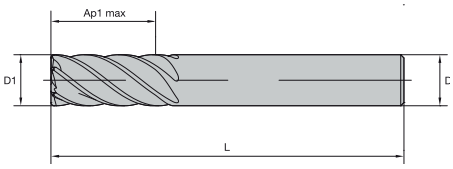
order number	catalogue number	D1	D	Ap1 max	L	Rε	KCSM15
5350326	UJDE1200E6ARF	12,00	12,00	26,00	83,00	0,75	●
5350340	UJDE1600E6ARF	16,00	16,00	32,00	92,00	0,75	●
5350615	UJDE2000E6ARF	20,00	20,00	38,00	104,00	0,75	●
5350650	UJDE2500E6ARF	25,00	25,00	45,00	121,00	0,75	●

HARVI III • Square End • 6 Flutes • Plain Shank • Metric

● first choice
○ alternate choice



P	○
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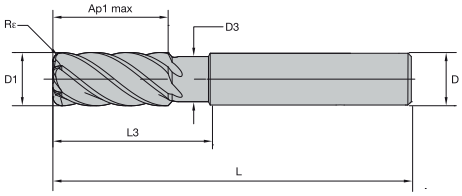
order number	catalogue number	D1	D	Ap1 max	L	KCSM15
5350288	UJDE1000A6AS	10,00	10,00	22,00	72,00	●
5350325	UJDE1200A6AS	12,00	12,00	26,00	83,00	●
5350338	UJDE1400A6AS	14,00	14,00	26,00	83,00	●
5350341	UJDE1600A6AS	16,00	16,00	32,00	92,00	●
5350616	UJDE2000A6AS	20,00	20,00	38,00	104,00	●
5350651	UJDE2500A6AS	25,00	25,00	45,00	121,00	●

158–159	160	115–117	164

Solid Carbide End Milling

HARVI™ III • Radiused • 6 Flutes • Necked • Plain Shank • Metric

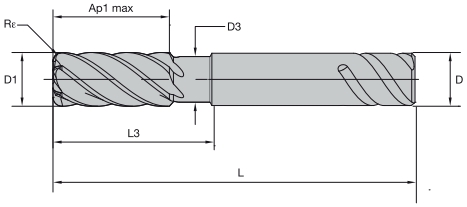
● first choice
○ alternate choice



									KCSM15
order number	catalogue number	D1	D	D3	Ap1 max	L3	L	Rε	
5350289	UJDE1000A6AQE	10,00	10,00	9,40	22,00	30,00	76,00	0,50	●
5350320	UJDE1000A6AQG	10,00	10,00	9,40	22,00	30,00	76,00	1,00	●
5350321	UJDE1000A6AQK	10,00	10,00	9,40	22,00	30,00	76,00	2,00	●
5350327	UJDE1200A6AQE	12,00	12,00	11,28	26,00	36,00	83,00	0,50	●
5350328	UJDE1200A6AQG	12,00	12,00	11,28	26,00	36,00	83,00	1,00	●
5350329	UJDE1200A6AQK	12,00	12,00	11,28	26,00	36,00	83,00	2,00	●
5350330	UJDE1200A6AQM	12,00	12,00	11,28	26,00	36,00	83,00	3,00	●
5350342	UJDE1600A6AQE	16,00	16,00	15,04	32,00	48,00	100,00	0,50	●
5350343	UJDE1600A6AQG	16,00	16,00	15,04	32,00	48,00	100,00	1,00	●
5350344	UJDE1600A6AQK	16,00	16,00	15,04	32,00	48,00	100,00	2,00	●
5350345	UJDE1600A6AQM	16,00	16,00	15,04	32,00	48,00	100,00	3,00	●
5350346	UJDE1600A6AQN	16,00	16,00	15,04	32,00	48,00	100,00	4,00	●
6063446	UJDE1600A6AQP	16,00	16,00	15,04	32,00	48,00	100,00	6,00	●
5350617	UJDE2000A6AQE	20,00	20,00	18,80	38,00	60,00	115,00	0,50	●
5350618	UJDE2000A6AQG	20,00	20,00	18,80	38,00	60,00	115,00	1,00	●
5350619	UJDE2000A6AQK	20,00	20,00	18,80	38,00	60,00	115,00	2,00	●
5350640	UJDE2000A6AQM	20,00	20,00	18,80	38,00	60,00	115,00	3,00	●
5350641	UJDE2000A6AQN	20,00	20,00	18,80	38,00	60,00	115,00	4,00	●
6063447	UJDE2000A6AQP	20,00	20,00	18,80	38,00	60,00	115,00	6,00	●
5350653	UJDE2500A6AQG	25,00	25,00	23,50	45,00	75,00	135,00	1,00	●
5350655	UJDE2500A6AQM	25,00	25,00	23,50	45,00	75,00	135,00	3,00	●
5350656	UJDE2500A6AQN	25,00	25,00	23,50	45,00	75,00	135,00	4,00	●

HARVI III • Radiused • 6 Flutes • Necked • Safe-Lock™ Shank • Metric

● first choice
○ alternate choice



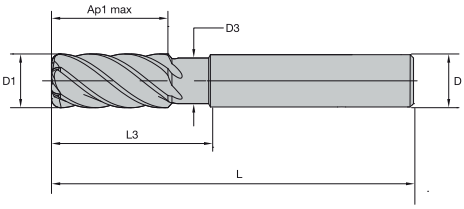
									KCSM15
order number	catalogue number	D1	D	D3	Ap1 max	L3	L	Rε	
5350332	UJDE1200E6AQE	12,00	12,00	11,28	26,00	36,00	83,00	0,50	●
5350333	UJDE1200E6AQG	12,00	12,00	11,28	26,00	36,00	83,00	1,00	●
5350348	UJDE1600E6AQE	16,00	16,00	15,04	32,00	48,00	100,00	0,50	●
5350349	UJDE1600E6AQG	16,00	16,00	15,04	32,00	48,00	100,00	1,00	●
5350350	UJDE1600E6AQK	16,00	16,00	15,04	32,00	48,00	100,00	2,00	●
5350352	UJDE1600E6AQN	16,00	16,00	15,04	32,00	48,00	100,00	4,00	●
5350644	UJDE2000E6AQE	20,00	20,00	18,80	38,00	60,00	115,00	0,50	●
5350645	UJDE2000E6AQG	20,00	20,00	18,80	38,00	60,00	115,00	1,00	●
5350646	UJDE2000E6AQK	20,00	20,00	18,80	38,00	60,00	115,00	2,00	●
5350648	UJDE2000E6AQN	20,00	20,00	18,80	38,00	60,00	115,00	4,00	●
5350658	UJDE2500E6AQE	25,00	25,00	23,50	45,00	75,00	135,00	0,50	●
5350662	UJDE2500E6AQN	25,00	25,00	23,50	45,00	75,00	135,00	4,00	●

158–159	160	115–117	164

Solid Carbide End Milling

HARVI™ III • Square End • 6 Flutes • Necked • Plain Shank • Metric

● first choice
○ alternate choice



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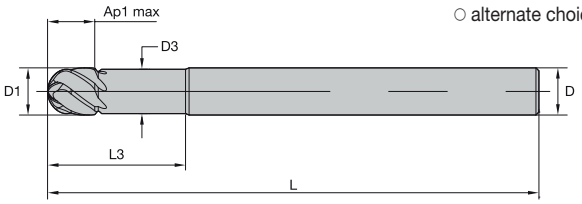
order number	catalogue number	D1	D	D3	Ap1 max	L3	L	KCSM15
5350323	UJDE1000A6ANS	10,00	10,00	9,40	22,00	30,00	76,00	●
5350331	UJDE1200A6ANS	12,00	12,00	11,28	26,00	36,00	83,00	●
5350347	UJDE1600A6ANS	16,00	16,00	15,04	32,00	48,00	100,00	●
5350642	UJDE2000A6ANS	20,00	20,00	18,80	38,00	60,00	115,00	●

HARVI III • Ball Nose • 6 Flutes • Plain Shank • Metric

● first choice
○ alternate choice



P	○
M	●
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H	○

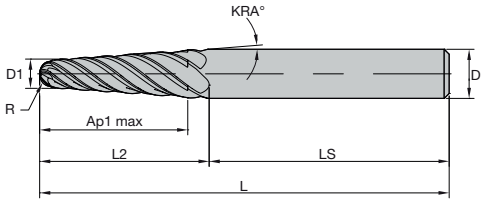
order number	catalogue number	D1	D	D3	Ap1 max	L3	L	KCSM15
5606546	UJBE1000A6AN	10,00	10,00	9,40	10,00	30,00	72,00	●
5606542	UJBE1000A6AL	10,00	10,00	9,40	10,00	30,00	121,50	●
5606547	UJBE1200A6AN	12,00	12,00	11,28	12,00	36,00	83,00	●
5606543	UJBE1200A6AL	12,00	12,00	11,28	12,00	36,00	125,00	●
5606548	UJBE1600A6AN	16,00	16,00	15,04	16,00	48,00	100,00	●
5606544	UJBE1600A6AL	16,00	16,00	15,04	16,00	48,00	150,00	●
5606549	UJBE2000A6AN	20,00	20,00	18,80	20,00	60,00	115,00	●
5606545	UJBE2000A6AL	20,00	20,00	18,80	20,00	60,00	150,00	●

158–159	160	115–117	164

Solid Carbide End Milling

HARVI™ III • Taper Ball Nose • 6 Flutes • Plain Shank • Metric

● first choice
○ alternate choice



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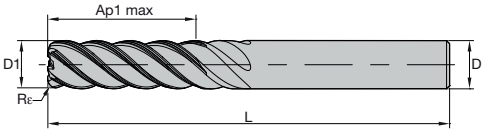
order number	catalogue number	D1	D	Ap1 max	L2	LS	L	R	KRA	KCSM15
5970180	UJBE0400A6CP	4,00	8,00	26,00	30,53	45,47	76,00	2,00	4.00	●
5970211	UJBE0400A6BP	4,00	10,00	25,00	30,44	58,56	89,00	2,00	6.00	●
5970212	UJBE0500A6CP	5,00	10,00	33,00	38,16	50,84	89,00	2,50	4.00	●
5970213	UJBE0500A6BP	5,00	12,00	29,00	35,67	64,33	100,00	2,50	6.00	●
5970214	UJBE0600A6BP	6,00	12,00	39,00	45,80	54,20	100,00	3,00	4.00	●
5970215	UJBE0600A6CP	6,00	16,00	42,00	50,42	59,59	110,00	3,00	6.00	●
5970218	UJBE0800A6CP	8,00	14,00	39,00	46,76	53,24	100,00	4,00	4.00	●
5970221	UJBE1000A6BP	10,00	16,00	25,00	33,28	76,72	110,00	5,00	6.00	●
5970220	UJBE1000A6CP	10,00	16,00	39,00	47,73	62,27	110,00	5,00	4.00	●

158–159	160	115–117	164

Solid Carbide End Milling

HARVI™ II Long • Radiused • 5 Flutes • 3 x D • Plain Shank • Metric

● first choice
○ alternate choice



P	●
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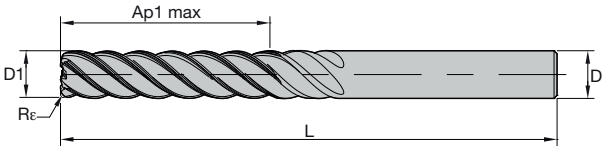
order number	catalogue number	D1	D	Ap1 max	L	Rε	KC643M
4124324	UGDE0600A5ARA	6,00	6,00	18,00	63,00	0,20	●
4124325	UGDE0600A5ARB	6,00	6,00	18,00	63,00	0,50	●
4124326	UGDE0600A5ARC	6,00	6,00	18,00	63,00	1,00	●
4124330	UGDE0800A5ARA	8,00	8,00	24,00	67,00	0,20	●
4124331	UGDE0800A5ARB	8,00	8,00	24,00	67,00	0,50	●
4124332	UGDE0800A5ARC	8,00	8,00	24,00	67,00	1,00	●
4124346	UGDE1000A5ARA	10,00	10,00	30,00	76,00	0,50	●
4124347	UGDE1000A5ARB	10,00	10,00	30,00	76,00	1,00	●
4124348	UGDE1000A5ARC	10,00	10,00	30,00	76,00	2,00	●
4124349	UGDE1000A5ARD	10,00	10,00	30,00	76,00	2,50	●
4124354	UGDE1200A5ARA	12,00	12,00	36,00	100,00	0,50	●
4124355	UGDE1200A5ARB	12,00	12,00	36,00	100,00	1,00	●
4124356	UGDE1200A5ARC	12,00	12,00	36,00	100,00	2,00	●
4124357	UGDE1200A5ARD	12,00	12,00	36,00	100,00	2,50	●
4156131	UGDE1400A5ARD	14,00	14,00	42,00	100,00	3,00	●
4124362	UGDE1600A5ARA	16,00	16,00	48,00	110,00	1,00	●
4124363	UGDE1600A5ARB	16,00	16,00	48,00	110,00	2,00	●
4124364	UGDE1600A5ARC	16,00	16,00	48,00	110,00	2,50	●
4124365	UGDE1600A5ARD	16,00	16,00	48,00	110,00	3,00	●
4124366	UGDE1600A5ARE	16,00	16,00	48,00	110,00	4,00	●
6064700	UGDE1600A5ARP	16,00	16,00	48,00	110,00	6,00	●
4124372	UGDE2000A5ARA	20,00	20,00	60,00	125,00	1,00	●
4124373	UGDE2000A5ARB	20,00	20,00	60,00	125,00	2,00	●
4124374	UGDE2000A5ARC	20,00	20,00	60,00	125,00	2,50	●
4124375	UGDE2000A5ARD	20,00	20,00	60,00	125,00	3,00	●
4124376	UGDE2000A5ARE	20,00	20,00	60,00	125,00	4,00	●
6064701	UGDE2000A5ARP	20,00	20,00	60,00	125,00	6,00	●
4124382	UGDE2500A5ARA	25,00	25,00	75,00	150,00	1,00	●
4124383	UGDE2500A5ARB	25,00	25,00	75,00	150,00	2,00	●
4124384	UGDE2500A5ARC	25,00	25,00	75,00	150,00	2,50	●
4124385	UGDE2500A5ARD	25,00	25,00	75,00	150,00	3,00	●
4124386	UGDE2500A5ARE	25,00	25,00	75,00	150,00	4,00	●
6064702	UGDE2500A5ARP	25,00	25,00	75,00	150,00	6,00	●

158–159	160	115–117	164

Solid Carbide End Milling

HARVI™ II Long • Radiused • 5 Flutes • 5 x D • Plain Shank • Metric

● first choice
○ alternate choice



P	●
M	●
K	○
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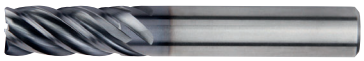
order number	catalogue number	D1	D	Ap1 max	L	Rε	KC643M
4124327	UGDE0600A5BRA	6,00	6,00	30,00	76,00	0,20	●
4124328	UGDE0600A5BRB	6,00	6,00	30,00	76,00	0,50	●
4124329	UGDE0600A5BRC	6,00	6,00	30,00	76,00	1,00	●
4124343	UGDE0800A5BRA	8,00	8,00	40,00	87,00	0,20	●
4124344	UGDE0800A5BRB	8,00	8,00	40,00	87,00	0,50	●
4124345	UGDE0800A5BRC	8,00	8,00	40,00	87,00	1,00	●
4124350	UGDE1000A5BRA	10,00	10,00	50,00	100,00	0,50	●
4124351	UGDE1000A5BRB	10,00	10,00	50,00	100,00	1,00	●
4124352	UGDE1000A5BRC	10,00	10,00	50,00	100,00	2,00	●
4124353	UGDE1000A5BRD	10,00	10,00	50,00	100,00	2,50	●
4124358	UGDE1200A5BRA	12,00	12,00	60,00	125,00	0,50	●
4124359	UGDE1200A5BRB	12,00	12,00	60,00	125,00	1,00	●
4124360	UGDE1200A5BRC	12,00	12,00	60,00	125,00	2,00	●
4124361	UGDE1200A5BRD	12,00	12,00	60,00	125,00	2,50	●
4156132	UGDE1400A5BRD	14,00	14,00	70,00	120,00	3,00	●
4124367	UGDE1600A5BRA	16,00	16,00	80,00	141,00	1,00	●
4124368	UGDE1600A5BRB	16,00	16,00	80,00	141,00	2,00	●
4124369	UGDE1600A5BRC	16,00	16,00	80,00	141,00	2,50	●
4124370	UGDE1600A5BRD	16,00	16,00	80,00	141,00	3,00	●
4124371	UGDE1600A5BRE	16,00	16,00	80,00	141,00	4,00	●
6063449	UGDE1600A5BRP	16,00	16,00	80,00	141,00	6,00	●
4124377	UGDE2000A5BRA	20,00	20,00	100,00	166,00	1,00	●
4124378	UGDE2000A5BRB	20,00	20,00	100,00	166,00	2,00	●
4124379	UGDE2000A5BRC	20,00	20,00	100,00	166,00	2,50	●
4124380	UGDE2000A5BRD	20,00	20,00	100,00	166,00	3,00	●
4124381	UGDE2000A5BRE	20,00	20,00	100,00	166,00	4,00	●
6063450	UGDE2000A5BRP	20,00	20,00	100,00	166,00	6,00	●
4124387	UGDE2500A5BRA	25,00	25,00	125,00	190,00	1,00	●
4124388	UGDE2500A5BRB	25,00	25,00	125,00	190,00	2,00	●
4124390	UGDE2500A5BRD	25,00	25,00	125,00	190,00	3,00	●
4124391	UGDE2500A5BRE	25,00	25,00	125,00	190,00	4,00	●
6063471	UGDE2500A5BRP	25,00	25,00	125,00	190,00	6,00	●

158–159	160	115–117	164

Solid Carbide End Milling

HARVI™ II • UCDE • Application Data • Metric



Material Group		A		B	KC643M		KCPM15		Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 10%.										
					Cutting Speed — vc m/min		Cutting Speed — vc m/min			D1 — Diameter									
		ap	ae	ap	min	max	min	max	mm	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	0	1,5 x D	0,5 x D	1 x D	150	200	150	200	fz	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	1	1,5 x D	0,5 x D	1 x D	150	200	150	200	fz	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	2	1,5 x D	0,5 x D	1 x D	140	190	140	190	fz	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	3	1,5 x D	0,5 x D	1 x D	120	160	120	160	fz	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	4	1,5 x D	0,5 x D	0,75 x D	90	150	90	150	fz	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098
	5	1,5 x D	0,5 x D	1 x D	60	100	60	100	fz	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
	6	1,5 x D	0,5 x D	0,75 x D	50	75	50	75	fz	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
M	1	1,5 x D	0,5 x D	1 x D	90	115	90	115	fz	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	2	1,5 x D	0,5 x D	1 x D	60	80	60	80	fz	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
	3	1,5 x D	0,5 x D	1 x D	60	70	60	70	fz	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
K	1	1,5 x D	0,5 x D	1 x D	120	150	120	150	fz	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	2	1,5 x D	0,5 x D	1 x D	110	140	110	140	fz	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	3	1,5 x D	0,5 x D	1 x D	110	130	110	130	fz	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
S	1	1,5 x D	0,3 x D	0,3 x D	50	90	–	–	fz	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	2	1,5 x D	0,3 x D	0,3 x D	25	40	–	–	fz	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061
	3	1,5 x D	0,3 x D	0,3 x D	25	40	–	–	fz	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061
	4	1,5 x D	0,5 x D	1 x D	50	60	–	–	fz	0,021	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074	0,084
H	1	1,5 x D	0,5 x D	0,75 x D	80	140	80	140	fz	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098

NOTE: Those guidelines may require variations to achieve optimum results.
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 >12mm diameter.

Solid Carbide End Milling

HARVI™ II • UDDE • Application Data • Metric

Material Group		A		B	KCSM15/ KC643M		Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 10%.								
					Cutting Speed — vc m/min			D1 — Diameter							
		ap	ae	ap	min	max	mm	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	5	1,5 x D	0,5 x D	1 x D	60	100	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
	6	1,5 x D	0,5 x D	0,75 x D	50	75	fz	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
K	1	1,5 x D	0,5 x D	1 x D	120	150	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	2	1,5 x D	0,5 x D	1 x D	110	140	fz	0,036	0,050	0,061	0,07	0,079	0,087	0,095	0,101	0,114
	3	1,5 x D	0,5 x D	1 x D	110	130	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
S	1	1,5 x D	0,3 x D	0,3 x D	50	90	fz	0,036	0,050	0,061	0,07	0,079	0,087	0,095	0,101	0,114
	2	1,5 x D	0,3 x D	0,3 x D	25	40	fz	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061
	3	1,5 x D	0,3 x D	0,3 x D	25	40	fz	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061
	4	1,5 x D	0,5 x D	1 x D	50	60	fz	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074	0,084
H	1	1,5 x D	0,5 x D	0,75 x D	80	140	fz	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098

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 > 12mm diameter.
Side milling applications — for longest reach (L3) tools, reduce Ae by 30%.
Slot milling applications — for longest reach (L3) tools, reduce Ae by 30%.

HARVI II UCDE & UDDE • Adjustment Factor for Feed and Speed Calculation • Metric

	Ae/D	2%	4%	5%	8%	10%	12%	20%	30%	40%	50%	100%
Speed factor	Kv	2,1—3,6	1,6—3	1,6—2,5	1,6	1,4	1,38	1,3	1,2	1,1	1	0,9
Feed factor	KFz	3,58	2,56	2,3	1,84	1,67	1,54	1,25	1,09	1,02	1	1

NOTE: For an Ae/D ratio of 5% or less there is a range given for speed factor Kv, which allows the user to either be more conservative at the lower value or more aggressive with the higher value.
This can also be considered based on the machinability of the material, from difficult to free cutting.
These calculations are for roughing/semi-finishing cuts when used with the recommeded base Fz.
For light finishing cuts requiring improved surface quality it is recommended to reduce the base Fz approximately 50% and then apply these factors.

To calculate application-specific cutting data, please use Kv coefficient table above for adaptation of cutting speed and KFz for feed respectively.

Vc new = Vc * Kv
Fz new = Fz * KFz

Calculation example:
Application: D = 20mm, HARVI II UCDE;
M2 material group;
Ae = 2mm
Cutting data recommendation: Vc = 80 m/min;
Fz = 0,089 mm/th
Adjustment coefficients: Ae = 2mm equals 10,0%;
Kv = 1,4; KFz = 1,67

Final cutting data recommendation:
Vc new = 80 * 1,4 = 112 m/min
Fz new = 0,089 * 1,67 = 0,15 mm/min

Solid Carbide End Milling

HARVI™ III • UJDE • Application Data • Metric

With Neck

Without Neck

Material Group				KCSM15		Recommended feed per tooth (fz = mm/th) for side milling (A).						
		A		Cutting Speed — vc m/min			D1 — Diameter					
		ap	ae	min	max	mm	10,0	12,0	16,0	18,0	20,0	25,0
P	4	Ap1 max	0,4 x D	90	150	fz	0,054	0,062	0,077	0,083	0,088	0,098
	5	Ap1 max	0,4 x D	60	100	fz	0,048	0,056	0,070	0,076	0,081	0,091
M	1	Ap1 max	0,4 x D	90	115	fz	0,061	0,070	0,087	0,095	0,101	0,114
	2	Ap1 max	0,4 x D	60	80	fz	0,048	0,056	0,070	0,076	0,081	0,091
	3	Ap1 max	0,4 x D	60	70	fz	0,040	0,047	0,057	0,061	0,065	0,071
S	1	Ap1 max	0,4 x D	50	90	fz	0,061	0,070	0,087	0,095	0,101	0,114
	2	Ap1 max	0,4 x D	25	40	fz	0,032	0,037	0,046	0,050	0,054	0,061
	3	Ap1 max	0,4 x D	25	40	fz	0,032	0,037	0,046	0,050	0,054	0,061
	4	Ap1 max	0,4 x D	50	60	fz	0,045	0,052	0,064	0,069	0,074	0,084
H	1	Ap1 max	0,4 x D	80	140	fz	0,054	0,062	0,077	0,083	0,088	0,098

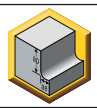
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centers, please adjust parameters accordingly on >12mm diameter.

Solid Carbide End Milling

HARVI™ III Ball Nose • UJBE • Application Data • Metric

Ball Nose

Taper Ball Nose

Material Group		 A		KCSM15 Cutting Speed — vc m/min			Recommended feed per tooth (fz = mm/th) for side milling (A). D1 — Diameter					
		ap	ae	min		max	mm	10,0	12,0	16,0	18,0	20,0	25,0
P	0	Ap max	0,4 x D	150	–	200	fz	0,072	0,083	0,101	0,108	0,114	0,124
	1	Ap max	0,4 x D	150	–	200	fz	0,072	0,083	0,101	0,108	0,114	0,124
	2	Ap max	0,4 x D	140	–	190	fz	0,072	0,083	0,101	0,108	0,114	0,124
	3	Ap max	0,4 x D	120	–	160	fz	0,061	0,070	0,087	0,095	0,101	0,114
	4	Ap max	0,4 x D	90	–	150	fz	0,054	0,062	0,077	0,083	0,088	0,098
	5	Ap max	0,4 x D	60	–	100	fz	0,048	0,056	0,070	0,076	0,081	0,091
	6	Ap max	0,4 x D	50	–	75	fz	0,040	0,047	0,057	–	0,065	0,071
M	1	Ap max	0,4 x D	90	–	115	fz	0,061	0,070	0,087	0,095	0,101	0,114
	2	Ap max	0,4 x D	60	–	80	fz	0,048	0,056	0,070	0,076	0,081	0,091
	3	Ap max	0,4 x D	60	–	70	fz	0,040	0,047	0,057	0,061	0,065	0,071
S	1	Ap max	0,4 x D	50	–	90	fz	0,061	0,070	0,087	0,095	0,101	0,114
	2	Ap max	0,4 x D	25	–	40	fz	0,032	0,037	0,046	0,050	0,054	0,061
	3	Ap max	0,4 x D	25	–	40	fz	0,032	0,037	0,046	0,050	0,054	0,061
	4	Ap max	0,4 x D	50	–	60	fz	0,045	0,052	0,064	0,069	0,074	0,084
H	1	Ap max	0,4 x D	80	–	140	fz	0,054	0,062	0,077	0,083	0,088	0,098

* For the above cutting data, do not exceed an overall Ae of 0,8mm.

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 machinining centers, please adjust parameters accordingly on >12mm diameter.

HARVI III UJDE & UJBE • Adjustment Factor for Feed and Speed Calculation • Metric

	Ae/D	2%	4%	5%	8%	10%	12%	20%	30%	40%	50%	100%
Speed factor	Kv	2,1—3,6	1,6—3	1,6—2,5	1,6	1,4	1,38	1,3	1,2	1,1	1	0,9
Feed factor	KFz	3,58	2,56	2,3	1,84	1,67	1,54	1,25	1,09	1,02	1	1

NOTE: For an Ae/D ratio of 5% or less there is a range given for speed factor Kv, which allows the user to either be more conservative at the lower value or more aggressive with the higher value.
This can also be considered based on the machinability of the material, from difficult to free cutting.
These calculations are for roughing/semi-finishing cuts when used with the recommeded base Fz.
For light finishing cuts requiring improved surface quality it is recommended to reduce the base Fz approximately 50% and then apply these factors.

To calculate application-specific cutting data, please use Kv coefficient table above for adaptation of cutting speed and KFz for feed respectively.

Vc new = Vc * Kv
Fz new = Fz * KFz

Calculation example:
Application: D = 20mm;
M2 material group;
Ae = 2mm
Cutting data recommendation: Vc = 80 m/min;
Fz = 0,089 mm/th
Adjustment coefficients: Ae = 2mm equals 10,0%;
Kv = 1,4; KFz = 1,67

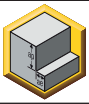
Final cutting data recommendation:
Vc new = 80 * 1,4 = 112 m/min
Fz new = 0,089 * 1,67 = 0,15 mm/min

Solid Carbide End Milling

HARVI™ II Long • UGDE • Application Data • Metric

3 x D Lengths of Cut

5 x D Lengths of Cut

Material Group		 A		KC643M Cutting Speed — vc m/min		Recommended feed per tooth (fz = mm/th) for side milling (A). D1 — Diameter							
		ap	ae	min	max	mm	6,0	8,0	10,0	12,0	14,0	16,0	20,0	25,0
P	1	Ap1 max	0,05 x D*	300	400	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,114	0,124
	2	Ap1 max	0,05 x D*	280	380	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,114	0,124
	3	Ap1 max	0,05 x D*	240	320	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,101	0,114
	4	Ap1 max	0,05 x D*	180	300	fz	0,033	0,045	0,054	0,062	0,070	0,077	0,088	0,098
	5	Ap1 max	0,05 x D*	120	200	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,081	0,091
	6	Ap1 max	0,05 x D*	100	150	fz	0,025	0,034	0,040	0,047	0,052	0,057	0,065	0,071
M	1	Ap1 max	0,05 x D*	180	230	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,101	0,114
	2	Ap1 max	0,05 x D*	120	160	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,081	0,091
	3	Ap1 max	0,05 x D*	120	140	fz	0,025	0,034	0,040	0,047	0,052	0,057	0,065	0,071
K	1	Ap1 max	0,05 x D*	240	300	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,114	0,124
	2	Ap1 max	0,05 x D*	220	260	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,101	0,114
	3	Ap1 max	0,05 x D*	200	260	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,081	0,091
S	1	Ap1 max	0,05 x D*	100	180	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,101	0,114
	2	Ap1 max	0,05 x D*	100	180	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,101	0,114
	3	Ap1 max	0,05 x D*	50	80	fz	0,019	0,026	0,032	0,037	0,042	0,046	0,054	0,061
	4	Ap1 max	0,05 x D*	100	120	fz	0,026	0,037	0,045	0,052	0,058	0,064	0,074	0,084
H	1	Ap1 max	0,05 x D*	160	280	fz	0,033	0,045	0,054	0,062	0,070	0,077	0,088	0,098

* For the above cutting data, do not exceed an overall Ae of 0,8mm.

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 machinining centers, please adjust parameters accordingly on >12mm diameter.

Solid Carbide End Milling

Application Recommendation for Surface Profiling with HARVI™ III Ball Nose Series

Not all six cutting edges reach the center of the HARVI III 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 III series), 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 III 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 III Ball Nose & HARVI III Taper Ball Nose

15°

22°

40°–45°

For tilt angles less than 15˚ and shallow profiling depths, only two cutting edges will be typically engaged. As the end mill is tilted above this, the next two edges will engage.

After reaching a tilt angle of at least 22˚, then all six edges will at least be partially engaged.

For maximum profiling performance, a tilt angle of 40˚–45˚ will result in full engagement of all edges with a wide range of cutting depths.