

**PRODUCT
SELECTION GUIDE**
Milling and Drilling



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Icon Chart

Tool Materials



Tungsten Carbide



Bright



ZrN Coating



TiAlN Coating



TiCN Coating



Diamond Coating

Tool Dimensions



Extra Long Length



Jobbers Length



Two Flutes



Four Flutes



Long Length



Regular Length



Three Flutes



Five Flutes



Stub Length



Medium Length



Multi-Flutes
Center Cut

Helix Angle



Degrees

Coolant-Through



Oil Hole

Shrink Fit



Shrink Fit



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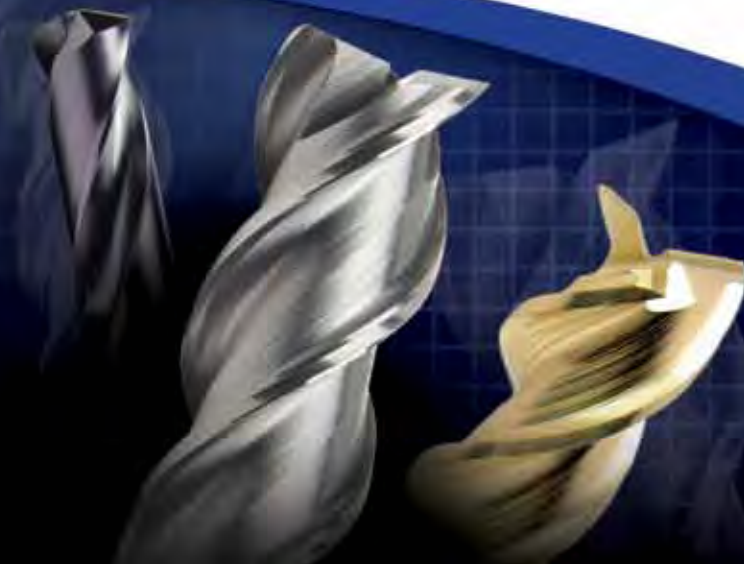
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Want the best High Performance Cutting Tools?

QCT



All of our products incorporate the disciplines of design, manufacturing and quality control. Every tool we design is developed on an advanced CAD/CAM system. The combination of our experienced technicians and the most advanced CNC equipment creates the finest high performance cutting tools available today. At QCT, integrated SPC programs are available at every work station. Our quality control processes insure total adherence to print specifications, maintaining the highest standards of quality.

Our Vision

To be recognized as a worldwide leader in the manufacturing of precision carbide cutting tools for the metal cutting industries.

Our Mission

QCT is committed to total satisfaction of our customers and the development of our employees through continuous improvement in quality, technology, engineering, product availability and service.



Company Profile

...Ask for QCT!

Engineering

All engineering work at QCT is conducted in strict compliance with procedures established by our engineering department. With the aid of our advanced computer and CAD system, every operation is identified and detailed. Customer drawings are used only as reference.

Quality Comes First!

QCT uses the industry's most advanced inspection machines, including the Walters Helicheck, PG-1000, and Keyence laser measuring scopes, to ensure conformance to our customers' specifications as well as our own rigid tolerances. The Helicheck is completely automatic and optically

checks all attributes of our standard tools. The PG-1000 couples 300X zoom with accuracy of 0.0001" and is used to verify all custom tooling. The Keyence laser scope permits accurate (within 0.01 microns) measurement of runout and diameter of all tools, instead of using a micrometer, which is cumbersome and can damage the tool itself.



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End Mills and Burrs

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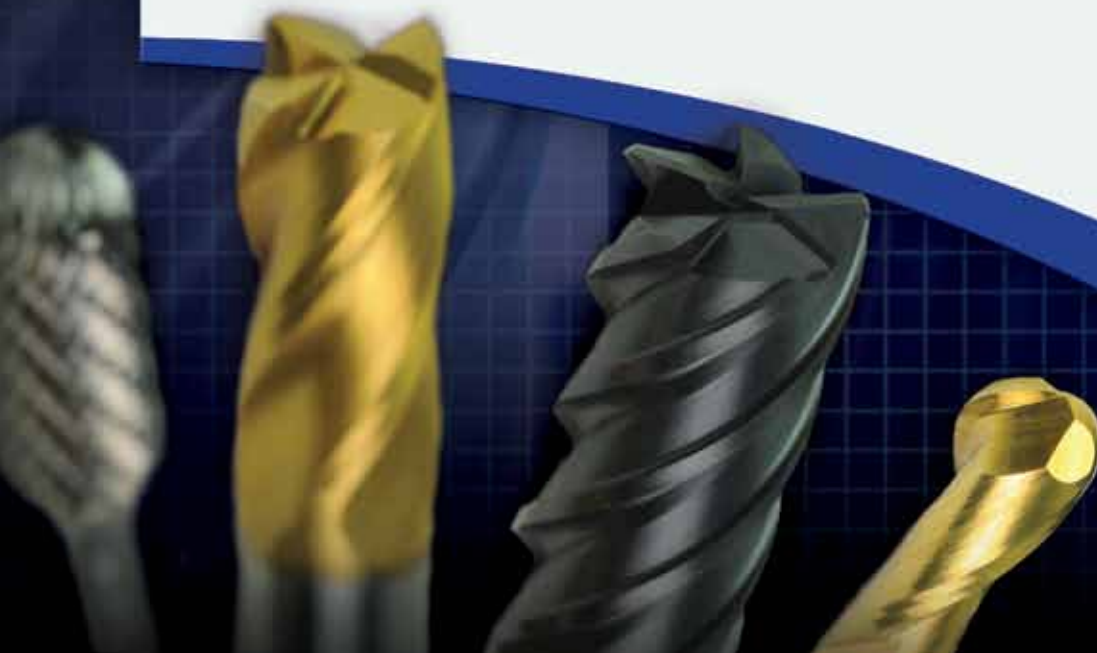
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END MILLS

High Performance Carbide

Premium coated end mills made from micrograin carbide designed for exceptional tool life in a variety of materials.







Standard Carbide

Multi-purpose, high quality end mills made from micrograin carbide.












HIGH PERFORMANCE END MILLS FOR ALUMINUM

Sub-micrograin Carbide End Mills

Product	Series No.	Page	Tech Page	Operation	Type	Description
	HP440 440	16	72	A1, A2, B1	Square End	Q-Carb, 2 Flute
	HP443	17	72	A1, A2, B1	Square End	Q-Carb, 3 Flute
	HP470 470	18	73	A1, A2, B1	Square End	Aluminum Cutter End Mill, Short Length
	HP471 471	19	73	A1, A2, B1	Square End	Aluminum Cutter End Mill, Regular Length
	HP475 475	20	74	A1, A2, B1	Square End	Aluminum Cutter End Mill, Short Length
	HP476 476	21	74	A1, A2, B2	Square End	Aluminum Cutter End Mill, Regular Length

HIGH PERFORMANCE END MILLS

Sub-micrograin Carbide TiAlN Coated End Mills

Product	Series No.	Page	Tech Page	Operation	Type	Description
	HP421	22	75, 77	A1, A2, B1	Square End	
	HP441	23	76, 77	A1, A2, B1	Square End	
	HP460	24	78	A1, A2, B1	Square End	High Helix
	HP455	25	79	A1, A2	Square End	Corner Protection, for Exotics
	HP450	26	80	A1, A2	Square End	
	HP450L	26	80	A1, A2	Square End	Long Length
	HP451	27	81	A1, A2, B1	Square End	Super Tough Mills
	HP453	28	81	A1, A2, B1	Square End	Super Tough Mills
	HP456	29	81	A1, A2, B1	Square End	Super Tough Mills, Corner Radius



❖ best
◆ good

Car. Steel Prehard. Alloy Steel Tool Steel	Prehardened Steel, Hardened Steel						Copper Alloys	Aluminum Alloys	Graphite	Ti-Alloy	High-Heat Material
	~45 Hrc	55 Hrc	60 Hrc	65 Hrc	Stainless Steel	Cast Iron Ductile Cast Iron					
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							❖	❖			
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Aluminum		Cast Iron	Low Carbon Steel	Med. Carbon Steel	High Carbon Steel	Alloy Steel	Die Steels	Titanium Alloy	High Nickel Alloy	Stainless Steels			Hardened Steels		
6061 7075	Castings		1010 1018	1035 1045	1065	4140 4340	20 Hrc	6AL4V (30Hrc)	Inconel	300	400	17-4PH	~35 Hrc	35-45 Hrc	45-50 Hrc
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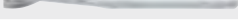
HIGH PERFORMANCE END MILLS (CONTINUED)

Sub-micrograin Carbide TiAlN Coated End Mills

Product	Series No.	Page	Tech Page	Operation	Type	Description
	HP400	30	82	A1, A2, B1	Square End	Rougher
	HP411	31	83	A2, B1	Square End	Short Length, Long Neck
	HP410	32	84	A2, B1	Square End	Short Length, Long Neck
	HP410L	32	84	A2, B1	Square End	Short Length, Long Neck
	HP432	33	85, 87	A3, B3, C1, D2	Corner Radius	2-Flute
	HP433	34	85, 87	A3, B3, C1, D2	Corner Radius	2-Flute
	HP434	35	86-87	A3, B3, C1, D2	Corner Radius	4-Flute
	HP435	36	86-87	A3, B3, C1, D2	Corner Radius	4-Flute
	HP421BN	37	88	B2, C1, D1	Ball End	
	HP441BN	38	88	B2, C1, D1	Ball End	
	HP413	39	89	B2, C1, D1	Ball End	
	HP419	40	89	B2, C1, D1	Ball End	Rib Cutting
	HP419L	40	89	B2, C1, D1	Ball End	Rib Cutting
	HP497	41	90	B2, C1, D1	Ball End	
	HP418	42	91	A5, C1, D1	Ball End	
	HP416	43	92, 93	B2, C1, D1	Ball End	
	HP407BN	44	94	B2, C1, D1	Ball End	

CARBIDE END MILLS

Micro-grain Carbide End Mills

Product	Series No.	Page	Tech Page	Operation	Type	Description
	400	46	-	A1, A2, B1	Square End	Rougher
	402	47	95	A1, A2, B1	Square End	
	403	47	95	A1, A2, B1	Square End	



❖ best
◆ good

Aluminum		Cast Iron	Low Carbon Steel	Med. Carbon Steel	High Carbon Steel	Alloy Steel	Die Steels	Titanium Alloy	High Nickel Alloy	Stainless Steels			Hardened Steels		
6061 7075	Castings		1010 1018	1035 1045	1065	4140 4340	20 Hrc	6AL4V (30HrC)	Inconel	300	400	17-4PH	~35 HrC	35-45 HrC	45-50 HrC
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Aluminum		Cast Iron	Low Carbon Steel	Med. Carbon Steel	High Carbon Steel	Alloy Steel	Die Steels	Titanium Alloy	High Nickel Alloy	Stainless Steels			Hardened Steels		
6061 7075	Castings		1010 1018	1035 1045	1065	4140 4340	20 Hrc	6AL4V (30HrC)	Inconel	300	400	17-4PH	~35 HrC	35-45 HrC	45-50 HrC
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CARBIDE END MILLS (CONTINUED)

Micro-grain Carbide End Mills

Product	Series No.	Page	Tech Page	Operation	Type	Description
	404	47	96	A1, A2, B1	Square End	General Purpose
	412	48	95	A1, A2, B1	Square End	Stub Length
	414	48	96	A1, A2, B1	Square End	Stub Length
	462	49	95	A1, A2, B1	Square End	Long Length
	464	49	96	A1, A2, B1	Square End	Long Length
	482	50	95	A1, A2, B1	Square End	Extra-Long Length
	484	50	96	A1, A2, B1	Square End	Extra-Long Length
	455	51	-	A1, A2	Square End	Five Flute
	460	52	-	A1, A2, B1	Square End	High Helix
	445	53	95	A1, A2, B1	Square End	RHS/RHC
	461	54	-	A1, A2	Square End	RHS/RHC
	402BN	55	98	B2, C1, D1	Ball End	
	403BN	55	98	B2, C1, D1	Ball End	
	404BN	55	99	B2, C1, D1	Ball End	
	412BN	56	98	B2, C1, D1	Ball End	
	414BN	56	99	B2, C1, D1	Ball End	
	462BN	57	98	B2, C1, D1	Ball End	
	464BN	57	99	B2, C1, D1	Ball End	
	482BN	58	98	B2, C1, D1	Ball End	
	484BN	58	99	B2, C1, D1	Ball End	
	497	59	97	B2, C1, D1	Ball End	









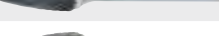

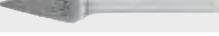





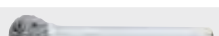









◆ best
◆ good

Aluminum		Cast Iron	Low Carbon Steel	Med. Carbon Steel	High Carbon Steel	Alloy Steel	Die Steels	Titanium Alloy	High Nickel Alloy	Stainless Steels			Hardened Steels		
6061 7075	Castings		1010 1018	1035 1045	1065	4140 4340	20 Hrc	6AL4V (30Hrc)	Inconel	300	400	17-4PH	~35 Hrc	35-45 Hrc	45-50 Hrc
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CARBIDE BURS

Micrograin Carbide Burs

Product	Series No.	Page	Type	Description
	801	60	Regular Length	Cylindrical
	802	60	Regular Length	Cylindrical Ball End
	803	60	Regular Length	Round Nose Tree
	901	60	Regular Length	Cylindrical
	902	60	Regular Length	Cylindrical Ball End
	903	60	Regular Length	Round Nose Tree
	804	61	Regular Length	Pointed Tree
	805	61	Regular Length	Pointed Cone
	806	61	Regular Length	Egg Shape
	904	61	Regular Length	Pointed Tree
	905	61	Regular Length	Pointed Cone
	906	61	Regular Length	Egg Shape
	807	62	Regular Length	14° Included Angle
	808	62	Regular Length	Ball Shape
	849	62	Regular Length	90° Cone
	907	62	Regular Length	14° Included Angle
	908	62	Regular Length	Ball Shape
	949	62	Regular Length	90° Cone
	850	63	Regular Length	60° Cone
	851	63	Regular Length	Flame Shape
	852	63	Regular Length	Inverted Taper
	950	63	Regular Length	60° Cone
	951	63	Regular Length	Flame Shape
	952	63	Regular Length	Inverted Taper



CARBIDE BURS (CONTINUED)

Micrograin Carbide Burs

Product	Series No.	Page	Type	Description
	861	64	152mm Long Shank	Cylindrical
	862	64	152mm Long Shank	Cylindrical Ball End
	863	64	152mm Long Shank	Round Nose Tree
	961	64	152mm Long Shank	Cylindrical
	962	64	152mm Long Shank	Cylindrical Ball End
	963	64	152mm Long Shank	Round Nose Tree
	867	65	152mm Long Shank	14° Included Angle
	868	65	152mm Long Shank	Ball Shape
	967	65	152mm Long Shank	14° Included Angle
	968	65	152mm Long Shank	Ball Shape
	800	66	38mm OAL	Tough Cut
	900	67	38mm OAL	Medium Right Hand Spiral
	815	68	38mm OAL	Tough Cut
	915	68	38mm OAL	Medium Right Hand Spiral
	820	69	38mm OAL	Tough Cut
	920	69	38mm OAL	Medium Right Hand Spiral
	881	70	Aluminum	Cylindrical
	882	70	Aluminum	Cylindrical Ball End
	883	70	Aluminum	Round Nose Tree
	885	70	Aluminum	Flame Shape
	886	70	Aluminum	Egg Shape
	887	70	Aluminum	14° Included Angle
	888	70	Aluminum	Ball Shape



HP END MILLS

High Performance Carbide

Premium coated end mills made from micrograin carbide designed for exceptional tool life in a variety of materials.

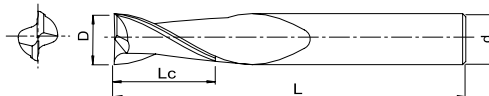


HP END MILLS FOR ALUMINUM

Sub-Micrograin Carbide End Mills

SERIES HP440

Q-Carb Mills - 2 Flute - Bright & TiCN Coated



EDP Number		Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
440	HP440				
-	HP440-1181	3	64	10	6
-	HP440-1575	4	64	14	6
-	HP440-1968	5	64	15	6
440-2362	HP440-2362	6	64	19	6
440-2363	HP440-2363	6	102	38	6
440-3150	HP440-3150	8	64	21	8
440-3151	HP440-3151	8	102	41	8
440-3937	HP440-3937	10	70	25	10
440-3938	HP440-3938	10	102	51	10
440-4724	HP440-4724	12	76	26	12
440-4725	HP440-4725	12	102	51	12
440-6299	HP440-6299	16	89	32	16
440-6300	HP440-6300	16	127	57	16
440-7874	HP440-7874	20	102	38	20
440-7875	HP440-7875	20	127	57	20
440-9843	HP440-9843	25	127	57	25
440-9844	HP440-9844	25	153	76	25

Packed: 1 pc. Set Screw Flat, Weldon Flat, Corner Radius or special tolerances available on request.

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P74	CARBIDE	TiCN	BRIGHT		40°	SHRINK FIT
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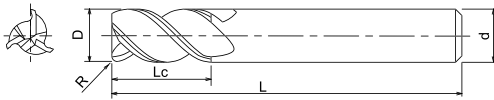
HP END MILLS FOR ALUMINUM

Sub-Micrograin Carbide End Mills



SERIES HP443

Regular Length, 3 Flute, Square, 45° Helix



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
430-6474	3	50	6	3
430-6475	3	50	9	3
430-6476	4	50	8	4
430-6477	4	50	12	4
430-6478	5	50	12	5
430-6479	6	64	12	6
430-6480	6	76	18	6
430-6481	8	64	16	8
430-6482	8	76	24	8
430-6483	10	64	20	10
430-6484	10	76	30	10
430-6485	12	76	24	12
430-6486	12	90	36	12
430-6487	14	90	30	14
430-6488	16	90	32	16
430-6489	16	105	48	16
430-6490	18	105	40	18
430-6491	20	105	40	20
430-6492	20	125	60	20

Packed: 1 pc. DLC coating available on request.



Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P75	CARBIDE	BRIGHT		Regular Length		SHRINK FIT
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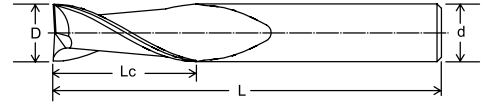


HP END MILLS FOR ALUMINUM

Sub-Micrograin Carbide End Mills

SERIES HP470

ACE (Aluminum Cutter End mill), 2 Flute



EDP Number		Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
470	HP470				
470-1181	HP470-1181	3	38	4.5	6
470-1575	HP470-1575	4	51	6	6
470-2362	HP470-2362	6	64	9	6
470-3150	HP470-3150	8	64	12	6
470-3937	HP470-3937	10	64	15	6
470-4724	HP470-4724	12	76	18	8
470-6299	HP470-6299	16	89	24	8
470-7874	HP470-7874	20	102	30	10
470-9843	HP470-9843	25	102	37.5	10

Packed: 1 pc. Available Bright finish and ZrN coating only.

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P76	CARBIDE	BRIGHT	ZrN		30°	SHRINK FIT
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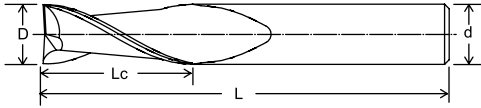
HP END MILLS FOR ALUMINUM

Sub-Micrograin Carbide End Mills



SERIES HP471

ACE (Aluminum Cutter End mill), 2 Flute



EDP Number		Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
471	HP471				
471-1181	HP471-1181	3	38	7.5	6
471-1575	HP471-1575	4	51	10	6
471-2362	HP471-2362	6	64	15	6
471-3150	HP471-3150	8	64	20	8
471-3937	HP471-3937	10	64	25	10
471-4724	HP471-4724	12	76	30	12
471-6299	HP471-6299	16	89	40	16
471-7874	HP471-7874	20	102	50	20
471-9843	HP471-9843	25	127	62.5	25

Packed: 1 pc. Available Bright finish and ZrN coating only.



Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P76	CARBIDE	BRIGHT	ZrN		 30°	SHRINK FIT
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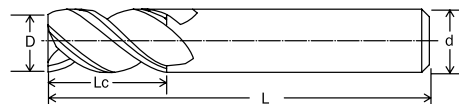


HP END MILLS FOR ALUMINUM

Sub-Micrograin Carbide End Mills

SERIES HP475

ACE (Aluminum Cutter End Mill), 3 Flute



EDP Number		Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
475	HP475				
475-1181	HP475-1181	3	38	4.5	6
475-1575	HP475-1575	4	51	6	6
475-2362	HP475-2362	6	64	9	6
475-3150	HP475-3150	8	64	12	8
475-3937	HP475-3937	10	64	15	10
475-4724	HP475-4724	12	76	18	12
475-6299	HP475-6299	16	89	24	16
475-7874	HP475-7874	20	102	30	20
475-9843	HP475-9843	25	102	37.5	25

Packed: 1 pc. Available Bright finish and ZrN coating only.

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P77	CARBIDE	BRIGHT	ZrN			SHRINK FIT
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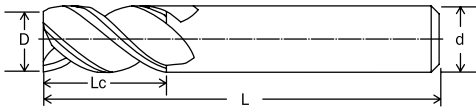
HP END MILLS FOR ALUMINUM

Sub-Micrograin Carbide End Mills



SERIES HP476

ACE (Aluminum Cutter End Mill), 3 Flute



EDP Number		Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
476	HP476				
476-1181	HP476-1181	3	38	7.5	6
476-1575	HP476-1575	4	51	10	6
476-2362	HP476-2362	6	64	15	6
476-3150	HP476-3150	8	64	20	8
476-3937	HP476-3937	10	64	25	10
476-4724	HP476-4724	12	76	30	12
476-6299	HP476-6299	16	89	40	16
476-7874	HP476-7874	20	102	50	20
476-9843	HP476-9843	25	127	62.5	25

Packed: 1 pc. Available Bright finish and ZrN coating only.



Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P77	CARBIDE	BRIGHT	ZrN		 40°	SHRINK FIT
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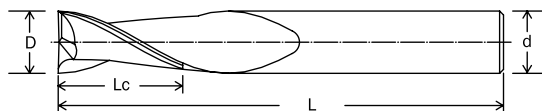


HP END MILLS

Sub-Micrograin Carbide TiAlN Coated End Mills

SERIES HP421

2 Flute, TiAlN Coated



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
HP421-0394	1.0	39	3	3
HP421-0591	1.5	39	5	3
HP421-0787	2.0	39	7	3
HP421-0984	2.5	39	8	3
HP421-1181	3.0	39	10	3
HP421-1378	3.5	51	12	4
HP421-1575	4.0	51	14	4
HP421-1772	4.5	51	14	5
HP421-1968	5.0	51	16	5
HP421-2362	6.0	64	19	6
HP421-2756	7.0	64	19	8
HP421-3150	8.0	64	21	8
HP421-3543	9.0	70	22	10
HP421-3937	10.0	70	25	10
HP421-4331	11.0	70	25	11
HP421-4724	12.0	76	25	12
HP421-5512	14.0	89	30	14
HP421-6299	16.0	89	32	16
HP421-7087	18.0	102	35	18
HP421-7874	20.0	102	38	20
HP421-8661	22.0	102	38	22
HP421-9843	25.0	102	38	25

Packed: 1 pc. Set Screw Flat, Weldon Flat, Corner Radius or special tolerances available on request.

Tolerances:

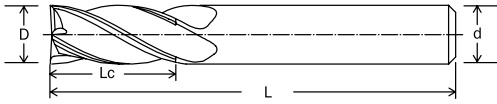
Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P79.81	CARBIDE	TIAlN		 35°	SHRINK FIT
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SERIES HP441
4 Flute, TiAlN Coated



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
HP441-0394	1.0	39	3	3
HP441-0591	1.5	39	5	3
HP441-0787	2.0	39	7	3
HP441-0984	2.5	39	8	3
HP441-1181	3.0	39	10	3
HP441-1378	3.5	51	12	4
HP441-1575	4.0	51	14	4
HP441-1772	4.5	51	14	5
HP441-1968	5.0	51	16	5
HP441-2362	6.0	64	19	6
HP441-2756	7.0	64	19	8
HP441-3150	8.0	64	21	8
HP441-3543	9.0	70	22	10
HP441-3937	10.0	70	25	10
HP441-4331	11.0	70	25	11
HP441-4724	12.0	76	25	12
HP441-5512	14.0	89	30	14
HP441-6299	16.0	89	32	16
HP441-7087	18.0	102	35	18
HP441-7874	20.0	102	38	20
HP441-8661	22.0	102	38	22
HP441-9843	25.0	102	38	25

Set Screw Flat, Weldon Flat, Corner Radius or special tolerances available on request.



Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P80-81	CARBIDE	TiAlN		 35°	SHRINK FIT
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HP END MILLS

Sub-Micrograin Carbide TiAlN Coated End Mills

SERIES HP460

3 Flute, TiAlN Coated



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
HP460-1181	3	64	12	6
HP460-1575	4	64	14	6
HP460-1968	5	64	16	6
HP460-2362	6	64	19	6
HP460-3150	8	64	21	8
HP460-3937	10	70	25	10
HP460-4724	12	76	25	12
HP460-5512	14	89	29	14
HP460-6299	16	89	32	16
HP460-7087	18	102	38	18
HP460-7874	20	102	38	20
HP460-9843	25	102	38	25

Packed: 1 pc. Set Screw Flat, Weldon Flat, Corner Radius or special tolerances available on request.

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P82	CARBIDE	TiAlN		60°	SHRINK FIT
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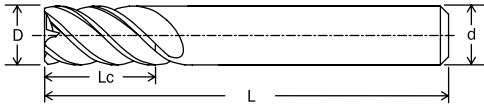
HP END MILLS

Sub-Micrograin Carbide TiAlN Coated End Mills



SERIES HP455

5 Flute, TiAlN Coated, **Designed for Exotics**



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
HP455-1181	3	39	9	3
HP455-1575	4	51	14	4
HP455-1968	5	51	16	5
HP455-2362	6	64	19	6
HP455-2756	7	64	19	8
HP455-3150	8	64	21	8
HP455-3937	10	70	22	10
HP455-4331	11	70	25	11
HP455-4724	12	76	25	12
HP455-5512	14	89	30	14
HP455-6299	16	89	32	16
HP455-7874	20	102	38	20
HP455-9843	25	102	38	25

Packed: 1 pc. Set Screw Flat, Weldon Flat or special tolerances available on request.



Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P83	CARBIDE	TiAlN		 45°	SHRINK FIT
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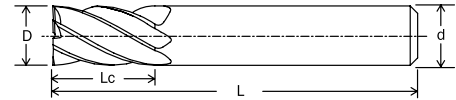


HP END MILLS

Sub-Micrograin Carbide TiAlN Coated End Mills

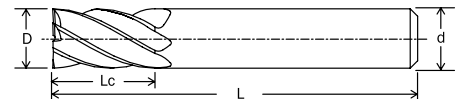
SERIES HP450 & HP450L

Rocket Mills, Multiple Flute, TiAlN Coated



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)	No. of Flutes
HP450-1181	3	51	10	6	4
HP450-1575	4	51	14	6	4
HP450-1969	5	51	16	6	4
HP450-2362	6	64	19	6	6
HP450-3150	8	64	21	8	6
HP450-3937	10	64	25	10	6
HP450-4724	12	76	25	12	6
HP450-5512	14	89	30	14	6
HP450-6299	16	89	35	16	6
HP450-7087	18	102	35	18	6
HP450-7874	20	102	38	20	6
HP450-8661	22	102	38	22	6
HP450-9843	25	102	38	25	8

Packed: 1 pc. Set Screw Flat, Weldon Flat, Corner Radius or special tolerances available on request.



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)	No. of Flutes
HP450L-2362	6	100	26	6	6
HP450L-3150	8	100	36	8	6
HP450L-3937	10	100	46	10	6
HP450L-4724	12	110	56	12	6
HP450L-6299	16	130	66	16	6
HP450L-7874	20	140	76	20	6
HP450L-9843	25	180	92	25	8

Packed: 1 pc. Set Screw Flat, Weldon Flat, Corner Radius or special tolerances available on request.

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P84	CARBIDE	TiAlN		50°	SHRINK FIT
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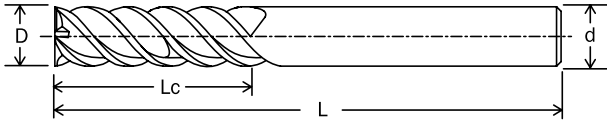
HP END MILLS

Sub-Micrograin Carbide TiAlN Coated End Mills



SERIES HP451

Super Tough Mills, 4 Flute, TiAlN Coated



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
HP451-1575	4	60	12	6
HP451-2362	6	60	15	6
HP451-3150	8	75	20	8
HP451-3937	10	80	25	10
HP451-4724	12	102	30	12
HP451-6299	16	110	40	16
HP451-7874	20	125	45	20

Packed: 1 pc. Set Screw Flat, Weldon Flat, Corner Radius or special tolerances available on request.



Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P85	CARBIDE	TiAlN		50°	SHRINK FIT
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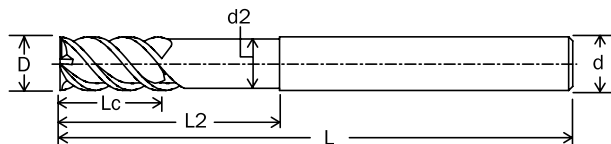


HP END MILLS

Sub-Micrograin Carbide TiAlN Coated End Mills

SERIES HP453

Super Tough Mills, 4 Flute, Neck, TiAlN Coated



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Neck Diameter (d2)	Neck Length (L1)	Shank Diameter (d)
HP453-1575	4	60	6	3.9	12	6
HP453-2362	6	60	9	5.9	18	6
HP453-3150	8	75	12	7.9	24	8
HP453-3937	10	80	15	9.9	30	10
HP453-4724	12	102	18	11.9	36	12
HP453-6299	16	110	24	15.9	48	16
HP453-7874	20	125	30	19.9	60	20

Packed: 1 pc. Set Screw Flat, Weldon Flat, Corner Radius or special tolerances available on request.

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P85	CARBIDE	TiAlN		50°	SHRINK FIT
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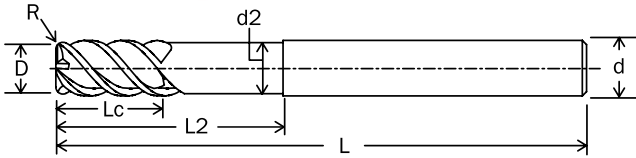
HP END MILLS

Sub-Micrograin Carbide TiAlN Coated End Mills



SERIES HP456

Super Tough Mills, 4 Flute, Neck, Corner Radius, TiAlN Coated



EDP Number	Milling Diameter (D)	Corner Radius (R)	Overall Length (L)	Length of Cut (Lc)	Neck Diameter (d2)	Neck Length (L1)	Shank Diameter (d)
HP456-2363	6	0.5	60	9	5.9	18	6
HP456-2364	6	1	60	9	5.9	18	6
HP456-3151	8	0.5	75	12	7.9	24	8
HP456-3152	8	1	75	12	7.9	24	8
HP456-3938	10	0.5	80	15	9.9	30	10
HP456-3939	10	1	80	15	9.9	30	10
HP456-4725	12	0.5	102	18	11.9	36	12
HP456-4726	12	1	102	18	11.9	36	12
HP456-4727	12	1.5	102	18	11.9	36	12

Packed: 1 pc. Set Screw Flat, Weldon Flat, Corner Radius or special tolerances available on request.



Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P85	CARBIDE	TiAlN		50°	SHRINK FIT
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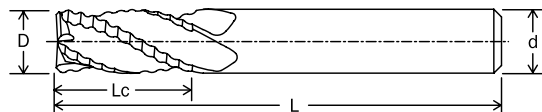


HP END MILLS

Sub-Micrograin Carbide TiAlN Coated End Mills

SERIES HP400

Roughy Mills, 4 Flute, TiAlN Coated



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
HP400-1181	3	64	10	6
HP400-1575	4	64	14	6
HP400-1968	5	64	15	6
HP400-2362	6	64	19	6
HP400-3150	8	64	21	8
HP400-3937	10	70	25	10
HP400-4724	12	76	25	12
HP400-6299	16	89	32	16
HP400-7874	20	102	38	20
HP400-9843	25	102	38	25

Packed: 1 pc. Set Screw Flat, Weldon Flat, Corner Radius or special tolerances available on request.

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P86	CARBIDE	TiAlN		 30°	SHRINK FIT
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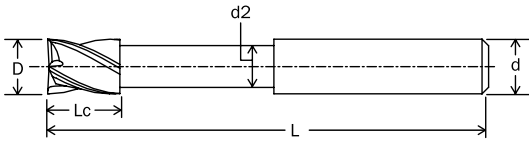
HP END MILLS

Sub-Micrograin Carbide TiAlN Coated End Mills



SERIES HP411

Short Length, Long Neck, 4 Flute, TiAlN Coated



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Neck Diameter (d2)	Neck Length (L1)	Shank Diameter (d)
HP411-1181	3	70	4.5	2.85	15	6
HP411-1378	3.5	70	5.3	3.35	17.5	6
HP411-1575	4	70	6	3.85	20	6
HP411-1969	5	80	7.5	4.85	25	6
HP411-2362	6	90	9	5.85	30	6

Packed: 1 pc.



Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P87	CARBIDE	TiAlN		30°	SHRINK FIT
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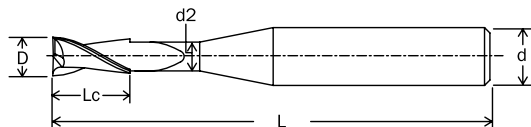


HP END MILLS

Sub-Micrograin Carbide TiAlN Coated End Mills

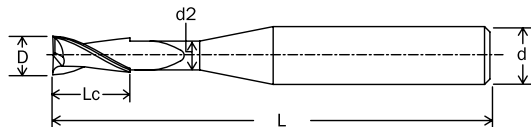
SERIES HP410 & 410L

Short Length, 2 Flute, TiAlN Coated



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Neck Diameter (d2)	Neck Length (L1)	Shank Diameter (d)
HP410-0197	0.5	60	0.7	0.45	2.5	6
HP410-0236	0.6	60	0.9	0.55	3	6
HP410-0315	0.8	60	1.2	0.75	4	6
HP410-0394	1	60	1.5	0.95	5	6
HP410-0472	1.2	60	1.8	1.15	6	6
HP410-0551	1.4	60	2.1	1.35	7.0	6
HP410-0591	1.5	60	2.3	1.45	7.5	6
HP410-0630	1.6	60	2.4	1.55	8.0	6
HP410-0709	1.8	60	2.7	1.75	9.0	6
HP410-0787	2	60	3	1.95	10.0	6
HP410-0984	2.5	60	3.7	2.40	12.5	6

Packed: 1 pc.



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Neck Diameter (d2)	Neck Length (L1)	Shank Diameter (d)
HP410L-0197	0.5	60	0.7	0.45	4	6
HP410L-0198	0.5	60	0.7	0.45	6	6
HP410L-0236	0.6	60	0.9	0.55	6	6
HP410L-0315	0.8	60	1.2	0.75	6	6
HP410L-0394	1	60	1.5	0.95	8	6
HP410L-0395	1	60	1.5	0.95	12	6
HP410L-0472	1.2	60	1.8	1.15	10	6
HP410L-0551	1.4	60	2.1	1.35	12	6
HP410L-0552	1.4	60	2.1	1.35	16	6
HP410L-0591	1.5	60	2.3	1.45	10	6
HP410L-0592	1.5	60	2.3	1.45	20	6
HP410L-0630	1.6	60	2.4	1.55	12	6
HP410L-0631	1.6	60	2.4	1.55	20	6
HP410L-0709	1.8	60	2.7	1.75	6	6
HP410L-0710	1.8	60	2.7	1.75	12	6
HP410L-0711	1.8	60	2.7	1.75	20	6
HP410L-0787	2	60	3	1.95	6	6
HP410L-0788	2	60	3	1.95	16	6
HP410L-0789	2	60	3	1.95	20	6

Packed: 1 pc.

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

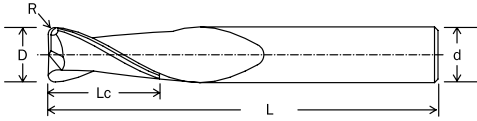
Details:

Speeds & Feeds P88	CARBIDE	TiAlN		30°	SHRINK FIT
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SERIES HP432
Corner Radius, 2 Flute, TiAlN Coated



EDP Number	Milling Diameter (D)	Corner Radius (R)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
HP432-1181	3	0.2	60	8	6
HP432-1182	3	0.5	60	8	6
HP432-1575	4	0.2	70	11	6
HP432-1576	4	0.5	70	11	6
HP432-1577	4	1	70	11	6
HP432-1960	5	0.2	80	13	6
HP432-1961	5	0.5	80	13	6
HP432-1962	5	1	80	13	6
HP432-2360	6	0.2	80	13	6
HP432-2361	6	0.5	80	13	6
HP432-2362	6	1	80	13	6
HP432-2363	6	1.5	80	13	6
HP432-2364	6	2	80	13	6
HP432-3150	8	0.5	100	19	8
HP432-3151	8	1	100	19	8
HP432-3152	8	1.5	100	19	8
HP432-3153	8	2	100	19	8
HP432-3930	10	0.5	100	22	10
HP432-3931	10	1	100	22	10
HP432-3932	10	1.5	100	22	10
HP432-3933	10	2	100	22	10
HP432-3934	10	3	100	22	10
HP432-4720	12	0.5	110	26	12
HP432-4721	12	1	110	26	12
HP432-4722	12	1.5	110	26	12
HP432-4723	12	2	110	26	12
HP432-4724	12	3	110	26	12

Packed: 1 pc. Set Screw Flat, Weldon Flat or special tolerances available on request.



Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P89_91	CARBIDE	TiAlN		35°	SHRINK FIT
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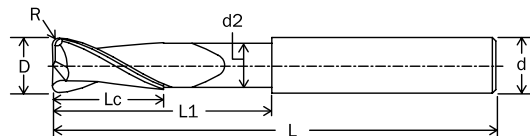


HP END MILLS

Sub-Micrograin Carbide TiAlN Coated End Mills

SERIES HP433

Corner Radius, 2 Flute, Neck, TiAlN Coated



EDP Number	Milling Diameter (D)	Corner Radius (R)	Overall Length (L)	Length of Cut (Lc)	Neck Diameter (d2)	Neck Length (L1)	Shank Diameter (d)
HP433-1181	3	0.2	60	4.5	2.8	14	6
HP433-1182	3	0.5	60	4.5	2.8	14	6
HP433-1575	4	0.2	70	6	3.7	25	6
HP433-1576	4	0.5	70	6	3.7	25	6
HP433-1577	4	1	70	6	3.7	25	6
HP433-1960	5	0.2	80	7.5	4.6	30	6
HP433-1961	5	0.5	80	7.5	4.6	30	6
HP433-1962	5	1	80	7.5	4.6	30	6
HP433-2360	6	0.2	80	9	5.5	35	6
HP433-2361	6	0.5	80	9	5.5	35	6
HP433-2362	6	1	80	9	5.5	35	6
HP433-2363	6	1.5	80	9	5.5	35	6
HP433-2364	6	2	80	9	5.5	35	6
HP433-3150	8	0.5	100	12	7.4	40	8
HP433-3151	8	1	100	12	7.4	40	8
HP433-3152	8	1.5	100	12	7.4	40	8
HP433-3153	8	2	100	12	7.4	40	8
HP433-3930	10	0.5	100	15	9.2	45	10
HP433-3931	10	1	100	15	9.2	45	10
HP433-3932	10	1.5	100	15	9.2	45	10
HP433-3933	10	2	100	15	9.2	45	10
HP433-3934	10	3	100	15	9.2	45	10
HP433-4720	12	0.5	110	18	11.0	50	12
HP433-4721	12	1	110	18	11.0	50	12
HP433-4722	12	1.5	110	18	11.0	50	12
HP433-4723	12	2	110	18	11.0	50	12
HP433-4724	12	3	110	18	11.0	50	12

Packed: 1 pc. Set Screw Flat, Weldon Flat or special tolerances available on request.

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P89,91	CARBIDE	TiAlN		30°	SHRINK FIT
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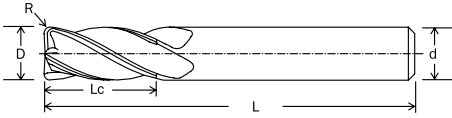
HP END MILLS

Sub-Micrograin Carbide TiAlN Coated End Mills



SERIES HP434

Corner Radius, 4 Flute, TiAlN Coated



EDP Number	Milling Diameter (D)	Corner Radius (R)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
HP434-1181	3	0.2	60	8	6
HP434-1182	3	0.5	60	8	6
HP434-1575	4	0.2	70	11	6
HP434-1576	4	0.5	70	11	6
HP434-1577	4	1	70	11	6
HP434-1960	5	0.2	80	13	6
HP434-1961	5	0.5	80	13	6
HP434-1962	5	1	80	13	6
HP434-2360	6	0.2	80	13	6
HP434-2361	6	0.5	80	13	6
HP434-2362	6	1	80	13	6
HP434-2363	6	1.5	80	13	6
HP434-2364	6	2	80	13	6
HP434-3150	8	0.5	100	19	8
HP434-3151	8	1	100	19	8
HP434-3152	8	1.5	100	19	8
HP434-3153	8	2	100	19	8
HP434-3930	10	0.5	100	22	10
HP434-3931	10	1	100	22	10
HP434-3932	10	1.5	100	22	10
HP434-3933	10	2	100	22	10
HP434-3934	10	3	100	22	10
HP434-4720	12	0.5	110	26	12
HP434-4721	12	1	110	26	12
HP434-4722	12	1.5	110	26	12
HP434-4723	12	2	110	26	12
HP434-4724	12	3	110	26	12

Packed: 1 pc. Set Screw Flat, Weldon Flat or special tolerances available on request.



Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P90,91	CARBIDE	TiAlN		30°	SHRINK FIT
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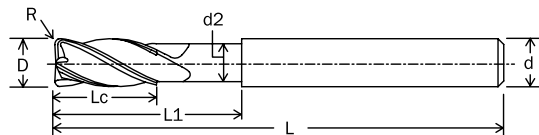


HP END MILLS

Sub-Micrograin Carbide TiAlN Coated End Mills

SERIES HP435

Corner Radius, 4 Flute, Neck, TiAlN Coated



EDP Number	Milling Diameter (D)	Corner Radius (R)	Overall Length (L)	Length of Cut (Lc)	Neck Diameter (d2)	Neck Length (L1)	Shank Diameter (d)
HP435-1181	3	0.2	60	4.5	2.8	14	6
HP435-1182	3	0.5	60	4.5	2.8	14	6
HP435-1575	4	0.2	70	6	3.7	25	6
HP435-1576	4	0.5	70	6	3.7	25	6
HP435-1577	4	1	70	6	3.7	25	6
HP435-1960	5	0.2	80	7.5	4.6	30	6
HP435-1961	5	0.5	80	7.5	4.6	30	6
HP435-1962	5	1	80	7.5	4.6	30	6
HP435-2360	6	0.2	80	9	5.5	35	6
HP435-2361	6	0.5	80	9	5.5	35	6
HP435-2362	6	1	80	9	5.5	35	6
HP435-2363	6	1.5	80	9	5.5	35	6
HP435-2364	6	2	80	9	5.5	35	6
HP435-3150	8	0.5	100	12	7.4	40	8
HP435-3151	8	1	100	12	7.4	40	8
HP435-3152	8	1.5	100	12	7.4	40	8
HP435-3153	8	2	100	12	7.4	40	8
HP435-3930	10	0.5	100	15	9.2	45	10
HP435-3931	10	1	100	15	9.2	45	10
HP435-3932	10	1.5	100	15	9.2	45	10
HP435-3933	10	2	100	15	9.2	45	10
HP435-3934	10	3	100	15	9.2	45	10
HP435-4720	12	0.5	110	18	11.0	50	12
HP435-4721	12	1	110	18	11.0	50	12
HP435-4722	12	1.5	110	18	11.0	50	12
HP435-4723	12	2	110	18	11.0	50	12
HP435-4724	12	3	110	18	11.0	50	12

Packed: 1 pc. Set Screw Flat, Weldon Flat or special tolerances available on request.

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

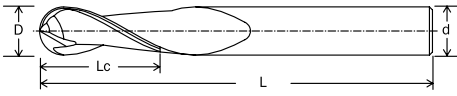
Details:

Speeds & Feeds P90,91	CARBIDE	TiAlN		30°	SHRINK FIT
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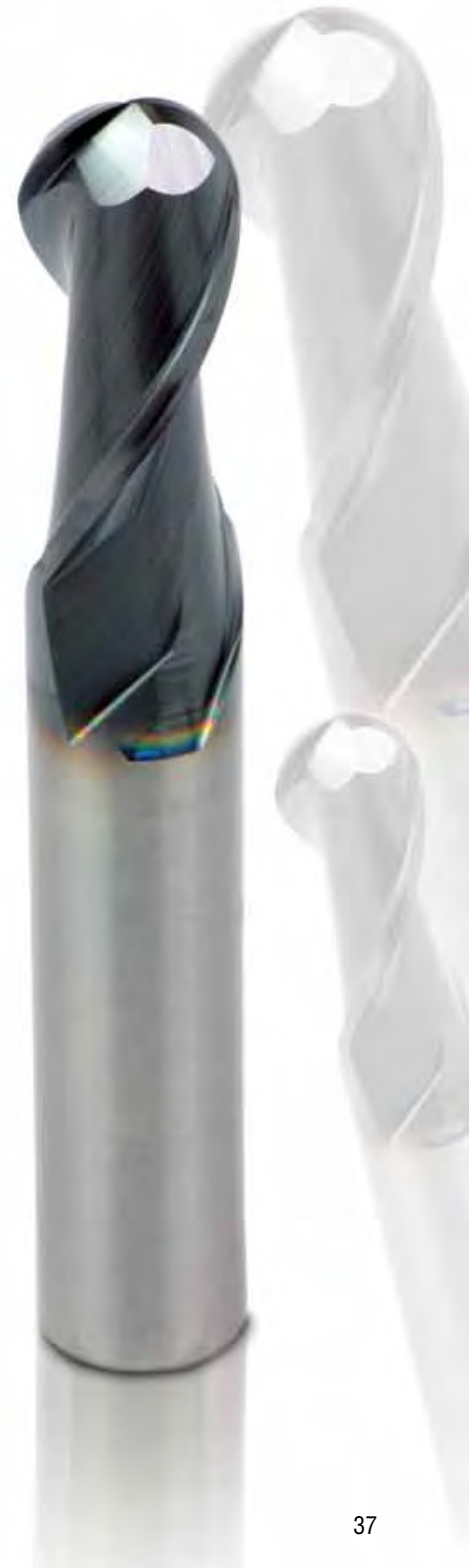
SERIES HP421BN

Ball Nose, 2 Flute, TiAlN Coated



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
HP421-0394-BN	1.0	39	3	3
HP421-0591-BN	1.5	39	5	3
HP421-0787-BN	2.0	39	7	3
HP421-0984-BN	2.5	39	8	3
HP421-1181-BN	3.0	39	10	3
HP421-1378-BN	3.5	51	12	4
HP421-1575-BN	4.0	51	14	4
HP421-1772-BN	4.5	51	14	5
HP421-1968-BN	5.0	51	16	5
HP421-2362-BN	6.0	64	19	6
HP421-2756-BN	7.0	64	19	8
HP421-3150-BN	8.0	64	21	8
HP421-3543-BN	9.0	70	22	10
HP421-3937-BN	10.0	70	25	10
HP421-4331-BN	11.0	70	25	11
HP421-4724-BN	12.0	76	25	12
HP421-5512-BN	14.0	89	30	14
HP421-6299-BN	16.0	89	32	16
HP421-7087-BN	18.0	102	35	18
HP421-7874-BN	20.0	102	38	20
HP421-8661-BN	22.0	102	38	22
HP421-9843-BN	25.0	102	38	25

Packed: 1 pc. Set Screw Flat, Weldon Flat or special tolerances available on request.



Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P92	CARBIDE	TiAlN		 35°	SHRINK FIT
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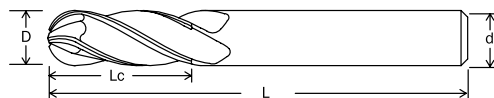


HP END MILLS

Sub-Micrograin Carbide TiAlN Coated End Mills

SERIES HP44 1BN

Ball Nose, 4 Flute, TiAlN Coated



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
HP441-0394-BN	1.0	39	3	3
HP441-0591-BN	1.5	39	5	3
HP441-0787-BN	2.0	39	7	3
HP441-0984-BN	2.5	39	8	3
HP441-1181-BN	3.0	39	10	3
HP441-1378-BN	3.5	51	12	4
HP441-1575-BN	4.0	51	14	4
HP441-1772-BN	4.5	51	14	5
HP441-1968-BN	5.0	51	16	5
HP441-2362-BN	6.0	64	19	6
HP441-2756-BN	7.0	64	19	8
HP441-3150-BN	8.0	64	21	8
HP441-3543-BN	9.0	70	22	10
HP441-3937-BN	10.0	70	25	10
HP441-4331-BN	11.0	70	25	11
HP441-4724-BN	12.0	76	25	12
HP441-5512-BN	14.0	89	30	14
HP441-6299-BN	16.0	89	32	16
HP441-7087-BN	18.0	102	35	18
HP441-7874-BN	20.0	102	38	20
HP441-8661-BN	22.0	102	38	22
HP441-9843-BN	25.0	102	38	25

Set Screw Flat, Weldon Flat or special tolerances available on request.

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P92	CARBIDE	TiAlN		 35°	SHRINK FIT
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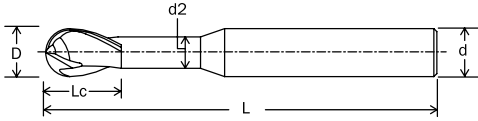
HP END MILLS

Sub-Micrograin Carbide TiAlN Coated End Mills



SERIES HP413

Ball Nose, 2 Flute, TiAlN Coated



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Neck Diameter (d2)	Shank Diameter (d)	Available Milling Depth
HP413-0394	1	50	1	0.95	6	2.5
HP413-0472	1.2	50	1.2	1.15	6	3
HP413-0551	1.4	50	1.4	1.35	6	7
HP413-0591	1.5	50	1.5	1.45	6	3.8
HP413-0630	1.6	50	1.6	1.55	6	4
HP413-0709	1.8	50	1.8	1.75	6	4.5
HP413-0787	2	50	2	1.95	6	5
HP413-0984	2.5	50	2.5	2.40	6	5
HP413-1181	3	50	3	2.85	6	6
HP413-1378	3.5	50	3.5	3.35	6	6
HP413-1575	4	50	4	3.85	6	6
HP413-1969	5	50	5	4.85	6	7.5
HP413-2362	6	50	6	5.85	6	9

Packed: 1 pc.



Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P93	CARBIDE	TiAlN		 30°	SHRINK FIT
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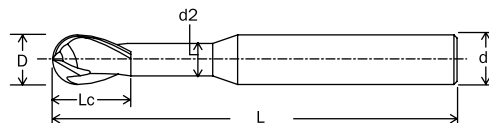


HP END MILLS

Sub-Micrograin Carbide TiAlN Coated End Mills

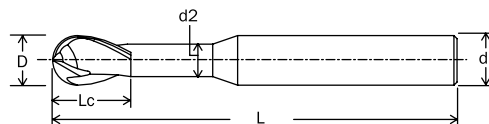
SERIES HP419 & 419L

Ball Nose, 2 Flute, TiAlN Coated



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Neck Diameter (d2)	Shank Diameter (d)	Available Milling Depth
HP419-0197	0.5	60	0.5	0.45	6	2.5
HP419-0236	0.6	60	0.6	0.55	6	3
HP419-0315	0.8	60	0.8	0.75	6	4
HP419-0394	1	60	1	0.95	6	5
HP419-0472	1.2	60	1.2	1.15	6	6
HP419-0551	1.4	60	1.4	1.35	6	7
HP419-0591	1.5	60	1.5	1.45	6	7.5
HP419-0630	1.6	60	1.6	1.55	6	8
HP419-0709	1.8	60	1.8	1.75	6	9
HP419-0787	2	60	2	1.95	6	10
HP419-0984	2.5	60	2.5	2.40	6	12.5
HP419-1181	3	70	3	2.85	6	15
HP419-1378	3.5	70	3.5	3.35	6	17.5
HP419-1575	4	70	4	3.85	6	20
HP419-1969	5	80	5	4.85	6	25
HP419-2362	6	90	6	5.85	6	30

Packed: 1 pc.



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Neck Diameter (d2)	Shank Diameter (d)	Available Milling Depth
HP419L-0236	0.6	60	0.6	0.55	6	6
HP419L-0315	0.8	60	0.8	0.75	6	8
HP419L-0394	1	60	1	0.95	6	10
HP419L-0472	1.2	60	1.2	1.15	6	12
HP419L-0551	1.4	60	1.4	1.35	6	12
HP419L-0591	1.5	60	1.5	1.45	6	12
HP419L-0630	1.6	60	1.6	1.55	6	16
HP419L-0709	1.8	60	1.8	1.75	6	16
HP419L-0787	2	60	2	1.95	6	16
HP419L-1181	3	70	3	2.85	6	30

Packed: 1 pc.

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P93	CARBIDE	TiAlN		30°	SHRINK FIT
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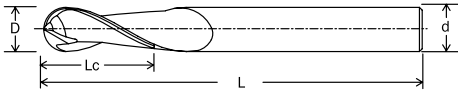
HP END MILLS

Sub-Micrograin Carbide TiAlN Coated End Mills



SERIES HP497

Ball Nose, Extended Length, 2 Flute, TiAlN Coated



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
HP497-1181	3	64	4.5	3
HP497-1575	4	64	6	4
HP497-1968	5	64	7.5	5
HP497-2362	6	102	9	6
HP497-3150	8	102	12	8
HP497-3937	10	102	15	10
HP497-4331	11	127	16.5	11
HP497-4724	12	127	18	12
HP497-5512	14	127	21	14
HP497-6299	16	153	24	16
HP497-7087	18	153	27	18
HP497-7874	20	153	30	20
HP497-8661	22	153	33	22
HP497-9843	25	153	37.5	25

Packed: 1 pc.



Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P94	CARBIDE	TiAlN		15°	SHRINK FIT
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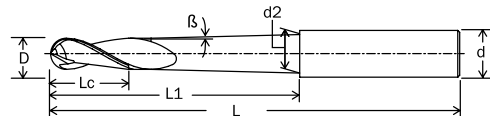


HP END MILLS

Sub-Micrograin Carbide TiAlN Coated End Mills

SERIES HP418

Ball Nose, Pencil Neck, 2 Flute, TiAlN Coated



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Neck Diameter (d2)	Neck Length (L1)	Non-Taper Neck Length	Neck Incline	Shank Diameter
HP418-0390	1	60	2.5	3.8	20	4	5	6
HP418-0391	1	80	2.5	4.8	40	4	3	6
HP418-0392	1	70	2.5	1.8	20	4	1.5	6
HP418-0780	2	60	5	4.3	20	7	5	6
HP418-0781	2	80	5	5.5	40	7	3	6
HP418-0782	2	70	5	2.7	20	7	1.5	6
HP418-1180	3	70	8	5	30	10.5	3	6
HP418-1181	3	90	8	5.1	50	10.5	1.5	6
HP418-1570	4	70	8	6	28	10.5	3	6
HP418-1571	4	90	8	6	48	10.5	1.5	6
HP418-1960	5	90	10	8	40	12.5	3	8
HP418-1961	5	110	10	7.5	60	12.5	1.5	8
HP418-2360	6	90	12	8	33.5	14.5	3	8
HP418-2361	6	110	12	8	52	14.5	1.5	8
HP418-3150	8	100	14	10	35.5	16.5	3	10
HP418-3151	8	120	14	10	54.5	16.5	1.5	10
HP418-3930	10	110	18	12	39.5	20.5	3	12
HP418-3931	10	130	18	12	58.5	20.5	1.5	12
HP418-4720	12	140	22	16	60	25	3	16
HP418-4721	12	160	22	14.9	80	25	1.5	16

Packed: 1 pc.

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

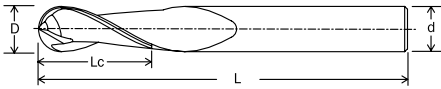
Details:

Speeds & Feeds P95	CARBIDE	TIAlN		30°	SHRINK FIT
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SERIES HP416

Ball Nose, 2 Flute, TiAlN Coated



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
HP416-0394	1	50	2.5	4
HP416-0472	1.2	50	3	4
HP416-0551	1.4	50	3.5	4
HP416-0591	1.5	50	4	4
HP416-0630	1.6	50	4	4
HP416-0709	1.8	50	4.5	4
HP416-0787	2	50	5	6
HP416-0984	2.5	60	6	6
HP416-1181	3	60	8	6
HP416-1378	3.5	70	8	6
HP416-1575	4	70	8	6
HP416-1576	4	60	8	6
HP416-1772	4.5	80	10	6
HP416-1969	5	80	10	6
HP416-2165	5.5	90	12	6
HP416-2362	6	90	12	6
HP416-2559	6.5	90	14	6
HP416-2756	7	90	14	6
HP416-2953	7.5	90	14	6
HP416-3150	8	100	14	8
HP416-3346	8.5	100	18	8
HP416-3543	9	100	18	8
HP416-3740	9.5	100	18	8
HP416-3937	10	100	18	10
HP416-4331	11	100	22	10
HP416-4724	12	110	22	12
HP416-5118	13	110	26	12
HP416-5512	14	110	26	12
HP416-5906	15	110	30	12
HP416-6299	16	140	30	16
HP416-7087	18	140	34	16
HP416-7874	20	160	38	20
HP416-9843	25	180	50	25

Packed: 1 pc.

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P96-97	CARBIDE	TiAlN		SHRINK FIT
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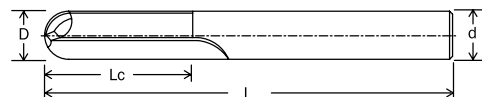


HP END MILLS

Sub-Micrograin Carbide TiAlN Coated End Mills

SERIES HP407BN

Ball Nose, Straight Flute, 2 Flute, TiAlN Coated



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter
HP407-1181-BN	3	102	4	6
HP407-1575-BN	4	102	5	6
HP407-1969-BN	5	102	6	6
HP407-2362-BN	6	102	8	6
HP407-3150-BN	8	127	12	8
HP407-3937-BN	10	153	15	10
HP407-4724-BN	12	153	18	12

Packed: 1 pc. Set Screw Flat, Weldon Flat or special tolerances available on request.

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.025mm	H6

Details:

Speeds & Feeds P98	CARBIDE	TiAlN		SHRINK FIT
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STANDARD END MILLS

Standard Carbide

Multi-purpose, high quality end mills made from micrograin carbide.

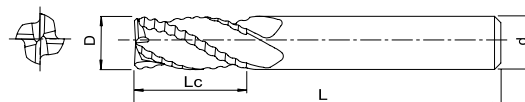


CARBIDE END MILLS

Micrograin Carbide End Mills

SERIES 400

Roughy Mills, 4 Flute



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter
400-2362	6	64	19	6
400-3150	8	64	19	8
400-3937	10	70	25	10
400-4724	12	76	25	12
400-6299	16	89	32	16
400-7874	20	102	38	20
400-9843	25	102	38	25

Packed: 1 pc. TiN, TiCN, TiAlN coatings available on request.

Tolerances:

Size	Diameter	Shank Diameter
< 6mm	+0.000mm -0.038mm	H7
≥ 6mm	+0.000mm -0.038mm	H6

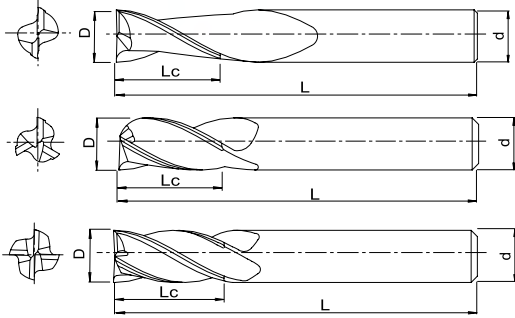
Details:

Speeds & Feeds -	CARBIDE	BRIGHT	ROUGH		30°
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SERIES 402, 403 & 404

2 Flute, 3 Flute and 4 Flute



EDP Number			Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
402	403	404				
402-0197	-	-	0.5	39	1.5	3
402-0394	403-0394	404-0394	1.0	39	3	3
402-0591	403-0591	404-0591	1.5	39	5	3
402-0787	403-0787	404-0787	2.0	39	7	3
402-0984	403-0984	404-0984	2.5	39	8	3
402-1181	403-1181	404-1181	3.0	39	10	3
402-1378	403-1378	404-1378	3.5	51	12	4
402-1575	403-1575	404-1575	4.0	51	14	4
402-1772	403-1772	404-1772	4.5	51	14	5
402-1968	403-1968	404-1968	5.0	51	16	5
402-2362	403-2362	404-2362	6.0	64	19	6
402-2756	403-2756	404-2756	7.0	64	19	8
402-3150	403-3150	404-3150	8.0	64	21	8
402-3543	403-3543	404-3543	9.0	70	22	10
402-3937	403-3937	404-3937	10.0	70	25	10
402-4331	403-4331	404-4331	11.0	70	25	11
402-4724	403-4724	404-4724	12.0	76	25	12
402-5512	403-5512	404-5512	14.0	89	30	14
402-6299	403-6299	404-6299	16.0	89	32	16
402-7087	403-7087	404-7087	18.0	102	35	18
402-7874	403-7874	404-7874	20.0	102	38	20
402-8661	403-8661	404-8661	22.0	102	38	22
402-9843	403-9843	404-9843	25.0	102	38	25

Packed: 1 pc. Specify treatment at time of order: 11 = TiAlN. TiN, TiCN coating available on request.



Tolerances:

Size	Diameter	Shank Diameter
< 6mm	+0.000mm -0.038mm	H7
≥ 6mm	+0.000mm -0.038mm	H6

Details:

Speeds & Feeds P99	CARBIDE	BRIGHT				
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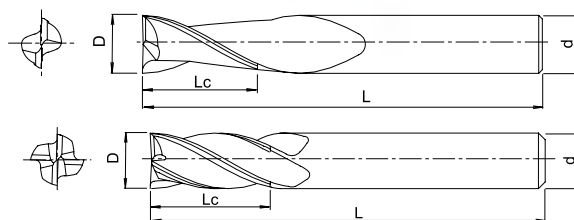


CARBIDE END MILLS

Micrograin Carbide End Mills

SERIES 412, 414

Stub Length, 2 or 4 Flute



EDP Number		Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
412	414				
412-0394	414-0394	1.0	39	2	3
412-0591	414-0591	1.5	39	3	3
412-0787	414-0787	2.0	39	4	3
412-0984	414-0984	2.5	39	5	3
412-1181	414-1181	3.0	39	6	3
412-1378	414-1378	3.5	51	7	4
412-1575	414-1575	4.0	51	8	4
412-1772	414-1772	4.5	51	9	5
412-1968	414-1968	5.0	51	10	5
412-2362	414-2362	6.0	51	12	6
412-2756	414-2756	7.0	51	12	8
412-3150	414-3150	8.0	51	12	8
412-3543	414-3543	9.0	51	14	10
412-3937	414-3937	10.0	51	14	10
412-4331	414-4331	11.0	64	16	11
412-4724	414-4724	12.0	64	16	12

Packed: 1 pc. TiN, TiCN, TiAlN coatings available on request.

Tolerances:

Size	Diameter	Shank Diameter
< 6mm	+0.000mm -0.038mm	H7
≥ 6mm	+0.000mm -0.038mm	H6

Details:

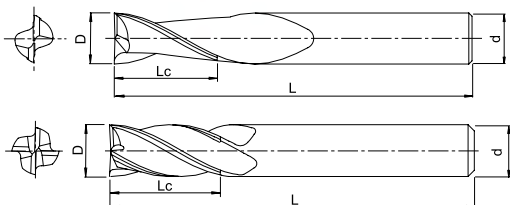
Speeds & Feeds P99-100	CARBIDE	BRIGHT			
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SERIES 462, 464

Long Length, 2 or 4 Flute



EDP Number		Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
462	464				
462-1181	464-1181	3	57	19	3
462-1575	464-1575	4	57	19	4
462-1968	464-1968	5	64	25	5
462-2362	464-2362	6	76	28	6
462-3150	464-3150	8	76	29	8
462-3937	464-3937	10	76	32	10
462-4724	464-4724	12	102	51	12
462-5512	464-5512	14	127	57	14
462-6299	464-6299	16	127	57	16
462-7087	464-7087	18	127	57	18
462-7874	464-7874	20	127	57	20
462-9843	464-9843	25	127	57	25

Packed: 1 pc. TiN, TiCN, TiAlN coatings available on request.



Tolerances:

Size	Diameter	Shank Diameter
< 6mm	+0.000mm -0.038mm	H7
≥ 6mm	+0.000mm -0.038mm	H6

Details:

Speeds & Feeds P99-100	CARBIDE	BRIGHT			
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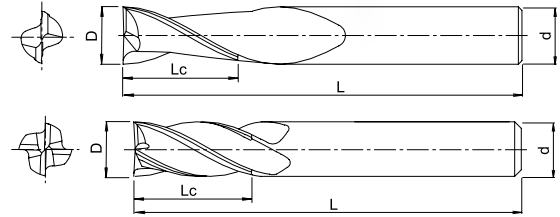


CARBIDE END MILLS

Micrograin Carbide End Mills

SERIES 482, 484

Extra Long Length, 2 or 4 Flute



EDP Number		Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
482	484				
482-1181	484-1181	3	76	25	3
482-1575	484-1575	4	76	28	4
482-1968	484-1968	5	76	32	5
482-2362	484-2362	6	102	38	6
482-3150	484-3150	8	102	42	8
482-3937	484-3937	10	102	45	10
482-4724	484-4724	12	153	76	12
482-5512	484-5512	14	153	76	14
482-6299	484-6299	16	153	76	16
482-7087	484-7087	18	153	76	18
482-7874	484-7874	20	153	76	20
482-9843	484-9843	25	153	76	25

Packed: 1 pc. TiN, TiCN, TiAlN coatings available on request.

Tolerances:

Size	Diameter	Shank Diameter
< 6mm	+0.000mm -0.038mm	H7
≥ 6mm	+0.000mm -0.038mm	H6

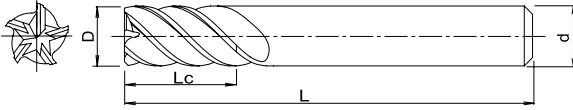
Details:

Speeds & Feeds P99-100	CARBIDE	BRIGHT			
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SERIES 455

5 Flute



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
455-1250	1/8	1-1/2	1/2	1/8
455-1562	5/32	2	9/16	3/16
455-1875	3/16	2	5/8	3/16
455-2188	7/32	2-1/2	5/8	1/4
455-2500	1/4	2-1/2	3/4	1/4
455-2812	9/32	2-1/2	3/4	5/16
455-3125	5/16	2-1/2	13/16	5/16
455-3750	3/8	2-1/2	1	3/8
455-4375	7/16	2-3/4	1	7/16
455-5000	1/2	3	1	1/2
455-5625	9/16	3-1/2	1-1/8	9/16
455-6250	5/8	3-1/2	1-1/4	5/8
455-7500	3/4	4	1-1/2	3/4
455-1000	1	4	1-1/2	1

Packed: 1 pc. TiN, TiCN, TiAlN coatings available on request.



Tolerances:

Size	Diameter	Shank Diameter
< 6mm	+0.000mm -0.038mm	H7
≥ 6mm	+0.000mm -0.038mm	H6

Details:

Speeds & Feeds -	CARBIDE	BRIGHT		
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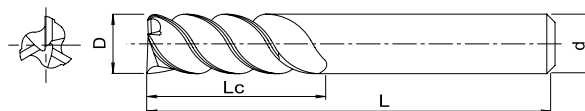


CARBIDE END MILLS

Micrograin Carbide End Mills

SERIES 460

High Helix, 3 Flute



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
460-2362	6	64	19	6
460-3150	8	64	21	8
460-3937	10	70	25	10
460-4724	12	76	25	12
460-5512	14	89	29	14
460-6299	16	89	32	16
460-7087	18	102	38	18
460-7874	20	102	38	20
460-9843	25	102	38	25

Packed: 1 pc. TiN, TiCN, TiAlN coatings available on request.

Tolerances:

Size	Diameter	Shank Diameter
< 6mm	+0.000mm -0.038mm	H7
≥ 6mm	+0.000mm -0.038mm	H6

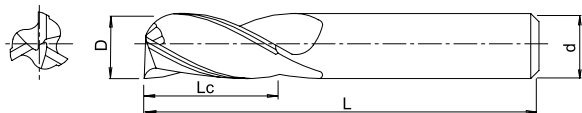
Details:

Speeds & Feeds -	CARBIDE	BRIGHT		
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SERIES 445

3 Flute



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
445-0394	1.0	39	3	3
445-0591	1.5	39	5	3
445-0787	2.0	39	7	3
445-0984	2.5	39	8	3
445-1181	3.0	39	10	3
445-1378	3.5	51	12	4
445-1575	4.0	51	14	4
445-1772	4.5	51	14	5
445-1968	5.0	51	16	5
445-2362	6.0	64	19	6
445-2756	7.0	64	19	8
445-3150	8.0	64	21	8
445-3543	9.0	70	22	10
445-3937	10.0	70	25	10
445-4331	11.0	70	25	11
445-4724	12.0	76	25	12
445-5512	14.0	89	30	14
445-6299	16.0	89	32	16
445-7087	18.0	102	35	18
445-7874	20.0	102	38	20
445-8661	22.0	102	38	22
445-9843	25.0	102	38	25

Packed: 1 pc. TiN, TiCN, TiAlN coatings available on request.



Tolerances:

Size	Diameter	Shank Diameter
< 6mm	+0.000mm -0.038mm	H7
≥ 6mm	+0.000mm -0.038mm	H6

Details:

Speeds & Feeds P99	CARBIDE	BRIGHT		
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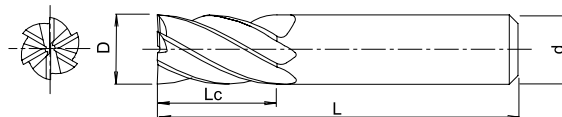


CARBIDE END MILLS

Micrograin Carbide End Mills

SERIES 461

6 Flute



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter
461-1181	3	39	10	3
461-1575	4	51	14	4
461-1968	5	51	16	5
461-2362	6	64	19	6
461-2756	7	64	19	7
461-3150	8	64	21	8
461-3543	9	70	22	10
461-3937	10	70	25	10
461-4331	11	70	25	11
461-4724	12	76	25	12
461-5512	14	89	30	14
461-6299	16	89	32	16
461-7087	18	102	35	18
461-7874	20	102	38	20
461-8661	22	102	38	22
461-9843	25	102	38	25

Packed: 1 pc. TiN, TiCN, TiAlN coatings available on request.

Tolerances:

Size	Diameter	Shank Diameter
< 6mm	+0.000mm -0.038mm	H7
≥ 6mm	+0.000mm -0.038mm	H6

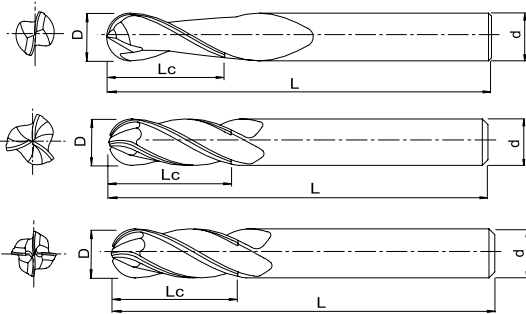
Details:

Speeds & Feeds -	CARBIDE	BRIGHT		
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SERIES 402BN, 403BN & 404BN

Ball Nose, 2, 3 or 4 Flute



EDP Number			Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
402BN	403BN	404BN				
402-0197-BN	-	-	0.5	39	1.5	3
402-0394-BN	403-0394-BN	404-0394-BN	1.0	39	3	3
402-0591-BN	403-0591-BN	404-0591-BN	1.5	39	5	3
402-0787-BN	403-0787-BN	404-0787-BN	2.0	39	7	3
402-0984-BN	403-0984-BN	404-0984-BN	2.5	39	8	3
402-1181-BN	403-1181-BN	404-1181-BN	3.0	39	10	3
402-1378-BN	403-1378-BN	404-1378-BN	3.5	51	12	4
402-1575-BN	403-1575-BN	404-1575-BN	4.0	51	14	4
402-1772-BN	403-1772-BN	404-1772-BN	4.5	51	14	5
402-1968-BN	403-1968-BN	404-1968-BN	5.0	51	16	5
402-2362-BN	403-2362-BN	404-2362-BN	6.0	64	19	6
402-2756-BN	403-2756-BN	404-2756-BN	7.0	64	19	8
402-3150-BN	403-3150-BN	404-3150-BN	8.0	64	21	8
402-3543-BN	403-3543-BN	404-3543-BN	9.0	70	22	10
402-3937-BN	403-3937-BN	404-3937-BN	10.0	70	25	10
402-4331-BN	403-4331-BN	404-4331-BN	11.0	70	25	11
402-4724-BN	403-4724-BN	404-4724-BN	12.0	76	25	12
402-5512-BN	403-5512-BN	404-5512-BN	14.0	89	30	14
402-6299-BN	403-6299-BN	404-6299-BN	16.0	89	32	16
402-7087-BN	403-7087-BN	404-7087-BN	18.0	102	35	18
402-7874-BN	403-7874-BN	404-7874-BN	20.0	102	38	20
402-8661-BN	403-8661-BN	404-8661-BN	22.0	102	38	22
402-9843-BN	403-9843-BN	404-9843-BN	25.0	102	38	25

Packed: 1 pc.

Specify treatment at time of order: 11 = TiAlN, TiN, TiCN, coatings available on request.



Tolerances:

Size	Diameter	Shank Diameter
< 6mm	+0.000mm -0.038mm	H7
≥ 6mm	+0.000mm -0.038mm	H6

Details:

Speeds & Feeds P102-103	CARBIDE	BRIGHT				
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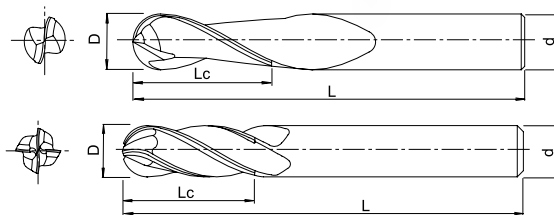


CARBIDE END MILLS

Micrograin Carbide End Mills

SERIES 412BN, 414BN

Ball Nose, Stub Length, 2 or 4 Flute



EDP Number		Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
412BN	414BN				
412-0394-BN	414-0394-BN	1.0	3	2	39
412-0591-BN	414-0591-BN	1.5	3	3	39
412-0787-BN	414-0787-BN	2.0	3	4	39
412-0984-BN	414-0984-BN	2.5	3	5	39
412-1181-BN	414-1181-BN	3.0	3	6	39
412-1378-BN	414-1378-BN	3.5	4	7	51
412-1575-BN	414-1575-BN	4.0	4	8	51
412-1772-BN	414-1772-BN	4.5	5	9	51
412-1968-BN	414-1968-BN	5.0	5	10	51
412-2362-BN	414-2362-BN	6.0	6	12	51
412-2756-BN	414-2756-BN	7.0	8	12	51
412-3150-BN	414-3150-BN	8.0	8	12	51
412-3543-BN	414-3543-BN	9.0	10	14	51
412-3937-BN	414-3937-BN	10.0	10	14	51
412-4331-BN	414-4331-BN	11.0	11	16	64
412-4724-BN	414-4724-BN	12.0	12	16	64

Packed: 1 pc. TiN, TiCN, TiAlN coatings available on request

Tolerances:

Size	Diameter	Shank Diameter
< 6mm	+0.000mm -0.038mm	H7
≥ 6mm	+0.000mm -0.038mm	H6

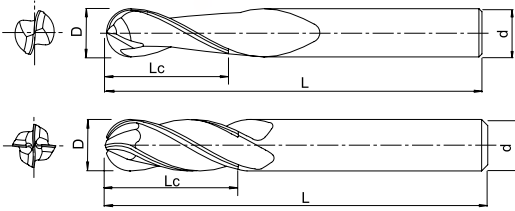
Details:

Speeds & Feeds P102-103	CARBIDE	BRIGHT	STUB			
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SERIES 462BN, 464BN

Ball Nose, Long Length, 2 or 4 Flute



EDP Number		Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
412BN	414BN				
462-1181-BN	464-1181-BN	3	57	19	3
462-1575-BN	464-1575-BN	4	57	19	4
462-1968-BN	464-1968-BN	5	64	25	5
462-2362-BN	464-2362-BN	6	76	28	6
462-3150-BN	464-3150-BN	8	76	29	8
462-3937-BN	464-3937-BN	10	76	32	10
462-4724-BN	464-4724-BN	12	102	51	12
462-5512-BN	464-5512-BN	14	127	57	14
462-6299-BN	464-6299-BN	16	127	57	16
462-7087-BN	464-7087-BN	18	127	57	18
462-7874-BN	464-7874-BN	20	127	57	20
462-9843-BN	464-9843-BN	25	127	57	25

Packed: 1 pc. TiN, TiCN, TiAlN coatings available on request



Tolerances:

Size	Diameter	Shank Diameter
< 6mm	+0.000mm -0.038mm	H7
≥ 6mm	+0.000mm -0.038mm	H6

Details:

Speeds & Feeds P102-103	CARBIDE	BRIGHT	LONG			
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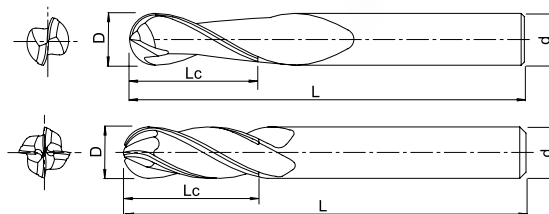


CARBIDE END MILLS

Micrograin Carbide End Mills

SERIES 482BN, 484BN

Ball Nose, Extra Long Length, 2 or 4 Flute



EDP Number		Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
482BN	484BN				
482-1181-BN	484-1181-BN	3	76	25	3
482-1575-BN	484-1575-BN	4	76	28	4
482-1968-BN	484-1968-BN	5	76	32	5
482-2362-BN	484-2362-BN	6	102	38	6
482-3150-BN	484-3150-BN	8	102	42	8
482-3937-BN	484-3937-BN	10	102	45	10
482-4724-BN	484-4724-BN	12	153	76	12
482-5512-BN	484-5512-BN	14	153	76	14
482-6299-BN	484-6299-BN	16	153	76	16
482-7087-BN	484-7087-BN	18	153	76	18
482-7874-BN	484-7874-BN	20	153	76	20
482-9843-BN	484-9843-BN	25	153	76	25

Packed: 1 pc. TiN, TiCN, TiAlN coatings available on request

482BN

484BN

Tolerances:

Size	Diameter	Shank Diameter
< 6mm	+0.000mm -0.038mm	H7
≥ 6mm	+0.000mm -0.038mm	H6

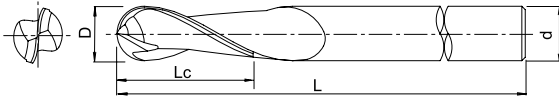
Details:

Speeds & Feeds P102-103	CARBIDE	BRIGHT	EXTRA LONG			
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SERIES 497

Ball Nose, 2 Flute, Long Shank



EDP Number	Milling Diameter (D)	Overall Length (L)	Length of Cut (Lc)	Shank Diameter (d)
497-1181	3	63	4.5	3
497-1575	4	63	6	4
497-1968	5	63	7.5	5
497-2362	6	100	9	6
497-3150	8	100	12	8
497-3937	10	100	15	10
497-4331	11	127	16.5	11
497-4724	12	127	18	12
497-5512	14	127	21	14
497-6299	16	152	24	16
497-7087	18	152	27	18
497-7874	20	152	30	20
497-8661*	22	152	33	22
497-9843*	25	152	37.5	25

Packed: 1 pc. TiN, TiCN, TiAlN coatings available on request. *Non stock item. Available on request.



Tolerances:

Size	Diameter	Shank Diameter
< 6mm	+0.000mm -0.038mm	H7
≥ 6mm	+0.000mm -0.038mm	H6

Details:

Speeds & Feeds P101	CARBIDE	BRIGHT		
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CARBIDE BURS

Solid Micrograin Carbide Burs

6mm Shank

Series 801 — Cylindrical

Metric

Medium Tough Cut	EDP Number	Style	Dia.	Flute Length
	801-1250-60	SA-11	3	12
	801-1875-60	SA-14	5	16
	801-2362	SA-1	6	16
	801-3125-60	SA-2	8	19
	801-3750-60	SA-3	9	19
	801-4375-60	SA-4	11	25
	801-5001-60	SA-5F	12	12
	801-5000-60	SA-5	12	25
	801-6250-60	SA-6	16	25
	801-7500-60	SA-16	19	19
	801-7501-60	SA-7	19	25
	801-1000-60	SA-9	25	25

For end cut add EC to EDP no.

6mm Shank

Series 901 — Cylindrical

Metric

Medium Right Hand Spiral	EDP Number	Style	Dia.	Flute Length
	901-1250-60	SA-11	3	12
	901-1875-60	SA-14	5	16
	901-2362	SA-1	6	16
	901-3125-60	SA-2	8	19
	901-3750-60	SA-3	9	19
	901-4375-60	SA-4	11	25
	901-5001-60	SA-5F	12	12
	901-5000-60	SA-5	12	25
	901-6250-60	SA-6	16	25
	901-7500-60	SA-16	19	19
	901-7501-60	SA-7	19	25
	901-1000-60	SA-9	25	25

For end cut add EC to EDP no.

Series 802 — Cylindrical Ball End

Metric

Medium Tough Cut	EDP Number	Style	Dia.	Flute Length
	802-1250-60	SC-11	3	12
	802-1875-60	SC-14	5	16
	802-2362	SC-1	6	16
	802-3125-60	SC-2	8	19
	802-3750-60	SC-3	9	19
	802-4375-60	SC-4	11	25
	802-5000-60	SC-5	12	25
	802-6250-60	SC-6	16	25
	802-7500-60	SC-7	19	25

Series 902 — Cylindrical Ball End

Metric

Medium Right Hand Spiral	EDP Number	Style	Dia.	Flute Length
	902-1250-60	SC-11	3	12
	902-1875-60	SC-14	5	16
	902-2362	SC-1	6	16
	902-3125-60	SC-2	8	19
	902-3750-60	SC-3	9	19
	902-4375-60	SC-4	11	25
	902-5000-60	SC-5	12	25
	902-6250-60	SC-6	16	25
	902-7500-60	SC-7	19	25

Series 803 — Round Nose Tree

Metric

Medium Tough Cut	EDP Number	Style	Dia.	Flute Length
	803-2362	SF-1	6	16
	803-3750-60	SF-3	9	19
	803-5001-60	SF-13	12	19
	803-5000-60	SF-5	12	25
	803-6250-60	SF-6	16	25
	803-7500-60	SF-7	19	25
	803-7501-60	SF-14	19	31
	803-7502-60	SF-15	19	38

*Indicates solid 6mm carbide shank 50mm OAL; all others have 6mm diameter hardened steel shank (9mm diameter shanks available).

Series 903 — Round Nose Tree

Metric

Medium Right Hand Spiral	EDP Number	Style	Dia.	Flute Length	
	903-2362	SF-1	6	16	
	903-3750-60	SF-3	9	19	
	903-5001-60	SF-13	12	19	
	903-5000-60	SF-5	12	25	
	903-6250-60	SF-6	16	25	
	903-7500-60	SF-7	19	25	
	903-7501-60	SF-14	19	32	
	903-7502-60	SF-15	19	38	


*Indicates solid 6mm carbide shank 50mm OAL; all others have 6mm diameter hardened steel shank (9mm diameter shanks available).



6mm Shank

Series 804 — Pointed Tree


Metric

Medium Tough Cut	EDP Number	Style	Dia.	Flute Length
	804-2362	SG-1	6	16
	804-3125-60	SG-2	8	19
	804-3750-60	SG-3	9	19
	804-5001-60	SG-13	12	19
	804-5000-60	SG-5	12	25
	804-6250-60	SG-6	16	25
	804-7500-60	SG-7	19	25
	804-7501-60	SG-15	19	38

6mm Shank


Series 904 — Pointed Tree

Metric

Medium Right Hand Spiral	EDP Number	Style	Dia.	Flute Length
	904-2362	SG-1*	6	16
	904-3125-60	SG-2	8	19
	904-3750-60	SG-3	9	19
	904-5001-60	SG-13	12	19
	904-5000-60	SG-5	12	25
	904-6250-60	SG-6	16	25
	904-7500-60	SG-7	19	25
	904-7501-60	SG-15	19	38


Series 805 — Pointed Cone

Metric

Medium Tough Cut	EDP Number	Style	Dia.	Flute Length	Incl. Ang. Deg.
	805-2362	SM-1	6	12	22
	805-2363	SM-2	6	19	14
	805-2364	SM-3	6	25	10
	805-3750-60	SM-4	9	16	28
	805-5000-60	SM-5	12	22	28
	805-6250-60	SM-6	16	25	31


Series 905 — Pointed Cone

Metric

Medium Right Hand Spiral	EDP Number	Style	Dia.	Flute Length	Incl. Ang. Deg.
	905-2362	SM-1	6	12	22
	905-2363	SM-2	6	19	14
	905-2364	SM-3	6	25	10
	905-3750-60	SM-4	9	16	28
	905-5000-60	SM-5	12	22	28
	905-6250-60	SM-6	16	25	31

Series 806 — Egg Shape


Metric

Medium Tough Cut	EDP Number	Style	Dia.	Flute Length
	806-2362	SE-1	6	9
	806-3750-60	SE-3	9	16
	806-5000-60	SE-5	12	22
	806-6250-60	SE-6	16	25
	806-7500-60	SE-7	19	25

*Indicates solid 6mm carbide shank 50mm OAL; all others have 6mm diameter hardened steel shank (9mm diameter shanks available).

Series 906 — Egg Shape

Metric

Medium Right Hand Spiral	EDP Number	Style	Dia.	Flute Length
	906-2362	SE-1	6	9
	906-3750-60	SE-3	16	16
	906-5000-60	SE-5	22	22
	906-6250-60	SE-6	25	25
	906-7500-60	SE-7	25	25

*Indicates solid 6mm carbide shank 50mm OAL; all others have 6mm diameter hardened steel shank (9mm diameter shanks available).




CARBIDE BURS

Solid Micrograin Carbide Burs

6mm Shank

Series 807 — 14° Included Angle


Metric

Medium Tough Cut	EDP Number	Style	Dia.	Flute Length	Incl. Ang. Deg.
	807-2362	SL-1	6	16	14
	807-3125-60	SL-2	8	22	14
	807-3750-60	SL-3	9	26	14
	807-5000-60	SL-4	12	28	14
	807-6250-60	SL-5	16	33	14
	807-7500-60	SL-7	19	38	14

6mm Shank


Series 907 — 14° Included Angle

Metric

Medium Right Hand Spiral	EDP Number	Style	Dia.	Flute Length	Incl. Ang. Deg.
	907-2362	SL-1	6	16	14
	907-3125-60	SL-2	8	22	14
	907-3750-60	SL-3	9	26	14
	907-5000-60	SL-4	12	28	14
	907-6250-60	SL-5	16	33	14
	907-7500-60	SL-7	19	38	14


Series 808 — Ball Shape

Metric

Medium Tough Cut	EDP Number	Style	Dia.
	808-1250-60	SD-11	3
	808-1875-60	SD-14	5
	808-2362	SD-1	6
	808-3125-60	SD-2	8
	808-3750-60	SD-3	9
	808-5000-60	SD-5	12
	808-6250-60	SD-6	16
	808-7500-60	SD-7	19
	808-1000-60	SD-9	25


Series 908 — Ball Shape

Metric

Medium Right Hand Spiral	EDP Number	Style	Dia.
	908-1250-60	SD-11	3
	908-1875-60	SD-14	5
	908-2362	SD-1	6
	908-3125-60	SD-2	8
	908-3750-60	SD-3	9
	908-5000-60	SD-5	12
	908-6250-60	SD-6	16
	908-7500-60	SD-7	19
	908-1000-60	SD-9	25

Series 849 — 90° Cone


Metric

Medium Tough Cut	EDP Number	Style	Dia.	Flute Length	Incl. Ang. Deg.
	849-2362	SK-1	6	90	22
	849-3750-60	SK-3	9	90	14
	849-5000-60	SK-5	12	90	10
	849-6250-60	SK-6	16	90	28
	849-7500-60	SK-7	19	90	28
	849-1000-60	SK-9	25	90	31

*Indicates solid 6mm carbide shank 50mm OAL; all others have 6mm diameter hardened steel shank (9mm diameter shanks available).

Series 949 — 90° Cone

Metric

Medium Right Hand Spiral	EDP Number	Style	Dia.	Flute Length	Incl. Ang. Deg.
	949-2362	SK-1	6	90	22
	949-3750-60	SK-3	9	90	14
	949-5000-60	SK-5	12	90	10
	949-6250-60	SK-6	16	90	28
	949-7500-60	SK-7	19	90	28
	949-1000-60	SK-9	25	90	31


*Indicates solid 6mm carbide shank 50mm OAL; all others have 6mm diameter hardened steel shank (9mm diameter shanks available).



6mm Shank

Series 850 — 60° Cone


Metric

Medium Tough Cut	EDP Number	Style	Dia.	Flute Length	Incl. Ang. Deg.
	850-2362	SJ-1	6	60	14
	850-3750-60	SJ-3	9	60	14
	850-5000-60	SJ-5	12	60	14
	850-6250-60	SJ-6	16	60	14
	850-7500-60	SJ-7	19	60	14
	850-1000-60	SJ-9	25	60	14

6mm Shank


Series 950 — 60° Cone

Metric

Medium Right Hand Spiral	EDP Number	Style	Dia.	Flute Length	Incl. Ang. Deg.
	950-2362	SJ-1	6	60	14
	950-3750-60	SJ-3	9	60	14
	950-5000-60	SJ-5	12	60	14
	950-6250-60	SJ-6	16	60	14
	950-7500-60	SJ-7	19	60	14
	950-1000-60	SJ-9	25	60	14


Series 851 — Flame Shape

Metric

Medium Tough Cut	EDP Number	Style	Dia.	Flute Length
	851-3125-60	SH-2	8	19
	851-5000-60	SH-5	12	31
	851-6250-60	SH-6	16	36
	851-7500-60	SH-7	19	41


Series 951 — Flame Shape

Metric

Medium Right Hand Spiral	EDP Number	Style	Dia.	Flute Length
	951-3125-60	SH-2	8	19
	951-5000-60	SH-5	12	31
	951-6250-60	SH-6	16	36
	951-7500-60	SH-7	19	41

Series 852 — Inverted Taper


Metric

Medium Tough Cut	EDP Number	Style	Dia.	Flute Length	Incl. Ang. Deg.
	852-2362	SN-1	6	8	10
	852-3750-60	SN-2	9	9	13
	852-5000-60	SN-4	12	12	28
	852-6250-60	SN-6	16	19	18
	852-7500-60	SN-7	19	16	30

*Indicates solid 6mm carbide shank 50mm OAL; all others have 6mm diameter hardened steel shank (9mm diameter shanks available).

Series 952 — Inverted Taper

Metric

Medium Right Hand Spiral	EDP Number	Style	Dia.	Flute Length	Incl. Ang. Deg.
	952-2362	SN-1	6	8	10
	952-3750-60	SN-2	9	9	13
	952-5000-60	SN-4	12	12	28
	952-6250-60	SN-6	16	19	18
	952-7500-60	SN-7	19	16	30

*Indicates solid 6mm carbide shank 50mm OAL; all others have 6mm diameter hardened steel shank (9mm diameter shanks available).




CARBIDE BURS

Solid Micrograin Carbide Burs

6mm Shank - 152mm Long Steel Shank

Series 861 — Cylindrical


Metric

Medium Tough Cut	EDP Number	Style	Dia.	Flute Length
	861-3750-60	SA-3L6	9	19
	861-5000-60	SA-5L6	12	25

6mm Shank - 152mm Long Steel Shank


Series 961 — Cylindrical

Metric

Medium Right Hand Spiral	EDP Number	Style	Dia.	Flute Length
	961-3750-60	SA-3L6	9	19
	961-5000-60	SA-5L6	12	25


Series 862 — Cylindrical Ball End

Metric

Medium Tough Cut	EDP Number	Style	Dia.	Flute Length
	862-3750-60	SC-3L6	9	19
	862-5000-60	SC-5L6	12	25


Series 962 — Cylindrical Ball End

Metric

Medium Right Hand Spiral	EDP Number	Style	Dia.	Flute Length
	962-3750-60	SC-3L6	9	19
	962-5000-60	SC-5L6	12	25


Series 863 — Round Nose Tree

Metric

Medium Tough Cut	EDP Number	Style	Dia.	Flute Length
	863-3750-60	SF-3L6	9	19
	863-5000-60	SF-5L6	12	25

Series 963 — Round Nose Tree

Metric


Medium Right Hand Spiral	EDP Number	Style	Dia.	Flute Length
	963-3750-60	SF-3L6	9	19
	963-5000-60	SF-5L6	12	25



6mm Shank - 152mm Long Steel Shank

Series 867 — 14° Included Angle


Metric

Medium Tough Cut	EDP Number	Style	Dia.	Flute Length
	867-3750-60	SL-3L6	9	26
	867-5000-60	SL-5L6	12	28

6mm Shank - 152mm Long Steel Shank


Series 967 — 14° Included Angle

Metric

Medium Right Hand Spiral	EDP Number	Style	Dia.	Flute Length
	967-3750-60	SL-3L6	9	26
	967-5000-60	SL-5L6	12	28


Series 868 — Ball Shape

Metric

Medium Tough Cut	EDP Number	Style	Diameter
	868-3750-60	SD-3L6	9
	868-5000-60	SD-5L6	12

Series 968 — Ball Shape

Metric

Medium Right Hand Spiral	EDP Number	Style	Diameter
	968-3750-60	SD-3L6	9
	968-5000-60	SD-5L6	12



CARBIDE BURS

Solid Micrograin Carbide Burs

3mm Shank Diameter — 38mm Overall Length

Series 800 — Metric Sizes, Tough Cut



Style: SA-42
Size: 2.38 x 11
EDP Number: 800-8001-30



Style: SA-43
Size: 3 x 14
EDP Number: 800-8002-30



Style: SB-43
Size: 3 x 14
EDP Number: 800-8003-30



Style: SC-42
Size: 3 x 14
EDP Number: 800-8004-30



Style: SG-44
Size: 3 x 12
EDP Number: 800-8005-30



Style: SF-42
Size: 3 x 12
EDP Number: 800-8006-30



Style: SC-41
Size: 2.38 x 14
EDP Number: 800-8007-30



Style: SA-41
Size: 1.59x6
EDP Number: 800-8008-30



Style: SE-41
Size: 3 x 5.5
EDP Number: 800-8010-30



Style: SM-41
Size: 3 x 8
Taper Degrees: 12
EDP Number: 800-8011-30



Style: SM-42
Size: 3 x 11
Taper Degrees: 14
EDP Number: 800-8012-30



Style: SM-43
Size: 3 x 16
Taper Degrees: 7
EDP Number: 800-8013-30



Style: SN-42
Size: 3 x 5
Taper Degrees: 10 INVERTED
EDP Number: 800-8014-30



Style: SJ-42
Size: 3 x 2.5
Taper Degrees: 60
EDP Number: 800-8015-30



Style: SK-42
Size: 3 x 1.5
Taper Degrees: 90
EDP Number: 800-8016-30



Style: SL-42
Size: 3 x 12
Taper Degrees: 8
EDP Number: 800-8017-30



Style: SD-41
Size: 2.38
EDP Number: 800-8018-30



Style: SD-42
Size: 3
EDP Number: 800-8019-30



Style: SH-41
Size: 3 x 6
EDP Number: 800-8020-30



3mm Shank Diameter — 38mm Overall Length
Series 900 — Metric Sizes, Medium Right Hand Spiral



Style: SA-42
Size: 2.38 x 11
EDP Number: 900-9001-30



Style: SA-43
Size: 3 x 14
EDP Number: 900-9002-30



Style: SB-43
Size: 3 x 14
EDP Number: 900-9003-30



Style: SC-42
Size: 3 x 14
EDP Number: 900-9004-30



Style: SG-44
Size: 3 x 12
EDP Number: 900-9005-30



Style: SF-42
Size: 3 x 12
EDP Number: 900-9006-30



Style: SC-41
Size: 2.38 x 14
EDP Number: 900-9007-30



Style: SA-41
Size: 1.59 x 6
EDP Number: 900-9008-30



Style: SB-ECO
Size: 3
EDP Number: 900-9009-30



Style: SE-41
Size: 3 x 5.5
EDP Number: 900-9010-30



Style: SM-41
Size: 3 x 8
Taper Degrees: 12
EDP Number: 900-9011-30



Style: SM-42
Size: 3 x 11
Taper Degrees: 14
EDP Number: 900-9012-30



Style: SM-43
Size: 3 x 16
Taper Degrees: 7
EDP Number: 900-9013-30



Style: SN-42
Size: 3 x 5
Taper Degrees: 10 INVERTED
EDP Number: 900-9014-30



Style: SJ-42
Size: 3 x 2.5
Taper Degrees: 60
EDP Number: 900-9015-30



Style: SK-42
Size: 3 x 1.5
Taper Degrees: 90
EDP Number: 900-9016-30



Style: SL-42
Size: 3 x 12
Taper Degrees: 8
EDP Number: 900-9017-30



Style: SD-41
Size: 2.38
EDP Number: 900-9018-30



Style: SD-42
Size: 3
EDP Number: 900-9019-30



Style: SH-41
Size: 3 x 6
EDP Number: 900-9020-30



CARBIDE BURS

Solid Micrograin Carbide Burs

6mm Diameter Carbide Burs — 3mm Hardened Steel Shank Series 815 — Metric Sizes, Tough Cut

Cylindrical	Cylindrical Ball End	Round Nose Tree	Pointed Tree	Pointed Cone	End Cut	Ball Shape	Egg Shape	Inverted Taper
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Style:	SA-51	SC-51	SF-51	SG-51	SM-51	SB-51	SD-51	SE-51	SN-51
Size:	6.35 x 12	6.35 x 12	6.35 x 12	6.35 x 12	6.35 x 12	6.35 x 5	6.35	6.35 x 9	6.35 x 6
Taper Degrees:					22				10 INVERTED
EDP #:	815-0001-30	815-0002-30	815-0003-30	815-0004-30	815-0005-30	815-0006-30	815-0007-30	815-0008-30	815-0009-30

6mm Diameter Carbide Burs — 3mm Hardened Steel Shank Series 915 — Metric Sizes, Medium Right Hand Spiral













Cylindrical	Cylindrical Ball End	Round Nose Tree	Pointed Tree	Pointed Cone	End Cut	Ball Shape	Egg Shape	Inverted Taper
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Style:	SA-51	SC-51	SF-51	SG-51	SM-51	SB-51	SD-51	SE-51	SN-51
Size:	6.35 x 12	6.35 x 12	6.35 x 12	6.35 x 12	6.35 x 12	6.35 x 5	6.35	6.35 x 9	6.35 x 6
Taper Degrees:					22				10 INVERTED
EDP Number:	915-0001-30	915-0002-30	915-0003-30	915-0004-30	915-0005-30	915-0006-30	915-0007-30	915-0008-30	915-0009-30



**3mm Shank Diameter — 38mm Overall Length — Solid Carbide
Series 820 — Metric Sizes, Tough Cut**

					
Style: SA-52	Style: SA-53	Style: SC-52	Style: SC-53	Style: SF-53	Style: SG-53
Size: 3.97 x 12	Size: 4.76 x 12	Size: 3.97 x 12	Size: 4.76 x 12	Size: 4.76 x 12	Size: 4.76 x 12
EDP Number: 820-0001-30	EDP Number: 820-0011-30	EDP Number: 820-0002-30	EDP Number: 820-0012-30	EDP Number: 820-0003-30	EDP Number: 820-0004-30
					
Style: SM-53	Style: SE-53	Style: SL-53	Style: SD-53	Style: SH-53	Style: SN-53
Size: 3.97 x 12	Size: 4.76 x 12	Size: 3.97 x 12	Size: 4.76	Size: 4.76 x 9	Size: 4.76 x 6
Taper Degrees: 16		Taper Degrees: 14			Taper Degrees: 10 INVERTED
EDP Number: 820-0005-30	EDP Number: 820-0006-30	EDP Number: 820-0007-30	EDP Number: 820-0008-30	EDP Number: 820-0009-30	EDP Number: 820-0010-30

**3mm Shank Diameter — 38mm Overall Length — Solid Carbide
Series 920 — Metric Sizes, Medium Right Hand Spiral**

					
Style: SA-52	Style: SA-53	Style: SC-52	Style: SC-53	Style: SF-53	Style: SG-53
Size: 3.97 x 12	Size: 4.76 x 12	Size: 3.97 x 12	Size: 4.76 x 12	Size: 4.76 x 12	Size: 4.76 x 12
EDP Number: 920-0001-30	EDP Number: 920-0011-30	EDP Number: 920-0002-30	EDP Number: 920-0012-30	EDP Number: 920-0003-30	EDP Number: 920-0004-30
					
Style: SM-53	Style: SE-53	Style: SL-53	Style: SD-53	Style: SH-53	Style: SN-53
Size: 3.97 x 12	Size: 4.76 x 12	Size: 3.97 x 12	Size: 4.76	Size: 4.76 x 9	Size: 4.76 x 6
Taper Degrees: 16		Taper Degrees: 14			Taper Degrees: 10 INVERTED
EDP Number: 920-0005-30	EDP Number: 920-0006-30	EDP Number: 920-0007-30	EDP Number: 920-0008-30	EDP Number: 920-0009-30	EDP Number: 920-0010-30




CARBIDE BURS

Solid Micrograin Carbide Burs

6mm Shank - Aluminum Cut

Series 881 — Cylindrical


Metric

Aluminium Cut	EDP Number	Style	Dia.	Flute Length
	881-2362	SA-1MA	6	16
	881-3125-60	SA-2MA	8	19
	881-3750-60	SA-3MA	9	19
	881-5000-60	SA-5MA	12	25
	881-6250-60	SA-6MA	16	25
	881-7500-60	SA-7MA	19	25

6mm Shank - Aluminum Cut


Series 885 — Flame Shape

Metric

Aluminium Cut	EDP Number	Style	Dia.	Flute Length	
	885-5000-60	SH-5MA	12	32	
	885-6250-60	SH-6MA	16	37	
	885-7500-60	SH-7MA	19	41	


Series 882 — Cylindrical Ball End

Metric

Aluminium Cut	EDP Number	Style	Dia.	Flute Length	
	882-2362	SC-1MA	6	19	
	882-3750-60	SC-3MA	9	19	
	882-5000-60	SC-5MA	12	25	
	882-6250-60	SC-6MA	16	25	
	882-7500-60	SC-7MA	19	25	


Series 886 — Egg Shape

Metric

Aluminium Cut	EDP Number	Style	Dia.	Flute Length	
	886-3750-60	SE-3MA	9	16	
	886-5000-60	SE-5MA	12	22	
	886-6250-60	SE-6MA	16	25	
	886-7500-60	SE-7MA	19	25	

Series 883 — Round Nose Tree

Metric

Aluminium Cut	EDP Number	Style	Dia.	Flute Length	
	883-2362	SF-1MA	6	16	
	883-3750-60	SF-3MA	9	19	
	883-5000-60	SF-5MA	12	25	
	883-6250-60	SF-6MA	16	25	
	883-7500-60	SF-14MA	19	32	

*Indicates solid 6mm carbide shank 50mm OAL; all others have 6mm diameter hardened steel shank (9mm diameter shanks available).

Aluminum Cut Burs are designed for use on:

Aluminum
Soft Steel


Other soft materials

Non-ferrous metals
Re-inforced plastics

Also provides excellent work finish with minimum loading when cutting soft, sticky materials.


Series 887 — 14° Included Angle

Metric

Aluminium Cut	EDP Number	Style	Dia.	Flute Length	
	887-3750-60	SL-3MA	9	27	
	887-5000-60	SL-4MA	12	29	
	887-6250-60	SL-5MA	16	33	
	887-7500-60	SL-7MA	19	38	

Series 888 — Ball Shape

Metric

Aluminium Cut	EDP Number	Style	Diameter	
	888-2362	SD-1MA	6	
	888-3125-60	SD-2MA	8	
	888-3750-60	SD-3MA	9	
	888-5000-60	SD-5MA	12	
	888-6250-60	SD-6MA	16	

*Indicates solid 6mm carbide shank 50mm OAL; all others have 6mm diameter hardened steel shank (9mm diameter shanks available).



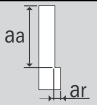
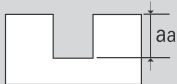
END MILLS TECHNICAL



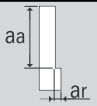
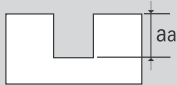
HP END MILLS FOR ALUMINUM

Sub-Micrograin Carbide End Mills

Series HP440

Side Milling			Slot Milling	
Hardness				
Work Material	Aluminum		Aluminum	
Cutting Speed	220 m/min		220 m/min	
Depth of Cut	$a_a=1.5D$ $a_r=0.1D$ 		$a_a=0.5D$ 	
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min
3	26,400	900	26,400	450
4	19,200	1,200	19,200	600
5	15,600	1,500	15,600	750
6	12,000	1,800	12,000	900
8	9,600	1,920	9,600	960
10	9,600	2,400	9,600	1,200
12	9,600	3,000	9,600	1,500
16	7,200	2,520	7,200	1,260
20	4,800	1,920	4,800	960
25	4,800	1,920	4,800	960

Series HP443

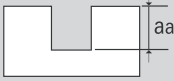
Side Milling			Slot Milling	
Hardness				
Work Material	Aluminum		Aluminum	
Cutting Speed	220 m/min		220 m/min	
Depth of Cut	$a_a=1.5D$ $a_r=0.1D$ 		$a_a=0.5D$ 	
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min
3	26,400	1,200	26,400	300
4	19,200	1,400	19,200	550
5	15,600	1,650	15,600	620
6	12,000	2,000	12,000	750
8	9,600	2,200	9,600	810
10	9,600	2,800	9,600	900
12	9,600	3,400	9,600	1,000
16	7,200	2,850	7,200	1,150
20	4,800	2,350	4,800	850
25	4,800	2,100	4,800	800





Series HP470

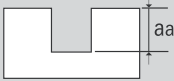
Slot Milling

Work Material	Aluminum Alloys (7075, 6061)		
Cutting Speed	450~750 m/min		
Depth of Cut	$a_a=0.5D$ 		
Mill Dia.	Speed min ⁻¹	Feed mm/min	
3	38,700	3,650	
4	29,100	4,400	
6	19,400	5,050	
8	14,500	5,270	
10	11,600	5,330	
12	9,700	5,330	
16	7,300	5,190	
20	5,800	4,900	
25	4,600	4,500	

For side milling, increase Feeds 20% to 50%.

Series HP471

Slot Milling

Work Material	Aluminum Alloys (7075, 6061)		
Cutting Speed	450~750 m/min		
Depth of Cut	$a_a=0.5D$ 		
Mill Dia.	Speed min ⁻¹	Feed mm/min	
3	31,800	3,000	
4	23,900	3,610	
6	15,900	4,140	
8	11,900	4,320	
10	9,500	4,370	
12	8,000	4,400	
16	6,000	4,260	
20	4,800	4,060	
25	3,800	3,720	

For side milling, increase Feeds 20% to 50%.

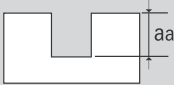


HP END MILLS FOR ALUMINUM

Sub-Micrograin Carbide End Mills

Series HP475

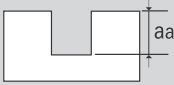
Slot Milling

Work Material	Aluminum Alloys (7075, 6061)		
Cutting Speed	450~750 m/min		
Depth of Cut	$a_a=0.5D$ 		
Mill Dia.	Speed min ⁻¹	Feed mm/min	
3	38,700	3,810	
4	29,000	4,590	
6	19,400	5,280	
8	14,500	5,490	
10	11,600	5,550	
12	9,700	5,540	
16	7,300	5,360	
20	5,800	5,040	
25	4,600	4,580	

For side milling, increase Feeds 20% to 50%.

Series HP476

Slot Milling

Work Material	Aluminum Alloys (7075, 6061)		
Cutting Speed	450~750 m/min		
Depth of Cut	$a_a=0.5D$ 		
Mill Dia.	Speed min ⁻¹	Feed mm/min	
3	31,800	3,130	
4	23,900	3,780	
6	15,900	4,330	
8	11,900	4,510	
10	9,500	4,550	
12	8,000	4,570	
16	6,000	4,410	
20	4,800	4,170	
25	3,800	3,790	

For side milling, increase Feeds 20% to 50%.



Series HP421

Slot Milling

Hardness	Tensile Strength: Up to 750N/mm ²				Up to 30 HRC	30 to 38 HRC	38 to 45 HRC	45 to 55 HRC	55 to 60 HRC																							
Work Material	Cast Iron	Mild Steels Carbon Steels		Alloy Steels Tool Steels	Hardened Steels Pre-hardened Steels Free Cutting	Hardened Steels Pre-hardened Steels Stainless Steels Non -Free Cutting	Hardened Steels	Hardened Steels																								
Cutting Speed	130 m/min	120 m/min		95 m/min	80 m/min	65 m/min	40 m/min	30 m/min																								
Depth of Cut	<table border="1"> <tr><td colspan="2">aa</td></tr> <tr><td>D<1</td><td>0.1D</td></tr> <tr><td>1<D<3</td><td>0.3D</td></tr> <tr><td>3<D</td><td>0.5D</td></tr> </table>				aa		D<1	0.1D	1<D<3	0.3D	3<D	0.5D			<table border="1"> <tr><td colspan="2">aa</td></tr> <tr><td>D<1</td><td>0.02D</td></tr> <tr><td>1<D</td><td>0.05D</td></tr> </table>		aa		D<1	0.02D	1<D	0.05D	<table border="1"> <tr><td colspan="2">aa</td></tr> <tr><td>D<1</td><td>0.01D</td></tr> <tr><td>1<D<3</td><td>0.02D</td></tr> <tr><td>3<D</td><td>0.05D</td></tr> </table>		aa		D<1	0.01D	1<D<3	0.02D	3<D	0.05D
	aa																															
D<1	0.1D																															
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3<D	0.05D																															
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min																		
1	30,888	204	28,080	187	20,880	179	18,000	128	15,840	95	10,080	43	7,272	36																		
2	17,424	213	15,840	194	12,096	179	10,080	128	9,144	102	5,688	59	3,960	36																		
3	11,750	318	10,656	289	9,144	216	7,632	143	6,408	109	3,960	66	2,880	43																		
4	9,425	374	8,568	343	7,056	266	6,134	179	5,040	128	3,168	73	2,232	43																		
5	8,395	501	7,632	454	6,192	340	5,112	187	4,392	143	2,736	81	1,814	43																		
6	7,049	491	6,408	446	5,184	340	4,248	187	3,600	143	2,232	81	1,512	36																		
8	5,227	467	4,752	425	3,888	340	3,168	179	2,736	143	1,656	73	1,145	36																		
10	4,198	442	3,816	402	3,096	333	2,520	179	2,160	135	1,375	73	914	36																		
12	3,485	442	3,168	402	2,592	333	2,088	179	1,800	135	1,145	66	763	29																		
14	3,010	442	2,736	402	2,160	311	1,814	157	1,512	135	979	59	655	26																		
16	2,614	382	2,376	373	1,944	289	1,584	143	1,375	121	857	52	569	22																		
18	2,297	366	2,088	333	1,728	259	1,426	128	1,217	109	763	43	504	22																		
20	2,059	328	1,872	297	1,512	223	1,282	114	1,094	95	684	43	454	19																		
22	1,901	302	1,728	275	1,382	209	1,166	102	994	88	619	36	410	14																		
25	1,663	262	1,512	238	1,246	187	1,022	94	878	81	547	29	367	14																		

For side milling, increase feeds 20% to 50%.



HP END MILLS

Micrograin Carbide End Mills

Series HP441

Side Milling

Hardness	Tensile Strength: Up to 750N/mm ²		Up to 30 HRC	30 to 38 HRC	38 to 45 HRC	45 to 55 HRC	55 to 60 HRC							
Work Material	Cast Iron	Mild Steels Carbon Steels	Alloy Steels Tool Steels Ti Alloys (Annealed)	Hardened Steels Pre-hardened Steels Ti Alloys (Solution Treated and Aged)	Hardened Steels Pre-hardened Steels Stainless Steels Inconel Ni Based Alloys	Hardened Steels	Hardened Steels							
Cutting Speed	114 m/min	120 m/min	96 m/min	78 m/min	72 m/min	42 m/min	30 m/min							
Depth of Cut							$aa=1D$ $ar=0.02D$							
			<table border="1"> <thead> <tr> <th></th> <th>aa</th> <th>ar</th> </tr> </thead> <tbody> <tr> <td>D<1/8</td> <td>1.5D</td> <td>0.05D</td> </tr> <tr> <td>1/8<D</td> <td>1.5D</td> <td>0.1D</td> </tr> </tbody> </table>			aa			ar	D<1/8	1.5D	0.05D	1/8<D	1.5D
	aa	ar												
D<1/8	1.5D	0.05D												
1/8<D	1.5D	0.1D												
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min
1	38,100	528	32,004	444	27,120	396	17,280	156	15,720	142	9,840	84	6,888	54
2	22,416	531	18,828	444	15,948	397	10,188	156	9,240	141	5,772	86	4,050	58
3	14,472	865	12,246	733	10,440	516	8,550	180	6,570	158	3,816	89	2,748	66
4	11,556	912	9,672	763	9,468	533	6,204	193	5,370	163	3,186	101	2,178	66
5	9,126	1,063	7,428	891	6,234	611	4,968	202	4,416	179	2,646	108	1,746	59
6	8,472	1,050	6,108	880	5,082	609	4,050	209	3,636	187	2,130	101	1,446	58
8	5,784	1,024	4,800	848	3,996	603	3,192	209	2,832	187	1,668	98	1,152	52
10	4,416	1,024	3,708	848	3,078	603	2,448	209	2,172	187	1,332	118	882	50
12	3,612	998	3,012	840	2,508	600	1,986	209	1,770	183	1,080	82	720	40
14	3,240	952	2,736	827	2,232	596	1,800	209	1,584	179	978	73	654	36
16	2,826	956	2,394	795	1,956	596	1,590	187	1,440	164	864	69	564	29
18	2,520	943	2,088	779	1,728	582	1,422	164	1,266	150	762	59	504	29
20	2,304	906	1,926	757	1,620	480	1,314	153	1,170	138	696	53	456	26
22	1,992	798	1,704	684	1,422	485	1,152	132	1,020	120	612	43	402	24
25	1,782	710	1,488	595	1,260	426	1,008	118	900	107	528	42	360	22

For side milling, increase feeds 20% to 50%.



Series HP421, HP441

High Speed Milling

Hardness	Tensile Strength: Up to 750N/mm ²	Up to 30 HRC		30 to 38 HRC		38 to 45 HRC		45 to 55 HRC																							
Work Material	Mild Steels Carbon Steels	Alloy Steels Tool Steels Ti Alloys (Annealed)		Hardened Steels Pre-hardened Steels Ti Alloys (Solution Treated and Aged)		Hardened Steels Pre-hardened Steels Stainless Steels Inconel Ni Based Alloys		Hardened Steels																							
Cutting Speed	400 m/min	350 m/min		250 m/min		150 m/min		80 m/min																							
Depth of Cut	<table border="1"> <tr><td></td><td>aa</td><td>ar</td></tr> <tr><td>D<8</td><td>1.5D</td><td>0.01D</td></tr> <tr><td>8<D<16</td><td>1.5D</td><td>0.02D</td></tr> <tr><td>16<D</td><td>1.5D</td><td>0.05D</td></tr> </table>			aa	ar	D<8	1.5D	0.01D	8<D<16	1.5D	0.02D	16<D	1.5D	0.05D			<table border="1"> <tr><td></td><td>aa</td><td>ar</td></tr> <tr><td>D<8</td><td>1D</td><td>0.01D</td></tr> <tr><td>8<D</td><td>1D</td><td>0.02D</td></tr> </table>			aa	ar	D<8	1D	0.01D	8<D	1D	0.02D				
		aa	ar																												
D<8	1.5D	0.01D																													
8<D<16	1.5D	0.02D																													
16<D	1.5D	0.05D																													
	aa	ar																													
D<8	1D	0.01D																													
8<D	1D	0.02D																													
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min																					
1	100,000	1,110	100,000	1,260	79,600	1,000	47,750	540	25,450	330																					
2	63,650	1,240	55,700	1,400	39,800	1,100	23,850	600	12,700	360																					
3	42,450	2,020	37,150	1,780	26,500	1,250	15,900	660	8,450	360																					
4	31,800	2,120	27,850	1,850	19,900	1,350	11,900	690	6,350	420																					
5	25,450	3,100	22,250	2,130	15,900	1,400	9,550	750	5,050	450																					
6	21,000	2,450	18,500	2,150	13,000	1,500	7,950	795	4,200	420																					
8	15,500	2,450	13,500	2,100	9,900	1,450	5,950	795	3,150	425																					
10	12,500	2,500	11,000	2,100	7,950	1,450	4,750	800	2,500	420																					
12	10,500	2,450	9,250	2,100	6,600	1,450	3,950	790	2,100	410																					
14	9,050	2,350	7,950	2,000	5,650	1,350	3,400	740	1,800	390																					
16	7,950	2,250	6,950	1,950	4,950	1,350	2,950	715	1,550	375																					
18	7,050	2,250	6,150	1,900	4,400	1,300	2,650	705	1,400	375																					
20	6,350	2,100	5,550	1,850	3,950	1,300	2,350	665	1,250	355																					
22	5,750	1,950	5,050	1,700	3,600	1,200	2,150	635	1,150	325																					
24	5,300	1,800	4,600	1,550	3,300	1,100	1,950	575	1,050	295																					
25	5,050	1,700	4,450	1,500	3,150	1,050	1,900	560	1,000	280																					

Reduce feeds 50% for Series HP421 High-Speed Light Milling.

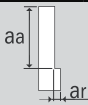


HP END MILLS


Micrograin Carbide End Mills

Series HP460

Side Milling

Hardness					Up to 35 HRC		35 to 45 HRC		45 to 55 HRC	
Work Material	Aluminum		Medium Carbon Steels Mild Steels		Pre-hardened Steels Stainless Steels Die & Alloy Steels		Pre-hardened Steels Stainless Steels Die & Alloy Steels		Hardened Steels	
Cutting Speed	156 m/min		54 m/min		36 m/min		18 m/min		18 m/min	
Depth of Cut	$a_a=1.5D$ $a_r=0.1D$						$a_a=1.5D$ $a_r=0.1D$			
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min
3	16,320	324	5,760	156	3,840	102	2,640	46	1,920	18
4	12,480	444	4,320	216	2,880	144	1,920	60	1,440	24
5	9,960	528	3,480	264	2,400	186	1,560	98	1,200	30
6	8,280	660	2,880	324	1,920	204	1,272	90	960	36
8	6,240	660	2,160	324	1,440	204	960	90	720	36
10	5,040	720	1,680	408	1,140	204	768	90	576	36
12	4,200	720	1,440	432	960	216	636	90	480	36
16	3,120	720	1,080	480	720	216	480	90	360	36
20	2,520	720	864	492	576	240	384	90	288	36
25	2,040	720	696	420	456	216	300	90	228	36

Slot Milling

Hardness			Up to 35 HRC		35 to 45 HRC		45 to 55 HRC							
Work Material	Medium Carbon Steels Mild Steels		Pre-hardened Steels Stainless Steels Die & Alloy Steels		Pre-hardened Steels Stainless Steels Die & Alloy Steels		Hardened Steels							
Cutting Speed	42 m/min		31 m/min		20 m/min		16 m/min							
Depth of Cut	<table border="1"> <tr><td></td><td>a_a</td></tr> <tr><td>$D < 1/2$</td><td>1.0D</td></tr> <tr><td>$1/2 < D$</td><td>0.5D</td></tr> </table>			a_a	$D < 1/2$	1.0D	$1/2 < D$	0.5D			$a_a=0.5D$			
	a_a													
$D < 1/2$	1.0D													
$1/2 < D$	0.5D													
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min						
3	4,920	120	3,600	72	2,280	30	1,680	12						
4	3,720	156	2,760	96	1,680	42	1,320	14						
5	3,000	204	2,160	120	1,320	52	1,080	19						
6	2,448	240	1,632	144	1,080	60	816	24						
8	1,836	240	1,224	144	816	60	612	24						
10	1,428	276	972	144	648	60	492	24						
12	1,224	300	816	156	540	60	408	24						
16	912	324	612	156	408	60	312	24						
20	744	336	492	168	324	60	240	24						
25	600	288	384	156	252	60	192	24						



Series HP455

Side Milling

Hardness	Up to 30 HRC		30 to 38 HRC		38 to 45 HRC	
Work Material	Alloy Steels Tool Steels Ti Alloys (Annealed)		Hardened Steels Pre-hardened Steels Ti Alloys (Solution Treated and Aged)		Hardened Steels Pre-hardened Steels Stainless Steels Inconel Ni Based Alloys	
Cutting Speed	48 m/min		43 m/min		36 m/min	
Depth of Cut	$a_a=1.5D$ $a_r=0.1D$					
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed in/min
3	4,806	332	4,332	131	3,444	101
4	3,780	332	3,420	131	2,754	101
5	2,934	360	2,646	131	2,100	101
6	2,400	360	2,130	131	1,716	101
7	2,142	360	1,896	131	1,554	101
8	1,884	360	1,668	131	1,380	101
10	1,464	360	1,332	131	1,062	101
11	1,368	360	1,242	131	990	101
12	1,194	372	1,080	131	864	101
14	1,056	399	954	131	762	101
16	948	421	864	131	684	101
20	768	424	696	125	558	101
25	588	332	528	101	432	79

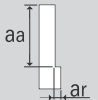


HP END MILLS

Micrograin Carbide End Mills

Series HP450, HP450L

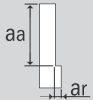
Side Milling

Hardness	Up to 25 HRC		25 to 45 HRC		45 to 55 HRC		55 to 65 HRC		30 to 40 HRC		25 to 45 HRC	
Work Material	Mild Steels Carbon Steels Cast Iron		Alloyed Steels Tool Steels		Hardened Steels Tool Steels		Hardened Steels Tool Steels		Titanium Alloy		Nickel Base Aigh-Temp Alloy	
Cutting Speed	132 m/min		72 m/min		39 m/min		22 m/min		66 m/min		20 m/min	
Depth of Cut	$a_a=1.5D$ $a_r=0.1D$				$a_a=1.5D$ $a_r=0.05D$							
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min
3	11,400	1,800	6,360	480	3,240	192	2,280	120	5,040	840	1,680	54
4	8,640	1,800	4,800	480	2,640	240	1,800	120	3,840	900	1,260	66
5	6,840	1,560	3,840	480	2,160	264	1,560	120	3,000	900	984	84
6	6,360	3,120	3,480	1,020	1,920	360	1,320	192	2,520	1,080	840	108
8	4,800	2,880	2,640	1,020	1,440	360	996	180	1,920	1,080	624	108
10	3,840	2,520	2,160	1,020	1,152	336	804	180	1,560	960	480	108
12	3,480	2,520	1,920	924	960	336	672	156	1,260	900	408	96
16	2,640	1,920	1,440	696	720	264	528	120	960	840	312	84
20	2,160	1,560	1,140	552	576	192	420	102	780	720	240	84
25	1,500	1,440	900	570	450	216	300	96	720	600	216	72




Series HP451, HP453, HP456

Side Milling

Hardness			Tensile Strength: Up to 750N/mm ²		Up to 30 HRC		30 to 38 HRC		38 to 45 HRC			
Work Material	Cast Iron		Mild Steels Carbon Steels		Alloy Steels Tool Steels Ti Alloys (Annealed)		Hardened Steels Pre-hardened Steels Ti Alloys (Solution Treated and Aged)		Hardened Steels Pre-hardened Steels Stainless Steels Inconel Ni Based Alloys		Aluminum Alloy	
Cutting Speed	102 m/min		120 m/min		96 m/min		72 m/min		48 m/min		132 m/min	
Depth of Cut	$a_a=1.5D$ $a_r=0.1D$ 											
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min
4	8,160	840	9,600	1,800	7,680	1,560	5,760	480	3,840	288	10,560	1,320
6	5,400	960	6,360	2,040	5,040	1,800	3,840	480	2,520	312	6,960	1,560
8	4,080	840	4,800	1,920	3,840	1,680	2,880	744	1,920	492	5,280	1,440
10	3,240	816	3,840	1,680	3,000	1,560	2,280	720	1,560	492	4,200	1,320
12	2,760	792	3,240	1,680	2,520	1,440	1,920	612	1,260	420	3,480	1,200
16	2,040	660	2,400	1,320	1,920	1,140	1,440	468	960	396	2,640	1,080
20	1,620	540	2,160	1,080	1,500	900	1,140	384	780	312	2,100	960

Slot Milling

Hardness			Tensile Strength: Up to 750N/mm ²		Up to 30 HRC		30 to 38 HRC		38 to 45 HRC			
Work Material	Cast Iron		Mild Steels Carbon Steels		Alloy Steels Tool Steels Ti Alloys (Annealed)		Hardened Steels Pre-hardened Steels Ti Alloys (Solution Treated and Aged)		Hardened Steels Pre-hardened Steels Stainless Steels Inconel Ni Based Alloys		Aluminum Alloy	
Cutting Speed	102 m/min		120 m/min		96 m/min		72 m/min		48 m/min		132 m/min	
Depth of Cut	$a_a=1.0D$ 						$a_a=0.5D$					
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min
4	3,840	384	8,640	756	7,200	540	4,800	348	2,880	204	8,160	1,080
6	2,520	444	5,760	876	4,800	756	3,240	408	1,920	276	6,960	1,200
8	1,920	396	4,320	792	3,600	696	2,400	408	1,440	276	5,280	1,140
10	1,560	360	3,480	720	2,880	564	1,920	372	1,140	252	4,200	1,080
12	1,272	348	2,880	696	2,400	540	1,560	348	960	240	3,480	960
16	960	576	2,160	576	1,800	816	1,200	264	720	216	2,640	840
20	780	504	1,680	504	1,440	384	960	216	576	168	2,100	720




HP END MILLS

Micrograin Carbide End Mills

Series HP400

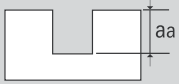
Slot Milling

Hardness			Tensile Strength: Up to 750N/mm ²		Up to 30 HRC		30 to 38 HRC		38 to 45 HRC	
Work Material	Cast Iron		Medium Steels Mild Steels		Alloy Steels Tool Steels Ti Alloys (Annealed)		Hardened Steels Pre-hardened Steels		Stainless Steels Hardened Steels	
Cutting Speed	102 m/min		70 m/min		90 m/min		66 m/min		54 m/min	
Depth of Cut	$a_a=0.75D$ 					$a_a=0.5D$				
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min
6	6,360	768	5,400	648	4,440	360	3,480	276	2,880	228
8	4,800	768	4,080	648	3,360	408	2,640	312	2,160	264
10	3,840	768	3,240	648	2,700	432	2,100	336	1,740	276
12	3,180	768	2,700	648	2,220	444	1,740	348	1,440	288
16	2,400	768	2,040	648	1,680	468	1,320	372	1,080	300
20	1,920	768	1,620	612	1,320	468	1,080	360	840	276
25	1,520	760	890	590	1,140	455	840	330	680	250



Series HP411

Slot Milling

Hardness	Tensile Strength: Up to 750N/mm ²		Up to 30 HRC		30 to 38 HRC		38 to 45 HRC		45 to 55 HRC		55 to 60 HRC	
Work Material	Mild Steels Carbon Steels		Alloy Steels Tool Steels Ti Alloys (Annealed)		Hardened Steels Pre-hardened Steels Ti Alloys (Solution Treated and Aged)		Hardened Steels Pre-hardened Steels Stainless Steels Inconel Ni Based Alloys		Hardened Steels		Hardened Steels	
Cutting Speed	100 m/min		80 m/min		68 m/min		56 m/min		36 m/min		25 m/min	
Depth of Cut	$a_a=0.1D$ 						$a_a=0.02D$					
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min
3	10,680	1,200	8,640	840	7,080	600	6,120	480	3,840	180	2,520	60
4	8,040	1,200	6,480	840	5,400	600	4,560	480	2,880	180	1,920	60
5	6,360	1,200	5,160	840	4,320	600	3,720	480	2,280	180	1,560	60
6	5,400	1,200	4,320	840	3,600	600	3,000	480	1,920	180	1,320	60



HP END MILLS

Micrograin Carbide End Mills

Series HP410, HP410L

Slot Milling

Hardness	Tensile Strength: Up to 750N/mm ²		Up to 30 HRC		30 to 38 HRC		38 to 45 HRC		45 to 55 HRC		55 to 60 HRC							
Work Material	Mild Steels Carbon Steels		Alloy Steels Tool Steels Ti Alloys (Annealed)		Hardened Steels Pre-hardened Steels Ti Alloys (Solution Treated and Aged)		Hardened Steels Pre-hardened Steels Stainless Steels Inconel Ni Based Alloys		Hardened Steels		Hardened Steels							
Cutting Speed	96 m/min		78 m/min		66 m/min		60 m/min		36 m/min		18 m/min							
Depth of Cut	<table border="1"> <tr><td colspan="2">aa</td></tr> <tr><td>D<1/16</td><td>0.05D</td></tr> <tr><td>1/16<D</td><td>0.1D</td></tr> </table>		aa		D<1/16	0.05D	1/16<D	0.1D									aa=0.02D	
aa																		
D<1/16	0.05D																	
1/16<D	0.1D																	
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min						
0.5	38,400	300	38,400	240	38,400	240	36,600	180	22,800	96	12,000	36						
0.6	38,400	360	38,400	300	35,400	264	30,000	240	18,600	96	10,140	36						
0.8	37,800	480	32,400	420	26,400	300	22,800	240	13,800	96	7,620	36						
1	31,800	600	25,800	540	21,000	420	18,000	300	11,400	96	6,060	36						
1.5	21,000	720	16,800	600	13,800	480	12,000	300	7,620	96	4,020	36						
2	15,600	720	12,600	600	10,680	480	9,120	300	5,700	96	3,000	36						
2.5	12,600	720	10,380	600	8,520	480	7,320	300	4,560	96	2,400	36						

For side milling, increase feeds 20% to 50%.



Series HP432, HP433

Slot Milling

Hardness	Tensile Strength: Up to 750N/mm ²				Up to 30 HRC	30 to 38 HRC	38 to 45 HRC	45 to 55 HRC	55 to 60 HRC																			
Work Material	Cast Iron	Mild Steels Carbon Steels		Alloy Steels Tool Steels Ti Alloys (Annealed)	Hardened Steels Pre-hardened Steels Ti Alloys (Solution Treated and Aged)	Hardened Steels Pre-hardened Steels Stainless Steels Inconel Ni Based Alloys	Hardened Steels	Hardened Steels																				
Cutting Speed	130 m/min	120 m/min		95 m/min	80 m/min	65 m/min	40 m/min	30 m/min																				
Depth of Cut	<table border="1"> <tr><td colspan="2">aa</td></tr> <tr><td>D<1/16</td><td>0.1D</td></tr> <tr><td>1/16<D<1/8</td><td>0.3D</td></tr> <tr><td>1/8<D</td><td>0.5D</td></tr> </table>				aa		D<1/16	0.1D	1/16<D<1/8	0.3D	1/8<D	0.5D					<table border="1"> <tr><td colspan="2">aa</td></tr> <tr><td>D<1/16</td><td>0.02D</td></tr> <tr><td>1/16<D<1/8</td><td>0.2D</td></tr> <tr><td>1/8<D</td><td>0.5D</td></tr> </table>				aa		D<1/16	0.02D	1/16<D<1/8	0.2D	1/8<D	0.5D
	aa																											
	D<1/16	0.1D																										
	1/16<D<1/8	0.3D																										
1/8<D	0.5D																											
aa																												
D<1/16	0.02D																											
1/16<D<1/8	0.2D																											
1/8<D	0.5D																											
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min														
3	11,750	318	10,656	289	9,144	216	7,632	143	6,408	109	3,960	66	2,880	43														
4	9,425	374	8,568	343	7,056	266	6,134	179	5,040	128	3,168	73	2,232	43														
5	8,395	501	7,632	454	6,192	340	5,112	187	4,392	143	2,736	81	1,814	43														
6	7,049	491	6,408	446	5,184	340	4,248	187	3,600	143	2,232	81	1,512	36														
8	5,227	467	4,752	425	3,888	340	3,168	179	2,736	143	1,656	73	1,145	36														
10	4,198	442	3,816	402	3,096	333	2,520	179	2,160	135	1,375	73	914	36														
12	3,485	442	3,168	402	2,592	333	2,088	179	1,800	135	1,145	66	763	29														

For side milling, increase feeds 20% to 50%.



HP END MILLS

Micrograin Carbide End Mills

Series HP434, HP435

Side Milling

Hardness			Tensile Strength: Up to 750N/mm ²		Up to 30 HRC		30 to 38 HRC		38 to 45 HRC		45 to 55 HRC		55 to 60 HRC											
Work Material	Cast Iron		Mild Steels Carbon Steels		Alloy Steels Tool Steels Ti Alloys (Annealed)		Hardened Steels Pre-hardened Steels Ti Alloys (Solution Treated and Aged)		Hardened Steels Pre-hardened Steels Stainless Steels Inconel Ni Based Alloys		Hardened Steels		Hardened Steels											
Cutting Speed	144 m/min		120 m/min		96 m/min		78 m/min		72 m/min		42 m/min		30 m/min											
Depth of Cut																								
			<table border="1"> <tr> <td></td> <td>a_a</td> <td>a_r</td> </tr> <tr> <td>$D < 1/8$</td> <td>1.5D</td> <td>0.05D</td> </tr> <tr> <td>$1/8 < D$</td> <td>1.5D</td> <td>0.1D</td> </tr> </table>			a_a	a_r	$D < 1/8$	1.5D	0.05D	$1/8 < D$	1.5D	0.1D											$a_a = 1D$ $a_r = 0.02D$
	a_a	a_r																						
$D < 1/8$	1.5D	0.05D																						
$1/8 < D$	1.5D	0.1D																						
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min										
3	14,472	865	12,246	733	10,440	516	8,550	180	6,570	158	3,816	89	2,748	66										
4	11,556	912	9,672	763	9,468	533	6,204	193	5,370	163	3,186	101	2,178	66										
5	9,126	1,063	7,428	891	6,234	611	4,968	202	4,416	179	2,646	108	1,746	59										
6	8,472	1,050	6,108	880	5,082	609	4,050	209	3,636	187	2,130	101	1,446	58										
8	5,784	1,024	4,800	848	3,996	603	3,192	209	2,832	187	1,668	98	1,152	52										
10	4,416	1,024	3,708	848	3,078	603	2,448	209	2,172	187	1,332	118	882	50										
12	3,612	998	3,012	840	2,508	600	1,986	209	1,770	183	1,080	82	720	40										

For Slotting, reduce feeds 20% to 50%.



Series HP432, HP434, HP433, HP435

High Speed Milling

Hardness	Tensile Strength: Up to 750N/mm ²		Up to 30 HRC		30 to 38 HRC		38 to 45 HRC		45 to 55 HRC													
Work Material	Mild Steels Carbon Steels		Alloy Steels Tool Steels Ti Alloys (Annealed)		Hardened Steels Pre-hardened Steels Ti Alloys (Solution Treated and Aged)		Hardened Steels Pre-hardened Steels Stainless Steels Inconel Ni Based Alloys		Hardened Steels													
Cutting Speed	400 m/min		350 m/min		250 m/min		150 m/min		80 m/min													
Depth of Cut						<table border="1"> <thead> <tr> <th></th> <th>aa</th> <th>ar</th> </tr> </thead> <tbody> <tr> <td>D<5/16</td> <td>1.5D</td> <td>0.01D</td> </tr> <tr> <td>5/16<D<5/8</td> <td>1.5D</td> <td>0.02D</td> </tr> <tr> <td>5/8<D</td> <td>1.5D</td> <td>0.05D</td> </tr> </tbody> </table>						aa	ar	D<5/16	1.5D	0.01D	5/16<D<5/8	1.5D	0.02D	5/8<D	1.5D	0.05D
							aa	ar														
D<5/16	1.5D	0.01D																				
5/16<D<5/8	1.5D	0.02D																				
5/8<D	1.5D	0.05D																				
						<table border="1"> <thead> <tr> <th></th> <th>aa</th> <th>ar</th> </tr> </thead> <tbody> <tr> <td>D<5/16</td> <td>1D</td> <td>0.01D</td> </tr> <tr> <td>5/8<D</td> <td>1D</td> <td>0.02D</td> </tr> </tbody> </table>						aa	ar	D<5/16	1D	0.01D	5/8<D	1D	0.02D			
	aa	ar																				
D<5/16	1D	0.01D																				
5/8<D	1D	0.02D																				
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min												
3	42,450	2,020	37,150	1,780	26,500	1,250	15,900	660	8,450	360												
4	31,800	2,120	27,850	1,850	19,900	1,350	11,900	690	6,350	420												
5	25,450	3,100	22,250	2,130	15,900	1,400	9,550	750	5,050	450												
6	21,000	2,450	18,500	2,150	13,000	1,500	7,950	795	4,200	420												
8	15,500	2,450	13,500	2,100	9,900	1,450	5,950	795	3,150	425												
10	12,500	2,500	11,000	2,100	7,950	1,450	4,750	800	2,500	420												
12	10,500	2,450	9,250	2,100	6,600	1,450	3,950	790	2,100	410												

Reduce feeds 50% for Series HP432 High-Speed Light Milling.

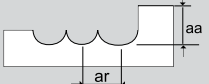


HP END MILLS

Micrograin Carbide End Mills

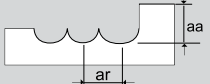
Series HP421BN, HP441BN

Profiling Milling

Hardness	Tensile Strength: Up to 750N/mm ²		Up to 30 HRC		30 to 38 HRC		38 to 45 HRC		45 to 55 HRC		55 to 60 HRC			
Work Material	Cast Iron		Mild Steels Carbon Steels		Alloy Steels Tool Steels Ti Alloys (Annealed)		Hardened Steels Pre-hardened Steels Ti Alloys (Solution Treated and Aged)		Hardened Steels Pre-hardened Steels Stainless Steels Inconel Ni Based Alloys		Hardened Steels			
Cutting Speed	210 m/min		168 m/min		138 m/min		114 m/min		96 m/min		84 m/min		60 m/min	
Depth of Cut	$a_a=0.1D$ $a_r=0.2D$ 										$a_a=0.05D$ $a_r=0.1D$			
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min
1	46,080	1,098	46,080	1,098	45,360	888	36,000	576	31,680	408	27,360	300	20,160	198
2	34,026	1,344	27,648	1,098	22,680	888	18,276	576	16,080	414	13,884	300	10,446	198
3	21,312	1,350	17,244	1,098	14,472	906	11,634	588	10,188	432	8,736	312	6,534	210
4	16,740	1,350	13,806	1,098	11,556	906	9,234	636	8,070	528	6,912	384	5,160	246
5	13,320	1,512	10,656	1,230	8,898	918	7,068	642	6,234	534	5,316	408	3,984	252
6	10,944	1,572	8,736	1,278	7,284	990	5,778	690	5,082	576	4,332	432	3,228	270
8	8,652	1,860	6,912	1,500	5,742	1,128	4,578	792	3,996	648	3,420	462	2,538	300
10	6,648	1,704	5,316	1,356	4,416	1,056	3,504	744	3,078	618	2,646	474	1,956	294
12	5,406	1,554	4,302	1,236	3,612	990	2,868	696	2,508	594	2,130	438	1,572	276
14	4,896	1,512	3,888	1,242	3,240	972	2,592	684	2,232	558	1,944	432	1,440	270
16	4,284	1,512	3,408	1,206	2,826	930	2,250	684	1,956	546	1,668	390	1,296	264
18	3,816	1,440	3,024	1,140	2,520	876	2,016	684	1,728	546	1,512	372	1,140	252
20	3,498	1,374	2,808	1,110	2,304	834	1,854	654	1,620	534	1,410	360	1,056	246
22	3,048	1,278	2,556	1,026	2,130	738	1,638	582	1,422	480	1,230	324	918	234
25	2,688	1,116	2,130	954	1,770	660	1,416	510	1,260	414	1,080	294	804	204

Increase feeds 40% to 50% for Series HP441BN.

High-Speed Milling

Hardness	Tensile Strength: Up to 750N/mm ²		Up to 30 HRC		30 to 38 HRC		38 to 45 HRC		45 to 55 HRC		55 to 60 HRC										
Work Material	Mild Steels Carbon Steels		Alloy Steels Tool Steels Ti Alloys (Annealed)		Hardened Steels Pre-hardened Steels Ti Alloys (Solution Treated and Aged)		Hardened Steels Pre-hardened Steels Stainless Steels Inconel Ni Based Alloys		Hardened Steels		Hardened Steels										
Cutting Speed	300 m/min		260 m/min		225 m/min		180 m/min		180 m/min		120 m/min										
Depth of Cut	$a_a=0.02D$ $a_r=0.05D$ 										<table border="1"> <tr><td></td><td>a_a</td><td>a_r</td></tr> <tr><td>D<4mm</td><td>0.02D</td><td>0.05D</td></tr> <tr><td>4mm<D</td><td>0.13"</td><td>0.05D</td></tr> </table>			a_a	a_r	D<4mm	0.02D	0.05D	4mm<D	0.13"	0.05D
	a_a	a_r																			
D<4mm	0.02D	0.05D																			
4mm<D	0.13"	0.05D																			
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min									
1	50,000	2,800	50,000	2,800	50,000	2,500	47,500	2,250	32,000	1,450	25,000	1,000									
2	31,780	3,485	25,385	2,800	24,890	2,500	23,875	2,250	17,225	1,545	12,690	1,000									
3	20,475	3,535	16,325	2,905	15,825	2,540	15,150	2,285	11,000	1,610	8,355	1,015									
4	18,085	3,690	15,525	3,380	15,025	2,740	13,555	2,440	11,000	1,885	7,960	1,095									
5	15,415	4,125	14,755	4,085	13,600	2,875	10,755	2,290	9,915	2,120	7,435	1,190									
6	14,380	4,595	12,880	4,105	11,050	2,635	9,080	2,150	9,080	2,150	6,305	1,100									
8	11,600	3,685	10,100	3,230	9,025	2,120	7,215	1,715	7,215	1,715	5,000	895									
10	9,250	2,920	8,025	2,525	6,950	1,650	5,540	1,310	5,540	1,310	3,840	690									
12	7,540	2,375	6,510	2,045	6,650	1,330	4,500	1,050	4,500	1,050	3,125	555									
14	6,800	2,150	5,900	1,850	5,100	1,200	4,050	970	4,050	970	2,800	500									
16	6,000	1,915	5,190	1,615	4,485	1,055	3,575	855	3,575	855	2,465	440									
18	5,300	1,650	4,550	1,450	3,950	945	3,150	755	3,150	755	2,200	395									
20	4,890	1,540	4,215	1,340	3,650	875	2,925	700	2,925	700	2,010	360									
22	4,255	1,350	3,710	1,175	3,190	765	2,550	610	2,550	610	1,755	310									
25	3,740	1,180	3,250	1,035	2,805	670	2,215	530	2,215	530	1,525	270									

Increase feeds 40% to 50% for Series HP441BN.



Series HP419, HP419L, HP413

Profiling Milling

Hardness	Tensile Strength: Up to 750N/mm ²		Up to 30 HRC		30 to 38 HRC		38 to 45 HRC		45 to 55 HRC		55 to 60 HRC			
Work Material	Cast Iron		Mild Steels Carbon Steels		Alloy Steels Tool Steels Ti Alloys (Annealed)		Hardened Steels Pre-hardened Steels Ti Alloys (Solution Treated and Aged)		Hardened Steels Pre-hardened Steels Stainless Steels Inconel Ni Based Alloys		Hardened Steels		Hardened Steels	
Cutting Speed	210 m/min		168 m/min		138 m/min		108 m/min		96 m/min		84 m/min		60 m/min	
Depth of Cut	$a_a=0.1D$ $a_r=0.2D$										$a_a=0.05D$ $a_r=0.1D$			
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min
0.5	46,080	900	46,080	900	46,080	720	46,080	456	46,080	360	55,032	240	40,320	180
0.6	46,080	972	46,080	972	46,080	792	46,080	480	46,080	384	55,032	264	40,320	186
0.8	46,080	1,080	46,080	1,080	46,080	852	46,080	504	46,080	396	34,416	288	25,200	192
1	46,080	1,098	46,080	1,098	45,360	888	36,000	576	31,680	408	27,360	300	20,160	198
2	34,020	1,344	27,648	1,098	22,680	888	18,276	576	16,080	414	13,884	300	10,440	198
3	21,312	1,350	17,244	1,098	14,472	906	11,628	588	10,188	432	8,736	312	6,528	210
4	16,740	1,350	13,800	1,098	11,556	906	9,228	636	8,064	528	6,912	384	5,160	246
5	13,320	1,512	10,656	1,230	8,892	918	7,068	642	6,228	534	5,316	408	3,984	252
6	10,944	1,572	8,736	1,278	7,284	990	5,772	690	5,076	576	4,332	432	3,228	270
8	8,652	1,860	6,912	1,500	5,736	1,128	4,572	792	3,996	648	3,420	462	2,532	300
10	6,648	1,704	5,316	1,356	4,416	1,056	3,504	744	3,072	618	2,640	474	1,956	294
12	5,400	1,554	4,296	1,236	3,612	990	2,868	696	2,508	594	2,124	438	1,572	276

Reduce feeds 10% to 20% for Series HP419L.

High-Speed Light Milling

Hardness	Tensile Strength: Up to 750N/mm ²		Up to 30 HRC		30 to 38 HRC		38 to 45 HRC		45 to 55 HRC		55 to 60 HRC										
Work Material	Mild Steels Carbon Steels		Alloy Steels Tool Steels Ti Alloys (Annealed)		Hardened Steels Pre-hardened Steels Ti Alloys (Solution Treated and Aged)		Hardened Steels Pre-hardened Steels Stainless Steels Inconel Ni Based Alloys		Hardened Steels		Hardened Steels										
Cutting Speed	290 m/min		250 m/min		220 m/min		175 m/min		175 m/min		120 m/min										
Depth of Cut											<table border="1"> <tr><td></td><td>a_a</td><td>a_r</td></tr> <tr><td>$D < 5/32$</td><td>0.02D</td><td>0.05D</td></tr> <tr><td>$5/32 < D$</td><td>0.13"</td><td>0.05D</td></tr> </table>			a_a	a_r	$D < 5/32$	0.02D	0.05D	$5/32 < D$	0.13"	0.05D
	a_a	a_r																			
$D < 5/32$	0.02D	0.05D																			
$5/32 < D$	0.13"	0.05D																			
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min									
0.5	50,000	1,450	50,000	1,400	50,000	1,400	50,000	1,200	32,000	735	32,000	735									
0.6	50,000	1,650	50,000	1,650	50,000	1,650	50,000	1,400	32,000	880	32,000	880									
0.8	50,000	2,200	50,000	2,200	50,000	2,000	50,000	1,900	32,000	1,150	32,000	1,000									
1	50,000	2,800	50,000	2,800	50,000	2,500	47,500	2,250	32,000	1,450	25,000	1,000									
2	31,780	3,489	25,385	2,800	24,890	2,500	23,875	2,250	17,225	1,548	12,690	1,000									
3	20,475	3,535	16,325	2,905	15,825	2,543	15,150	2,285	11,000	1,611	8,355	1,017									
4	18,085	3,693	15,525	3,381	15,025	2,742	13,555	2,443	11,000	1,889	7,960	1,096									
5	15,415	4,127	14,755	4,089	13,600	2,876	10,755	2,292	9,915	2,123	7,435	1,192									
6	14,380	4,598	12,880	4,107	11,050	2,636	9,080	2,153	9,080	2,153	6,305	1,104									
8	11,600	3,685	10,100	3,234	9,025	2,120	7,215	1,717	7,215	1,717	5,000	898									
10	9,250	2,920	8,025	2,528	6,950	1,652	5,540	1,310	5,540	1,310	3,840	690									
12	7,540	2,377	6,510	2,045	5,650	1,330	4,500	1,054	4,500	1,054	3,125	558									

Reduce feeds 10% to 20% for Series HP419L.

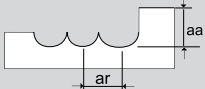


HP END MILLS

Micrograin Carbide End Mills

Series HP497

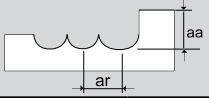
Profiling

Hardness	Tensile Strength: Up to 750N/mm ²		Up to 30 HRC	30 to 38 HRC	38 to 45 HRC	45 to 55 HRC	55 to 60 HRC							
Work Material	Cast Iron	Mild Steels Carbon Steels	Alloy Steels Tool Steels Ti Alloys (Annealed)	Hardened Steels Pre-hardened Steels Ti Alloys (Solution Treated and Aged)	Hardened Steels Pre-hardened Steels Stainless Steels Inconel Ni Based Alloys	Hardened Steels	Hardened Steels							
Cutting Speed	198 m/min	198 m/min	162 m/min	132 m/min	96 m/min	84 m/min	72 m/min							
Depth of Cut	$a_a=0.1D$ $a_r=0.2D$ 						$a_a=0.05D$ $a_r=0.1D$							
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min
3	17,280	1,242	17,280	1,056	15,264	876	12,240	582	9,216	438	7,834	318	6,820	282
4	15,552	1,278	15,552	1,056	13,392	876	10,728	618	8,064	474	6,854	342	5,967	306
5	13,824	1,314	13,824	1,056	11,520	876	9,216	654	6,912	510	5,875	372	5,115	330
6	10,944	1,314	10,944	1,056	9,216	876	7,344	690	5,472	510	4,651	372	4,049	330
8	9,216	1,314	9,216	1,092	7,632	876	6,048	726	4,608	546	3,917	396	3,410	354
10	6,912	984	6,912	840	5,760	690	4,608	546	3,456	402	2,938	288	2,557	258
11	5,472	768	5,472	654	4,608	546	3,600	438	2,736	324	2,326	240	2,025	210
12	5,040	726	5,040	582	4,176	510	3,312	402	2,448	288	2,081	210	1,812	186
14	4,608	654	4,608	546	3,744	474	3,024	360	2,304	288	1,958	210	1,705	186
16	3,456	510	3,456	402	2,880	324	2,304	288	1,728	216	1,469	156	1,279	138
18	3,096	456	3,096	360	2,592	306	2,088	252	1,548	198	1,316	144	1,146	126
20	2,736	402	2,736	324	2,304	288	1,872	216	1,368	180	1,163	132	1,012	114
22	2,448	360	2,448	288	2,088	252	1,656	198	1,231	162	1,047	120	911	102
25	2,160	324	2,160	252	1,872	216	1,440	180	1,094	144	930	102	810	90

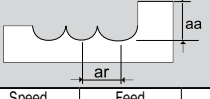


Series HP418

Profiling

Hardness			Tensile Strength: Up to 750N/mm ²		Up to 30 HRC		30 to 38 HRC		38 to 45 HRC		45 to 55 HRC		55 to 60 HRC	
Work Material	Cast Iron		Mild Steels Carbon Steels		Alloy Steels Tool Steels Ti Alloys (Annealed)		Hardened Steels Pre-hardened Steels Ti Alloys (Solution Treated and Aged)		Hardened Steels Pre-hardened Steels Stainless Steels Inconel Ni Based Alloys		Hardened Steels		Hardened Steels	
Cutting Speed	183 m/min		146 m/min		120 m/min		99 m/min		83 m/min		73 m/min		52 m/min	
Depth of Cut	$a_a=0.1D$ $a_r=0.2D$												$a_a=0.05D$ $a_r=0.1D$	
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min
1	40,070	955	40,070	955	39,443	772	31,304	501	27,548	355	23,791	261	17,530	172
2	29,588	1,169	24,042	955	19,722	772	15,892	501	13,983	360	12,073	261	9,083	172
3	18,532	1,174	14,995	955	12,584	788	10,117	511	8,859	376	7,597	271	5,682	183
4	14,557	1,174	12,005	955	10,049	788	8,030	553	7,017	459	6,010	334	4,487	214
5	11,583	1,315	9,266	1,070	7,737	798	6,146	558	5,421	464	4,623	355	3,464	219
6	9,517	1,367	7,597	1,111	6,334	861	5,024	600	4,419	501	3,767	376	2,807	235
8	7,523	1,617	6,010	1,304	4,993	981	3,981	689	3,475	563	2,974	402	2,207	261
10	5,781	1,482	4,623	1,179	3,840	918	3,047	647	2,677	537	2,301	412	1,701	256
12	4,701	1,351	3,741	1,075	3,141	861	2,494	605	2,181	517	1,852	381	1,367	240

High-Speed Milling

Hardness			Tensile Strength: Up to 750N/mm ²		Up to 30 HRC		30 to 38 HRC		38 to 45 HRC		45 to 55 HRC												
Work Material	Mild Steels Carbon Steels		Alloy Steels Tool Steels Ti Alloys (Annealed)		Hardened Steels Pre-hardened Steels Ti Alloys (Solution Treated and Aged)		Hardened Steels Pre-hardened Steels Stainless Steels Inconel Ni Based Alloys		Hardened Steels		Hardened Steels												
Cutting Speed	261 m/min		226 m/min		196 m/min		157 m/min		157 m/min		109 m/min												
Depth of Cut	$a_a=0.02D$ $a_r=0.05D$												<table border="1"> <tr> <td></td> <td>a_a</td> <td>a_r</td> </tr> <tr> <td>$D \leq 5/32$</td> <td>0.02D</td> <td>0.05D</td> </tr> <tr> <td>$5/32 < D$</td> <td>0.13"</td> <td>0.05D</td> </tr> </table>			a_a	a_r	$D \leq 5/32$	0.02D	0.05D	$5/32 < D$	0.13"	0.05D
	a_a	a_r																					
$D \leq 5/32$	0.02D	0.05D																					
$5/32 < D$	0.13"	0.05D																					
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min											
1	43,478	2,435	43,478	2,435	43,478	2,174	41,304	1,957	27,826	1,261	21,739	870											
2	27,635	3,026	22,074	2,435	21,643	2,174	20,761	1,957	14,978	1,339	11,035	870											
3	17,804	3,070	14,196	2,522	13,761	2,209	13,174	1,983	9,565	1,400	7,265	878											
4	15,726	3,209	13,500	2,939	13,065	2,383	11,787	2,122	9,565	1,635	6,922	948											
5	13,404	3,583	12,830	3,548	11,826	2,496	9,352	1,991	8,622	1,843	6,465	1,035											
6	12,504	3,991	11,200	3,565	9,609	2,287	7,896	1,870	7,896	1,870	5,483	957											
8	10,087	3,200	8,783	2,809	7,848	1,843	6,274	1,487	6,274	1,487	4,348	774											
10	8,043	2,539	6,978	2,191	6,043	1,435	4,817	1,139	4,817	1,139	3,339	600											
12	6,557	2,061	5,661	1,774	4,913	1,157	3,913	913	3,913	913	2,717	478											

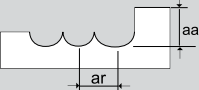


HP END MILLS

Micrograin Carbide End Mills

Series HP416

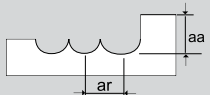
Profiling

Hardness		Tensile Strength: Up to 750N/mm ²		Up to 30 HRC	30 to 38 HRC	38 to 45 HRC	45 to 55 HRC	55 to 60 HRC						
Work Material	Cast Iron	Mild Steels Carbon Steels		Alloy Steels Tool Steels Ti Alloys (Annealed)	Hardened Steels Pre-hardened Steels Ti Alloys (Solution Treated and Aged)	Hardened Steels Pre-hardened Steels Stainless Steels Inconel Ni Based Alloys	Hardened Steels	Hardened Steels						
Cutting Speed	210 m/min	168 m/min		138 m/min	114 m/min	96 m/min	84 m/min	60 m/min						
Depth of Cut	$a_a=0.1D$ $a_r=0.2D$ 						$a_a=0.05D$ $a_r=0.1D$							
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min
1	46,080	1098	46,080	1098	45,360	888	36,000	576	31,680	408	27,360	300	20,160	198
2	34,026	1344	27,648	1098	22,680	888	18,276	576	16,080	414	13,884	300	10,446	198
3	21,312	1350	17,244	1098	14,472	906	11,634	588	10,188	432	8,736	312	6,534	210
4	16,740	1350	13,806	1098	11,556	906	9,234	636	8,070	528	6,912	384	5,160	246
5	13,320	1512	10,656	1230	8,898	918	7,068	642	6,234	534	5,316	408	3,984	252
6	10,944	1572	8,736	1278	7,284	990	5,778	690	5,082	576	4,332	432	3,228	270
8	8,652	1860	6,912	1500	5,742	1128	4,578	792	3,996	648	3,420	462	2,538	300
10	6,648	1704	5,316	1356	4,416	1056	3,504	744	3,078	618	2,646	474	1,956	294
12	5,406	1554	4,302	1236	3,612	990	2,868	696	2,508	594	2,130	438	1,572	276
14	4,896	1512	3,888	1242	3,240	972	2,592	684	2,232	558	1,944	432	1,440	270
16	4,284	1512	3,408	1206	2,826	930	2,250	684	1,956	546	1,668	390	1,296	264
18	3,816	1440	3,024	1140	2,520	876	2,016	684	1,728	546	1,512	372	1,140	252
20	3,498	1374	2,808	1110	2,304	834	1,854	654	1,620	534	1,410	360	1,056	246
22	3,048	1278	2,556	1026	2,130	738	1,638	582	1,422	480	1,230	324	918	234
25	2,688	1116	2,130	954	1,770	660	1,416	510	1,260	414	1,080	294	804	204



Series HP416

High-Speed Light Milling

Hardness	Tensile Strength: Up to 750N/mm ²		Up to 30 HRC		30 to 38 HRC		38 to 45 HRC		45 to 55 HRC		55 to 60 HRC										
Work Material	Mild Steels Carbon Steels		Alloy Steels Tool Steels Ti Alloys (Annealed)		Hardened Steels Pre-hardened Steels Ti Alloys (Solution Treated and Aged)		Hardened Steels Pre-hardened Steels Stainless Steels Inconel Ni Based Alloys		Hardened Steels		Hardened Steels										
Cutting Speed	300 m/min		260 m/min		225 m/min		180 m/min		180 m/min		125 m/min										
Depth of Cut	$a_a=0.02D$ $a_r=0.05D$ 						<table border="1"> <thead> <tr> <th></th> <th>a_a</th> <th>a_r</th> </tr> </thead> <tbody> <tr> <td>$D < 5/32$</td> <td>0.02D</td> <td>0.05D</td> </tr> <tr> <td>$5/32 < D$</td> <td>0.13"</td> <td>0.05D</td> </tr> </tbody> </table>							a_a	a_r	$D < 5/32$	0.02D	0.05D	$5/32 < D$	0.13"	0.05D
							a_a	a_r													
$D < 5/32$	0.02D	0.05D																			
$5/32 < D$	0.13"	0.05D																			
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min									
1	50,000	2,800	50,000	2,800	50,000	2,500	47,500	2,250	32,000	1,450	25,000	1,000									
2	31,780	3,480	25,385	2,800	24,890	2,500	23,875	2,250	17,225	1,540	12,690	1,000									
3	20,475	3,530	16,325	2,900	15,825	2,540	15,150	2,280	11,000	1,610	8,355	1,010									
4	18,085	3,690	15,525	3,380	15,025	2,740	13,555	2,440	11,000	1,880	7,960	1,090									
5	15,415	4,120	14,755	4,080	13,600	2,870	10,755	2,290	9,915	2,120	7,435	1,190									
6	14,380	4,590	12,880	4,100	11,050	2,630	9,080	2,150	9,080	2,150	6,305	1,100									
8	11,600	3,680	10,100	3,230	9,025	2,120	7,215	1,710	7,215	1,710	5,000	890									
10	9,250	2,920	8,025	2,520	6,950	1,650	5,540	1,310	5,540	1,310	3,840	690									
12	7,540	2,370	6,510	2,040	5,650	1,330	4,500	1,050	4,500	1,050	3,125	550									
14	6,800	2,150	5,900	1,850	5,100	1,200	4,050	970	4,050	970	2,800	500									
16	6,000	1,910	5,190	1,610	4,485	1,050	3,575	850	3,575	850	2,465	440									
18	5,300	1,650	4,550	1,450	3,950	940	3,150	750	3,150	750	2,200	390									
20	4,890	1,540	4,215	1,340	3,650	870	2,925	700	2,925	700	2,010	360									
22	4,255	1,350	3,710	1,170	3,190	760	2,550	610	2,550	610	1,755	310									
25	3,740	1,180	3,250	1,030	2,805	670	2,215	530	2,215	530	1,525	270									

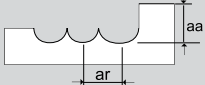


HP END MILLS

Micrograin Carbide End Mills

Series HP407BN

Profiling Milling

Hardness	Tensile Strength: Up to 750N/mm ²		Up to 30 HRC	30 to 38 HRC	38 to 45 HRC	45 to 55 HRC	55 to 60 HRC							
Work Material	Cast Iron	Mild Steels Carbon Steels	Alloy Steels Tool Steels Ti Alloys (Annealed)	Hardened Steels Pre-hardened Steels Ti Alloys (Solution Treated and Aged)	Hardened Steels Pre-hardened Steels Stainless Steels Inconel Ni Based Alloys	Hardened Steels	Hardened Steels							
Cutting Speed	150 m/min	150 m/min	126 m/min	102 m/min	78 m/min	66 m/min	54 m/min							
Depth of Cut	$aa=0.05D$ $ar=0.1D$ 													
Mill Dia.	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min	Speed min ⁻¹	Feed mm/min
3	12,096	870	12,096	738	10,680	612	8,568	408	6,444	306	5,472	222	4,764	198
4	11,940	870	11,940	738	10,032	612	8,124	408	6,216	306	5,256	222	4,296	198
5	9,672	918	9,672	738	8,064	612	6,444	456	4,836	354	4,104	258	3,576	228
6	7,656	918	7,656	738	6,444	612	5,136	486	3,828	354	3,252	258	2,832	228
8	6,444	918	6,444	768	5,340	612	4,224	510	3,216	384	2,736	276	2,376	246
10	4,836	690	4,836	588	4,032	486	3,216	384	2,412	276	2,052	204	1,788	180
12	3,528	510	3,528	408	2,916	354	2,316	276	1,704	204	1,452	144	1,260	132



Standard 2 Flute and 3 Flute Carbide

Side Milling

Hardness							Up to 30 HRC		30 to 40 HRC		40 to 50 HRC	
Work Material	Aluminum		Cast Iron		Mild Carbon Steels Mild Steels		Pre-hardened Steels Die & Alloy Steels		Pre-hardened Steels Die & Alloy Steels		Hardened Steels	
Cutting Speed	100-120 m/min		30-45 m/min		30-45 m/min		25-35 m/min		25-35 m/min		15 m/min	
Depth of Cut	$aa=1.5D$ $ar=0.1D$											
Mill Dia.	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min
0.3	100,000	400	31,500	100	30,000	50	25,000	30	25,000	15	16,000	8
0.5	62,000	450	22,400	125	22,000	60	16,000	35	16,000	18	9,500	10
0.8	40,000	450	16,000	125	14,000	60	10,000	35	10,000	18	6,000	10
1.0	31,500	450	14,000	175	11,000	85	8,000	60	8,000	35	4,800	14
1.5	21,200	450	9,500	175	7,500	85	5,300	60	5,400	35	3,200	14
2.0	16,000	450	7,100	250	5,500	85	4,000	60	4,000	35	2,400	14
3.0	12,500	450	4,750	300	4,500	150	3,550	120	3,150	45	1,600	25
4.0	9,500	475	3,550	300	3,550	175	2,650	120	2,360	45	1,200	25
5.0	7,500	475	2,800	300	2,800	200	2,120	125	1,900	45	950	25
6.0	6,300	475	2,360	300	2,360	200	1,700	125	1,600	45	800	25
8.0	4,750	500	1,800	300	1,800	200	1,320	125	1,180	45	600	25
10	3,750	500	1,400	315	1,400	225	1,060	125	950	45	480	25
12	3,150	560	1,180	315	1,180	225	850	125	800	45	400	25
16	2,360	560	900	375	900	250	670	140	600	45	300	25
20	1,900	560	710	375	710	250	530	150	475	45	240	25
25	1,500	500	560	375	560	250	425	140	375	35	190	20

(1) Increase speeds & feeds 5-10% for Series 412 and 422. (2) Reduce speeds & feeds 20-30% for Series 462. (3) Reduce speeds & feeds 40-50% for Series 482. (4) Increase speeds & feeds 20-30% for 402 TiN. (5) Column for Hardened Steels (40-50 HRC) is for Series 402 TiN and 403 TiN only. (6) Increase speeds & feeds 20-30% for Series 403 and 445. (7) Increase speeds & feeds 20-40% for Series 403 TiN.

Slotting

Hardness							Up to 30 HRC		30 to 40 HRC		40 to 50 HRC									
Work Material	Aluminum		Cast Iron		Mild Carbon Steels Mild Steels		Pre-hardened Steels Die & Alloy Steels		Pre-hardened Steels Die & Alloy Steels		Hardened Steels									
Cutting Speed	100 m/min		30-45 m/min		30-40 m/min		20-30 m/min		20-25 m/min		15 m/min									
Depth of Cut	<table border="1" style="margin: auto; border-collapse: collapse;"> <tr><td colspan="2" style="text-align: center;">aa</td></tr> <tr><td style="text-align: center;">$D < 1/32$</td><td style="text-align: center;">$0.25D$</td></tr> <tr><td style="text-align: center;">$1/32 < D < 5/64$</td><td style="text-align: center;">$0.5D$</td></tr> <tr><td style="text-align: center;">$5/64 < D$</td><td style="text-align: center;">$1D$</td></tr> </table>												aa		$D < 1/32$	$0.25D$	$1/32 < D < 5/64$	$0.5D$	$5/64 < D$	$1D$
aa																				
$D < 1/32$	$0.25D$																			
$1/32 < D < 5/64$	$0.5D$																			
$5/64 < D$	$1D$																			
Mill Dia.	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min								
0.3	100,000	180	31,500	100	30,000	35	22,400	18	21,200	13	16,000	7								
0.5	62,000	200	22,400	125	19,000	40	13,000	20	12,000	15	9,500	8								
0.8	40,000	200	16,000	125	14,000	63	8,000	25	8,000	15	6,000	8								
1.0	31,500	200	14,000	140	12,500	75	7,500	30	7,000	15	4,800	8								
1.5	21,200	200	9,500	140	8,500	90	6,500	35	5,000	20	3,200	11								
2.0	16,000	300	7,100	150	6,300	100	5,000	60	4,000	30	2,400	16								
3.0	11,200	300	4,750	160	4,250	100	3,200	80	2,600	30	1,600	16								
4.0	8,000	300	3,550	160	3,150	100	2,400	80	2,000	30	1,200	16								
5.0	6,300	300	2,800	160	2,500	100	2,000	80	1,600	30	950	16								
6.0	5,300	300	2,360	200	2,120	100	1,600	80	1,300	30	800	16								
8.0	4,000	300	1,800	236	1,600	100	1,200	80	1,000	30	600	16								
10	3,150	300	1,400	236	1,250	100	1,000	80	800	30	480	16								
12	2,650	300	1,180	236	1,060	100	820	80	700	30	400	16								
16	2,000	300	900	236	800	100	640	85	500	37	300	12								
20	1,600	300	710	236	630	100	500	85	400	37	240	10								
25	1,250	300	560	236	500	100	400	85	320	37	190	8								

(1) Increase speeds & feeds 5-10% for Series 412 and 422. (2) Reduce speeds & feeds 20-30% for Series 462. (3) Reduce speeds & feeds 40-50% for Series 482. (4) Increase speeds & feeds 20-30% for 402 TiN. (5) Column for Hardened Steels (40-50 HRC) is for Series 402 TiN and 403 TiN only. (6) Increase speeds & feeds 20-30% for Series 403 and 445. (7) Increase speeds & feeds 20-40% for Series 403 TiN.




CARBIDE END MILLS

Micrograin Carbide End Mills

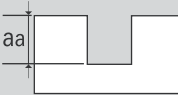
Standard 4 Flute and Multiple Flute Carbide

Side Milling

Hardness							Up to 30 HRC		30 to 40 HRC		40 to 50 HRC	
Work Material	Aluminum		Cast Iron		Mild Carbon Steels Mild Steels		Pre-hardened Steels Die & Alloy Steels		Pre-hardened Steels Die & Alloy Steels		Hardened Steels	
Cutting Speed	100-120 m/min		30-45 m/min		30-45 m/min		25-35 m/min		25-35 m/min		15 m/min	
Depth of Cut	$a_a = 1.5D$ $a_r = 0.1D$ 											
Mill Dia.	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min
0.8	40,000	630	16,000	175	14,000	85	10,000	50	10,000	25	6,000	14
1.0	31,500	630	14,000	245	11,000	120	8,000	85	8,000	50	4,800	20
1.5	21,200	630	9,500	245	7,500	120	5,300	85	5,400	50	3,200	20
2.0	16,000	630	7,100	350	5,500	120	4,000	85	4,000	50	2,400	20
3.0	12,500	630	4,750	420	4,500	210	3,550	170	3,150	63	1,600	35
4.0	9,500	665	3,550	420	3,550	245	2,650	170	2,360	63	1,200	35
5.0	7,500	665	2,800	420	2,800	280	2,120	170	1,900	63	950	35
6.0	6,300	665	2,360	420	2,360	280	1,700	170	1,600	63	800	35
8.0	4,750	700	1,800	420	1,800	280	1,320	170	1,180	63	600	35
10	3,750	700	1,400	440	1,400	310	1,060	170	950	63	480	35
12	3,150	780	1,180	440	1,180	310	850	170	800	63	400	35
16	2,360	780	900	525	900	350	670	200	600	63	300	35
20	1,900	780	710	525	710	350	530	210	475	63	240	35
25	1,500	700	560	525	560	350	425	200	375	50	190	28

(1) Reduce speeds & feeds 20-30% for Series 464. (2) Reduce speeds & feeds 40-50% for Series 484. (3) Slotting is not recommended for Series 484. (4) Increase speeds & feeds 20-30 % for Series 404 TiN. (5) Column for Hardened Steels (40-50 HRC), is for Series 404 TiN only.

Slotting

Hardness							Up to 30 HRC		30 to 40 HRC		40 to 50 HRC									
Work Material	Aluminum		Cast Iron		Mild Carbon Steels Mild Steels		Pre-hardened Steels Die & Alloy Steels		Pre-hardened Steels Die & Alloy Steels		Hardened Steels									
Cutting Speed	100 m/min		30-45 m/min		30-40 m/min		20-30 m/min		20-25 m/min		15 m/min									
Depth of Cut	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td colspan="2" style="text-align: center;">a_a</td></tr> <tr><td style="text-align: center;">$D < 1/32$</td><td style="text-align: center;">$0.2D$</td></tr> <tr><td style="text-align: center;">$1/32 < D < 5/64$</td><td style="text-align: center;">$0.3D$</td></tr> <tr><td style="text-align: center;">$5/64 < D$</td><td style="text-align: center;">$0.5D$</td></tr> </table> 												a_a		$D < 1/32$	$0.2D$	$1/32 < D < 5/64$	$0.3D$	$5/64 < D$	$0.5D$
a_a																				
$D < 1/32$	$0.2D$																			
$1/32 < D < 5/64$	$0.3D$																			
$5/64 < D$	$0.5D$																			
Mill Dia.	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min								
0.8	40,000	280	16,000	175	14,000	88	8,000	35	8,000	20	6,000	10								
1.0	31,500	280	14,000	200	12,500	105	7,500	42	7,000	20	4,800	10								
1.5	21,200	280	9,500	200	8,500	125	6,500	50	5,000	28	3,200	15								
2.0	16,000	420	7,100	210	6,300	140	5,000	85	4,000	42	2,400	22								
3.0	11,200	420	4,750	225	4,250	140	3,200	110	2,600	42	1,600	22								
4.0	8,000	420	3,550	225	3,150	140	2,400	110	2,000	42	1,200	22								
5.0	6,300	420	2,800	225	2,500	140	2,000	110	1,600	42	950	22								
6.0	5,300	420	2,360	280	2,120	140	1,600	110	1,300	42	800	22								
8.0	4,000	420	1,800	330	1,600	140	1,200	110	1,000	42	600	22								
10	3,150	420	1,400	330	1,250	140	1,000	110	800	42	480	22								
12	2,650	420	1,180	330	1,060	140	820	110	700	42	400	22								
16	2,000	420	900	330	800	140	640	120	500	50	300	17								
20	1,600	420	710	330	630	140	500	120	400	50	240	14								
25	1,250	420	560	330	500	140	400	120	320	50	190	11								



Series 497

Profiling

Hardness					Up to 30 HRC	30 to 40 HRC	40 to 50 HRC												
Work Material	Cast Iron	Mild Carbon Steels Mild Steels			Pre-hardened Steels Stainless Steel Die & Alloy Steels	Pre-hardened Steels Stainless Steel Die & Alloy Steels		Hardened Steels											
Cutting Speed	390 SFM	390 SFM			330 SFM	260 SFM		200 SFM											
Depth of Cut	<table border="1"> <thead> <tr> <th></th> <th>aa</th> <th>ar</th> </tr> </thead> <tbody> <tr> <td>D < 5/8</td> <td>0.05D</td> <td>0.1D</td> </tr> <tr> <td>5/8 < D</td> <td>0.03D</td> <td>0.1D</td> </tr> </tbody> </table>											aa	ar	D < 5/8	0.05D	0.1D	5/8 < D	0.03D	0.1D
												aa	ar						
D < 5/8	0.05D	0.1D																	
5/8 < D	0.03D	0.1D																	
Mill Dia.	Speed min ⁻¹	Feed in/min	Speed min ⁻¹	Feed in/min	Speed min ⁻¹	Feed in/min	Speed min ⁻¹	Feed in/min	Speed min ⁻¹	Feed in/min									
1/8	12,000	34.0	12,000	29.0	10,600	24.0	8,500	16.0	6,400	12.0									
3/16	9,600	36.0	9,600	29.0	8,000	24.0	6,400	18.0	4,800	14.0									
1/4	7,600	36.0	7,600	29.0	6,400	24.0	5,100	19.0	3,800	14.0									
5/16	6,400	36.0	6,400	30.0	5,300	24.0	4,200	20.0	3,200	15.0									
3/8	4,800	27.0	4,800	23.0	4,000	19.0	3,200	15.0	2,400	11.0									
7/16	3,800	21.0	3,800	18.0	3,200	15.0	2,500	12.0	1,900	9.0									
1/2	3,500	20.0	3,500	16.0	2,900	14.0	2,300	11.0	1,700	8.0									
9/16	3,200	18.0	3,200	15.0	2,600	13.0	2,100	10.0	1,600	8.0									
5/8	2,400	14.0	2,400	11.0	2,000	9.0	1,600	8.0	1,200	6.0									
3/4	1,900	11.0	1,900	9.0	1,600	8.0	1,300	6.0	950	5.0									
1	1,500	9.0	1,500	7.0	1,300	6.0	1,000	5.0	760	4.0									

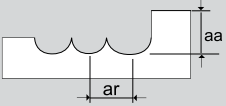


CARBIDE END MILLS

Micrograin Carbide End Mills

Ball Nose Carbide 2 and 3 Flute

Profiling

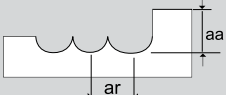
Hardness							Up to 30 HRC		30 to 40 HRC		40 to 50 HRC	
Work Material	Aluminum		Cast Iron		Mild Carbon Steels Mild Steels		Pre-hardened Steels Die & Alloy Steels		Pre-hardened Steels Die & Alloy Steels		Hardened Steels	
Cutting Speed	100 m/min		35 m/min		35 m/min		25 m/min		20 m/min		25 m/min	
Depth of Cut	$a_a=0.3D$ $a_r=0.7D$ 											
Mill Dia.	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min
1	32,000	190	11,000	90	11,000	80	8,000	45	6,400	24	8,000	45
2	16,000	190	5,600	90	5,600	80	4,000	45	3,200	24	4,000	45
3	10,000	190	3,700	100	3,700	90	2,600	50	2,100	30	2,600	55
4	8,000	190	2,800	100	2,800	90	2,000	50	1,600	30	2,000	55
5	6,400	190	2,200	100	2,200	90	1,600	50	1,300	30	1,600	55
6	5,300	190	1,900	100	1,900	90	1,320	50	1,000	30	1,320	55
8	4,000	220	1,400	100	1,400	90	1,000	50	800	30	1,000	55
10	3,200	220	1,100	100	1,100	90	800	50	640	30	800	55
12	2,600	220	930	100	930	90	660	50	530	30	660	55
16	2,000	220	700	100	700	90	500	50	400	30	500	55
20	1,600	220	560	100	560	90	400	50	320	30	400	55
25	1,200	220	450	100	450	90	320	50	250	30	320	55

(1) Increase speeds & feeds 5-10% for Series 412BN, 414BN, 442BN and 444BN. (2) Reduce speeds & feeds 20-30% for Series 462BN and 464BN. (3) Reduce speeds & feeds 40-50% for Series 482BN and 484BN. (4) Increase speeds & feeds 20-30% for Series 402BN TiN and 404BN TiN. (5) Column for Hardened Steels (40-50 HRC) is for 402BN TiN and 404BN TiN only.



Ball Nose Carbide 4 Flute and Multiple Flute

Profiling

Hardness							Up to 30 HRC		30 to 40 HRC		40 to 50 HRC	
Work Material	Aluminum	Cast Iron	Mild Carbon Steels Mild Steels		Pre-hardened Steels Die & Alloy Steels		Pre-hardened Steels Die & Alloy Steels		Hardened Steels			
Cutting Speed	100 m/min	35-45 m/min	30-40 m/min		20-30 m/min		20-25 m/min		15 m/min			
Depth of Cut	$a_a=0.3D$ $a_r=0.7D$											
												
Mill Dia.	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min	Speed min ⁻¹	Feed m/min
1	32,000	226	11,000	126	11,000	112	8,000	63	6,400	33.6	8,000	63
2	16,000	226	5,600	126	5,600	112	4,000	63	3,200	33.6	4,000	63
3	10,000	226	3,700	140	3,700	126	2,600	70	2,100	42	2,600	77
4	8,000	226	2,800	140	2,800	126	2,000	70	1,600	42	2,000	77
5	6,400	226	2,200	140	2,200	126	1,600	70	1,300	42	1,600	77
6	5,300	226	1,900	140	1,900	126	1,320	70	1,000	42	1,320	77
8	4,000	308	1,400	140	1,400	126	1,000	70	800	42	1,000	77
10	3,200	308	1,100	140	1,100	126	800	70	640	42	800	77
12	2,600	308	930	140	930	126	660	70	530	42	660	77
16	2,000	308	700	140	700	126	500	70	400	42	500	77
20	1,600	308	560	140	560	126	400	70	320	42	400	77
25	1,200	308	450	140	450	126	320	70	250	42	320	77

(1) Increase speeds & feeds 5-10% for Series 412BN, 414BN, 442BN and 444BN. (2) Reduce speeds & feeds 20-30% for Series 462BN and 464BN. (3) Reduce speeds & feeds 40-50% for Series 482BN and 484BN. (4) Increase speeds & feeds 20-30% for Series 402BN TiN and 404BN TiN. (5) Column for Hardened Steels (40-50 HRC) is for 402BN TiN and 404BN TiN only.

Coating Process



Quality Carbide Tool Corporation is proud to announce that we have added a state-of-the-art tool-coating department. In addition to coating our standard and special product lines, we can provide a rapid-turnaround coating service for tools you supply.

We have the ability for these coatings:

- TiN – Titanium Nitride
- TiCN – Titanium Carbonitride
- TiAlN – Titanium Aluminum Nitride - Multilayer
- TiAlN – Titanium Aluminum Nitride - Monolayer
- TiAlCN – Titanium Aluminum Carbonitride
- ZrN – Zirconium Nitride

We are constantly evaluating other coatings so that QCT will be positioned to meet the demands for new and improved coating types and processes.



DRILLS

High Performance Drills

Premium drills made from micrograin carbide with TiAlN coating. Designed for exceptional life and performance in a variety of materials.






Carbide

Micrograin carbide drills and reamers.





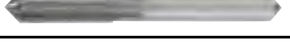
HP DRILLS

Sub-Micrograin Carbide Drills

Product	Series No.	Series	Page	Tech Page	Material	Flute Length	Description
 (NEW!)	HP243	High Performance	104-106	128	Carbide	3D	3D, Solid
 (NEW!)	HP245	High Performance	107-109	128	Carbide	5D	5D, Solid
 (NEW!)	HP253	High Performance	110-112	128	Carbide	3D	3D, Coolant-Through
 (NEW!)	HP255	High Performance	113-115	128	Carbide	5D	5D, Coolant-Through
 (NEW!)	HP258	High Performance	116-118	128	Carbide	8D	8D, Coolant-Through

CARBIDE

Micrograin Carbide Drills

Product	Series No.	Series	Page	Tech Page	Material	Flute Length	Description
	215	Performance	119-121	129	Carbide		Slow Spiral
	200	Performance	122	129	Carbide		Straight Flute
	300	Performance	123-125	130	Carbide		Chucking Reamer, Right Hand Cutting



HP DRILLS

Sub-Micrograin Carbide Drills

best
good

Series No.	Aluminum		Cast Iron	Low Carbon Steel	Med. Carbon Steel	High Carbon Steel	Alloy Steels	Die Steels	Titanium	High Nickel Alloy		Stainless Steels			Hardened Steels		
	6061 7075	Casting		1010 1018	1035 1045	1065	4140 4340	20 Hrc	6Al4V (30Hrc)	Inconel	Kovar	300	400	17-4PH	~35 Hrc	35-45 Hrc	45-50 Hrc
HP243		◆	◆	◆	◆	◆	◆	◆					◆	◆	◆	◆	
HP245		◆	◆	◆	◆	◆	◆	◆					◆	◆	◆	◆	
HP253		◆	◆	◆	◆	◆	◆	◆				◆	◆	◆	◆	◆	◆
HP255		◆	◆	◆	◆	◆	◆	◆				◆	◆	◆	◆	◆	◆
HP258		◆	◆	◆	◆	◆	◆	◆				◆	◆	◆	◆	◆	◆

CARBIDE

Micrograin Carbide Drills

Series No.	Aluminum		Cast Iron	Low Carbon Steel	Med. Carbon Steel	High Carbon Steel	Alloy Steels	Die Steels	Titanium	High Nickel Alloy		Stainless Steels			Hardened Steels		
	6061 7075	Casting		1010 1018	1035 1045	1065	4140 4340	20 Hrc	6Al4V (30Hrc)	Inconel	Kovar	300	400	17-4PH	~35 Hrc	35-45 Hrc	45-50 Hrc
215		◆	◆	◆	◆	◆	◆		◆	◆			◆	◆	◆	◆	
200			◆	◆													
300	◆	◆	◆	◆	◆		◆		◆	◆		◆	◆	◆			

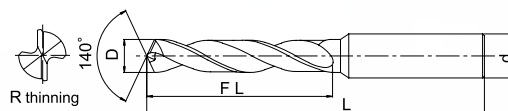


HIGH PERFORMANCE DRILLS

Sub-Micrograin Carbide

SERIES HP243 **NEW!**

3D, Solid



EDP Number	Diameter (D)	Flute Length (FL)	Overall Length (L)	Shank Diameter (d)
HP243-1181	3.00	20	62	6
HP243-1220	3.10	20	62	6
HP243-1248	3.17	20	62	6
HP243-1260	3.20	20	62	6
HP243-1299	3.30	20	62	6
HP243-1339	3.40	20	62	6
HP243-1378	3.50	20	62	6
HP243-1406	3.57	20	62	6
HP243-1417	3.60	20	62	6
HP243-1457	3.70	20	62	6
HP243-1496	3.80	24	66	6
HP243-1535	3.90	24	66	6
HP243-1563	3.97	24	66	6
HP243-1575	4.00	24	66	6
HP243-1610	4.09	24	66	6
HP243-1614	4.10	24	66	6
HP243-1654	4.20	24	66	6
HP243-1693	4.30	24	66	6
HP243-1720	4.37	24	66	6
HP243-1732	4.40	24	66	6
HP243-1772	4.50	24	66	6
HP243-1811	4.60	24	66	6
HP243-1831	4.65	24	66	6
HP243-1850	4.70	24	66	6
HP243-1874	4.76	28	66	6
HP243-1890	4.80	28	66	6
HP243-1929	4.90	28	66	6
HP243-1969	5.00	28	66	6
HP243-2008	5.10	28	66	6
HP243-2031	5.16	28	66	6
HP243-2047	5.20	28	66	6
HP243-2087	5.30	28	66	6
HP243-2126	5.40	28	66	6
HP243-2130	5.41	28	66	6
HP243-2165	5.50	28	66	6
HP243-2189	5.56	28	66	6
HP243-2205	5.60	28	66	6
HP243-2244	5.70	28	66	6
HP243-2283	5.80	28	66	6
HP243-2323	5.90	28	66	6
HP243-2343	5.95	28	66	6
HP243-2362	6.00	28	66	6
HP243-2402	6.10	34	79	8
HP243-2441	6.20	34	79	8
HP243-2480	6.30	34	79	8
HP243-2500	6.35	34	79	8
HP243-2520	6.40	34	79	8
HP243-2559	6.50	34	79	8
HP243-2571	6.53	34	79	8
HP243-2598	6.60	34	79	8
HP243-2638	6.70	34	79	8
HP243-2657	6.75	34	79	8
HP243-2677	6.80	34	79	8
HP243-2717	6.90	34	79	8
HP243-2756	7.00	34	79	8
HP243-2795	7.10	41	79	8
HP243-2811	7.14	41	79	8
HP243-2835	7.20	41	79	8
HP243-2874	7.30	41	79	8
HP243-2913	7.40	41	79	8
HP243-2953	7.50	41	79	8

Packed: 1 pc. Available TiALN coating only.





SERIES HP243 (CONTINUED)

NEW!

3D, Solid

EDP Number	Diameter (D)	Flute Length (FL)	Overall Length (L)	Shank Diameter (d)
HP243-2969	7.54	41	79	8
HP243-2992	7.60	41	79	8
HP243-3031	7.70	41	79	8
HP243-3071	7.80	41	79	8
HP243-3110	7.90	41	79	8
HP243-3126	7.94	41	79	8
HP243-3150	8.00	41	79	8
HP243-3189	8.10	47	89	10
HP243-3228	8.20	47	89	10
HP243-3268	8.30	47	89	10
HP243-3280	8.33	47	89	10
HP243-3307	8.40	47	89	10
HP243-3319	8.43	47	89	10
HP243-3346	8.50	47	89	10
HP243-3386	8.60	47	89	10
HP243-3425	8.70	47	89	10
HP243-3437	8.73	47	89	10
HP243-3465	8.80	47	89	10
HP243-3504	8.90	47	89	10
HP243-3543	9.00	47	89	10
HP243-3583	9.10	47	89	10
HP243-3594	9.13	47	89	10
HP243-3622	9.20	47	89	10
HP243-3642	9.25	47	89	10
HP243-3661	9.30	47	89	10
HP243-3701	9.40	47	89	10
HP243-3740	9.50	47	89	10
HP243-3748	9.52	47	89	10
HP243-3780	9.60	47	89	10
HP243-3819	9.70	47	89	10
HP243-3858	9.80	47	89	10
HP243-3898	9.90	47	89	10
HP243-3906	9.92	47	89	10
HP243-3937	10.00	47	89	10
HP243-3976	10.10	55	102	12
HP243-4016	10.20	55	102	12
HP243-4055	10.30	55	102	12
HP243-4063	10.32	55	102	12
HP243-4094	10.40	55	102	12
HP243-4134	10.50	55	102	12
HP243-4173	10.60	55	102	12
HP243-4213	10.70	55	102	12
HP243-4220	10.72	55	102	12
HP243-4252	10.80	55	102	12
HP243-4291	10.90	55	102	12
HP243-4331	11.00	55	102	12
HP243-4370	11.10	55	102	12
HP243-4374	11.11	55	102	12
HP243-4409	11.20	55	102	12
HP243-4449	11.30	55	102	12
HP243-4488	11.40	55	102	12
HP243-4528	11.50	55	102	12

Packed: 1 pc. Available TiALN coating only.

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Tolerances:

Size	Diameter	Shank Diameter
All Sizes	M7	H6

Details:

Speeds & Feeds P130	CARBIDE	TiAIN	30°	SHRINK FIT
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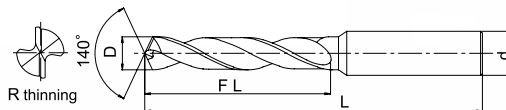


HIGH PERFORMANCE DRILLS

Sub-Micrograin Carbide

SERIES HP243 (CONTINUED) **NEW!**

3D, Solid



EDP Number	Diameter (D)	Flute Length (FL)	Overall Length (L)	Shank Diameter (d)
HP243-4531	11.51	55	102	12
HP243-4567	11.60	55	102	12
HP243-4606	11.70	55	102	12
HP243-4646	11.80	55	102	12
HP243-4685	11.90	55	102	12
HP243-4689	11.91	55	102	12
HP243-4724	12.00	55	102	12
HP243-4764	12.10	60	107	14
HP243-4803	12.20	60	107	14
HP243-4843	12.30	60	107	14
HP243-4882	12.40	60	107	14
HP243-4921	12.50	60	107	14
HP243-4961	12.60	60	107	14
HP243-5000	12.70	60	107	14
HP243-5039	12.80	60	107	14
HP243-5079	12.90	60	107	14
HP243-5118	13.00	60	107	14
HP243-5157	13.10	60	107	14
HP243-5197	13.20	60	107	14
HP243-5236	13.30	60	107	14
HP243-5276	13.40	60	107	14
HP243-5311	13.49	60	107	14
HP243-5315	13.50	60	107	14
HP243-5394	13.70	60	107	14
HP243-5512	14.00	60	107	14
HP243-5626	14.29	65	115	16
HP243-5709	14.50	65	115	16
HP243-5780	14.68	65	115	16
HP243-5787	14.70	65	115	16
HP243-5906	15.00	65	115	16
HP243-5937	15.08	65	115	16
HP243-6102	15.50	65	115	16
HP243-6181	15.70	65	115	16
HP243-6248	15.87	65	115	16
HP243-6299	16.00	65	115	16
HP243-6496	16.50	73	123	18
HP243-6563	16.67	73	123	18
HP243-6693	17.00	73	123	18
HP243-6890	17.50	73	123	18
HP243-7087	18.00	73	123	18
HP243-7283	18.50	79	131	20
HP243-7480	19.00	79	131	20
HP243-7500	19.05	79	131	20
HP243-7677	19.50	79	131	20
HP243-7874	20.00	79	131	20

Packed: 1 pc. Available TiALN coating only.

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	M7	H6

Details:

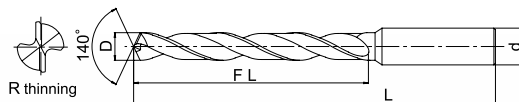
Speeds & Feeds P130	CARBIDE	TIAlN	30°	SHRINK FIT
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SERIES HP245 **NEW!**

5D, Solid



EDP Number	Diameter (D)	Flute Length (FL)	Overall Length (L)	Shank Diameter (d)
HP245-1181	3.00	28	66	6
HP245-1220	3.10	28	66	6
HP245-1248	3.17	28	66	6
HP245-1260	3.20	28	66	6
HP245-1299	3.30	28	66	6
HP245-1339	3.40	28	66	6
HP245-1378	3.50	28	66	6
HP245-1406	3.57	28	66	6
HP245-1417	3.60	28	66	6
HP245-1457	3.70	28	66	6
HP245-1496	3.80	36	74	6
HP245-1535	3.90	36	74	6
HP245-1563	3.97	36	74	6
HP245-1575	4.00	36	74	6
HP245-1610	4.09	36	74	6
HP245-1614	4.10	36	74	6
HP245-1654	4.20	36	74	6
HP245-1693	4.30	36	74	6
HP245-1720	4.37	36	74	6
HP245-1732	4.40	36	74	6
HP245-1772	4.50	36	74	6
HP245-1811	4.60	36	74	6
HP245-1831	4.65	36	74	6
HP245-1850	4.70	36	74	6
HP245-1874	4.76	44	82	6
HP245-1890	4.80	44	82	6
HP245-1929	4.90	44	82	6
HP245-1969	5.00	44	82	6
HP245-2008	5.10	44	82	6
HP245-2031	5.16	44	82	6
HP245-2047	5.20	44	82	6
HP245-2087	5.30	44	82	6
HP245-2126	5.40	44	82	6
HP245-2130	5.41	44	82	6
HP245-2165	5.50	44	82	6
HP245-2189	5.56	44	82	6
HP245-2205	5.60	44	82	6
HP245-2244	5.70	44	82	6
HP245-2283	5.80	44	82	6
HP245-2323	5.90	44	82	6
HP245-2343	5.95	44	82	6
HP245-2362	6.00	44	82	6
HP245-2402	6.10	53	91	8

Packed: 1 pc. Available TiALN coating only.

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Tolerances:

Size	Diameter	Shank Diameter
All Sizes	M7	H6

Details:

Speeds & Feeds P130	CARBIDE	TiAlN	30°	SHRINK FIT
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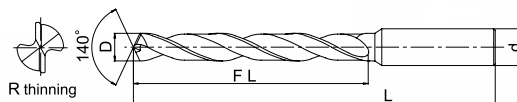


HIGH PERFORMANCE DRILLS

Sub-Micrograin Carbide

SERIES HP245 **NEW!**

5D, Solid



EDP Number	Diameter (D)	Flute Length (FL)	Overall Length (L)	Shank Diameter (d)
HP245-2441	6.20	53	91	8
HP245-2480	6.30	53	91	8
HP245-2500	6.35	53	91	8
HP245-2520	6.40	53	91	8
HP245-2559	6.50	53	91	8
HP245-2571	6.53	53	91	8
HP245-2598	6.60	53	91	8
HP245-2638	6.70	53	91	8
HP245-2657	6.75	53	91	8
HP245-2677	6.80	53	91	8
HP245-2717	6.90	53	91	8
HP245-2756	7.00	53	91	8
HP245-2795	7.10	53	91	8
HP245-2811	7.14	53	91	8
HP245-2835	7.20	53	91	8
HP245-2874	7.30	53	91	8
HP245-2913	7.40	53	91	8
HP245-2953	7.50	53	91	8
HP245-2969	7.54	53	91	8
HP245-2992	7.60	53	91	8
HP245-3031	7.70	53	91	8
HP245-3071	7.80	53	91	8
HP245-3110	7.90	53	91	8
HP245-3126	7.94	53	91	8
HP245-3150	8.00	53	91	8
HP245-3189	8.10	61	103	10
HP245-3228	8.20	61	103	10
HP245-3268	8.30	61	103	10
HP245-3280	8.33	61	103	10
HP245-3307	8.40	61	103	10
HP245-3319	8.43	61	103	10
HP245-3346	8.50	61	103	10
HP245-3386	8.60	61	103	10
HP245-3425	8.70	61	103	10
HP245-3437	8.73	61	103	10
HP245-3465	8.80	61	103	10
HP245-3504	8.90	61	103	10
HP245-3543	9.00	61	103	10
HP245-3583	9.10	61	103	10
HP245-3594	9.13	61	103	10
HP245-3622	9.20	61	103	10
HP245-3642	9.25	61	103	10
HP245-3661	9.30	61	103	10
HP245-3701	9.40	61	103	10
HP245-3740	9.50	61	103	10
HP245-3748	9.52	61	103	10
HP245-3780	9.60	61	103	10
HP245-3819	9.70	61	103	10
HP245-3858	9.80	61	103	10
HP245-3898	9.90	61	103	10
HP245-3906	9.92	61	103	10
HP245-3937	10.00	61	103	10
HP245-3976	10.10	71	118	12
HP245-4016	10.20	71	118	12
HP245-4055	10.30	71	118	12
HP245-4063	10.32	71	118	12
HP245-4094	10.40	71	118	12
HP245-4134	10.50	71	118	12
HP245-4173	10.60	71	118	12
HP245-4213	10.70	71	118	12
HP245-4220	10.72	71	118	12

Packed: 1 pc. Available TiALN coating only.





SERIES HP245 (CONTINUED) **NEW!** 5D, Solid

EDP Number	Diameter (D)	Flute Length (FL)	Overall Length (L)	Shank Diameter (d)
HP245-4252	10.80	71	118	12
HP245-4291	10.90	71	118	12
HP245-4331	11.00	71	118	12
HP245-4370	11.10	71	118	12
HP245-4374	11.11	71	118	12
HP245-4409	11.20	71	118	12
HP245-4449	11.30	71	118	12
HP245-4488	11.40	71	118	12
HP245-4528	11.50	71	118	12
HP245-4531	11.51	71	118	12
HP245-4567	11.60	71	118	12
HP245-4606	11.70	71	118	12
HP245-4646	11.80	71	118	12
HP245-4685	11.90	71	118	12
HP245-4689	11.91	71	118	12
HP245-4724	12.00	71	118	12
HP245-4764	12.10	77	124	14
HP245-4803	12.20	77	124	14
HP245-4843	12.30	77	124	14
HP245-4882	12.40	77	124	14
HP245-4921	12.50	77	124	14
HP245-4961	12.60	77	124	14
HP245-5000	12.70	77	124	14
HP245-5039	12.80	77	124	14
HP245-5079	12.90	77	124	14
HP245-5118	13.00	77	124	14
HP245-5157	13.10	77	124	14
HP245-5197	13.20	77	124	14
HP245-5236	13.30	77	124	14
HP245-5276	13.40	77	124	14
HP245-5311	13.49	77	124	14
HP245-5315	13.50	77	124	14
HP245-5394	13.70	77	124	14
HP245-5512	14.00	77	124	14
HP245-5626	14.29	83	133	16
HP245-5709	14.50	83	133	16
HP245-5780	14.68	83	133	16
HP245-5787	14.70	83	133	16
HP245-5906	15.00	83	133	16
HP245-5937	15.08	83	133	16
HP245-6102	15.50	83	133	16
HP245-6181	15.70	83	133	16
HP245-6248	15.87	83	133	16
HP245-6299	16.00	83	133	16
HP245-6496	16.50	93	143	18
HP245-6563	16.67	93	143	18
HP245-6693	17.00	93	143	18
HP245-6890	17.50	93	143	18
HP245-7087	18.00	93	143	18
HP245-7283	18.50	101	153	20
HP245-7480	19.00	101	153	20
HP245-7500	19.05	101	153	20
HP245-7677	19.50	101	153	20
HP245-7874	20.00	101	153	20

Packed: 1 pc. Available TiALN coating only.

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	M7	H6

Details:

Speeds & Feeds P130	CARBIDE	TiAlN	30°	SHRINK FIT
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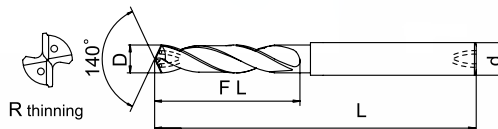


HIGH PERFORMANCE DRILLS

Sub-Micrograin, Carbide, Coolant-Through, Drills

SERIES HP253 **NEW!**

3D, Coolant-Through



EDP Number	Diameter (D)	Flute Length (FL)	Overall Length (L)	Shank Diameter (d)
HP253-1181	3.00	20	62	6
HP253-1220	3.10	20	62	6
HP253-1248	3.17	20	62	6
HP253-1260	3.20	20	62	6
HP253-1299	3.30	20	62	6
HP253-1339	3.40	20	62	6
HP253-1378	3.50	20	62	6
HP253-1406	3.57	20	62	6
HP253-1417	3.60	20	62	6
HP253-1457	3.70	20	62	6
HP253-1496	3.80	24	66	6
HP253-1535	3.90	24	66	6
HP253-1563	3.97	24	66	6
HP253-1575	4.00	24	66	6
HP253-1610	4.09	24	66	6
HP253-1614	4.10	24	66	6
HP253-1654	4.20	24	66	6
HP253-1693	4.30	24	66	6
HP253-1720	4.37	24	66	6
HP253-1732	4.40	24	66	6
HP253-1772	4.50	24	66	6
HP253-1811	4.60	24	66	6
HP253-1831	4.65	24	66	6
HP253-1850	4.70	24	66	6
HP253-1874	4.76	28	66	6
HP253-1890	4.80	28	66	6
HP253-1929	4.90	28	66	6
HP253-1969	5.00	28	66	6
HP253-2008	5.10	28	66	6
HP253-2031	5.16	28	66	6
HP253-2047	5.20	28	66	6
HP253-2087	5.30	28	66	6
HP253-2126	5.40	28	66	6
HP253-2130	5.41	28	66	6
HP253-2165	5.50	28	66	6
HP253-2189	5.56	28	66	6
HP253-2205	5.60	28	66	6
HP253-2244	5.70	28	66	6
HP253-2283	5.80	28	66	6
HP253-2323	5.90	28	66	6
HP253-2343	5.95	28	66	6
HP253-2362	6.00	28	66	6
HP253-2402	6.10	34	79	8
HP253-2441	6.20	34	79	8
HP253-2480	6.30	34	79	8
HP253-2500	6.35	34	79	8
HP253-2520	6.40	34	79	8
HP253-2559	6.50	34	79	8
HP253-2571	6.53	34	79	8
HP253-2598	6.60	34	79	8
HP253-2638	6.70	34	79	8
HP253-2657	6.75	34	79	8
HP253-2677	6.80	34	79	8
HP253-2717	6.90	34	79	8
HP253-2756	7.00	34	79	8
HP253-2795	7.10	41	79	8
HP253-2811	7.14	41	79	8
HP253-2835	7.20	41	79	8
HP253-2874	7.30	41	79	8
HP253-2913	7.40	41	79	8
HP253-2953	7.50	41	79	8

Packed: 1 pc. Available TiALN coating only.



HIGH PERFORMANCE DRILLS

Sub-Micrograin, Carbide, Coolant-Through, Drills



SERIES HP253 (CONTINUED) **NEW!**

3D, Coolant-Through

EDP Number	Diameter (D)	Flute Length (FL)	Overall Length (L)	Shank Diameter (d)
HP253-2969	7.54	41	79	8
HP253-2992	7.60	41	79	8
HP253-3031	7.70	41	79	8
HP253-3071	7.80	41	79	8
HP253-3110	7.90	41	79	8
HP253-3126	7.94	41	79	8
HP253-3150	8.00	41	79	8
HP253-3189	8.10	47	89	10
HP253-3228	8.20	47	89	10
HP253-3268	8.30	47	89	10
HP253-3280	8.33	47	89	10
HP253-3307	8.40	47	89	10
HP253-3319	8.43	47	89	10
HP253-3346	8.50	47	89	10
HP253-3386	8.60	47	89	10
HP253-3425	8.70	47	89	10
HP253-3437	8.73	47	89	10
HP253-3465	8.80	47	89	10
HP253-3504	8.90	47	89	10
HP253-3543	9.00	47	89	10
HP253-3583	9.10	47	89	10
HP253-3594	9.13	47	89	10
HP253-3622	9.20	47	89	10
HP253-3642	9.25	47	89	10
HP253-3661	9.30	47	89	10
HP253-3701	9.40	47	89	10
HP253-3740	9.50	47	89	10
HP253-3748	9.52	47	89	10
HP253-3780	9.60	47	89	10
HP253-3819	9.70	47	89	10
HP253-3858	9.80	47	89	10
HP253-3898	9.90	47	89	10
HP253-3906	9.92	47	89	10
HP253-3937	10.00	47	89	10
HP253-3976	10.10	55	102	12
HP253-4016	10.20	55	102	12
HP253-4055	10.30	55	102	12
HP253-4063	10.32	55	102	12
HP253-4094	10.40	55	102	12
HP253-4134	10.50	55	102	12
HP253-4173	10.60	55	102	12
HP253-4213	10.70	55	102	12
HP253-4220	10.72	55	102	12
HP253-4252	10.80	55	102	12
HP253-4291	10.90	55	102	12
HP253-4331	11.00	55	102	12
HP253-4370	11.10	55	102	12
HP253-4374	11.11	55	102	12
HP253-4409	11.20	55	102	12
HP253-4449	11.30	55	102	12
HP253-4488	11.40	55	102	12
HP253-4528	11.50	55	102	12

Packed: 1 pc. Available TiALN coating only.

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Tolerances:

Size	Diameter	Shank Diameter
All Sizes	M7	H6

Details:

Speeds & Feeds P130	CARBIDE	TiAlN		 30°	SHRINK FIT
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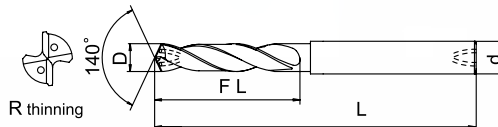


HIGH PERFORMANCE DRILLS

Sub-Micrograin, Carbide, Coolant-Through, Drills

SERIES HP253 (CONTINUED) **NEW!**

3D, Coolant-Through



EDP Number	Diameter (D)	Flute Length (FL)	Overall Length (L)	Shank Diameter (d)
HP253-4531	11.51	55	102	12
HP253-4567	11.60	55	102	12
HP253-4606	11.70	55	102	12
HP253-4646	11.80	55	102	12
HP253-4685	11.90	55	102	12
HP253-4689	11.91	55	102	12
HP253-4724	12.00	55	102	12
HP253-4764	12.10	60	107	14
HP253-4803	12.20	60	107	14
HP253-4843	12.30	60	107	14
HP253-4882	12.40	60	107	14
HP253-4921	12.50	60	107	14
HP253-4961	12.60	60	107	14
HP253-5000	12.70	60	107	14
HP253-5039	12.80	60	107	14
HP253-5079	12.90	60	107	14
HP253-5118	13.00	60	107	14
HP253-5157	13.10	60	107	14
HP253-5197	13.20	60	107	14
HP253-5236	13.30	60	107	14
HP253-5276	13.40	60	107	14
HP253-5311	13.49	60	107	14
HP253-5315	13.50	60	107	14
HP253-5394	13.70	60	107	14
HP253-5512	14.00	60	107	14
HP253-5626	14.29	65	115	16
HP253-5709	14.50	65	115	16
HP253-5780	14.68	65	115	16
HP253-5787	14.70	65	115	16
HP253-5906	15.00	65	115	16
HP253-5937	15.08	65	115	15
HP253-6102	15.50	65	115	16
HP253-6181	15.70	65	115	16
HP253-6248	15.87	65	115	16
HP253-6299	16.00	65	115	16
HP253-6496	16.50	73	123	18
HP253-6563	16.67	73	123	18
HP253-6693	17.00	73	123	18
HP253-6890	17.50	73	123	18
HP253-7087	18.00	73	123	18
HP253-7283	18.50	79	131	20
HP253-7480	19.00	79	131	20
HP253-7500	19.05	79	131	20
HP253-7677	19.50	79	131	20
HP253-7874	20.00	79	131	20

Packed: 1 pc. Available TiAlN coating only.

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	M7	H6

Details:

Speeds & Feeds P130	CARBIDE	TIAlN		30°	SHRINK FIT
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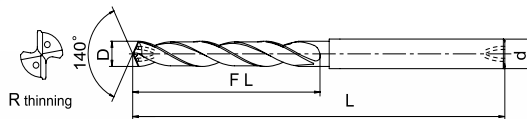
HIGH PERFORMANCE DRILLS

Sub-Micrograin, Carbide, Coolant-Through, Drills



SERIES HP255 **NEW!**

5D, Coolant-Through



EDP Number	Diameter (D)	Flute Length (FL)	Overall Length (L)	Shank Diameter (d)
HP255-1181	3.00	28	66	6
HP255-1220	3.10	28	66	6
HP255-1248	3.17	28	66	6
HP255-1260	3.20	28	66	6
HP255-1299	3.30	28	66	6
HP255-1339	3.40	28	66	6
HP255-1378	3.50	28	66	6
HP255-1406	3.57	28	66	6
HP255-1417	3.60	28	66	6
HP255-1457	3.70	28	66	6
HP255-1496	3.80	36	74	6
HP255-1535	3.90	36	74	6
HP255-1563	3.97	36	74	6
HP255-1575	4.00	36	74	6
HP255-1610	4.09	36	74	6
HP255-1614	4.10	36	74	6
HP255-1654	4.20	36	74	6
HP255-1693	4.30	36	74	6
HP255-1720	4.37	36	74	6
HP255-1732	4.40	36	74	6
HP255-1772	4.50	36	74	6
HP255-1811	4.60	36	74	6
HP255-1831	4.65	36	74	6
HP255-1850	4.70	36	74	6
HP255-1874	4.76	44	82	6
HP255-1890	4.80	44	82	6
HP255-1929	4.90	44	82	6
HP255-1969	5.00	44	82	6
HP255-2008	5.10	44	82	6
HP255-2031	5.16	44	82	6
HP255-2047	5.20	44	82	6
HP255-2087	5.30	44	82	6
HP255-2126	5.40	44	82	6
HP255-2130	5.41	44	82	6
HP255-2165	5.50	44	82	6
HP255-2189	5.56	44	82	6
HP255-2205	5.60	44	82	6
HP255-2244	5.70	44	82	6
HP255-2283	5.80	44	82	6
HP255-2323	5.90	44	82	6
HP255-2343	5.95	44	82	6
HP255-2362	6.00	44	82	6
HP255-2402	6.10	53	91	8
HP255-2441	6.20	53	91	8
HP255-2480	6.30	53	91	8

Packed: 1 pc. Available TiAlN coating only.

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Tolerances:

Size	Diameter	Shank Diameter
All Sizes	M7	H6

Details:

Speeds & Feeds P130	CARBIDE	TiAlN		30°	SHRINK FIT
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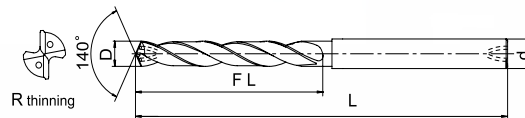


HIGH PERFORMANCE DRILLS

Sub-Micrograin, Carbide, Coolant-Through, Drills

SERIES HP255 (CONTINUED) **NEW!**

5D, Coolant-Through



EDP Number	Diameter (D)	Flute Length (FL)	Overall Length (L)	Shank Diameter (d)
HP255-2500	6.35	53	91	8
HP255-2520	6.40	53	91	8
HP255-2559	6.50	53	91	8
HP255-2571	6.53	53	91	8
HP255-2598	6.60	53	91	8
HP255-2638	6.70	53	91	8
HP255-2657	6.75	53	91	8
HP255-2677	6.80	53	91	8
HP255-2717	6.90	53	91	8
HP255-2756	7.00	53	91	8
HP255-2795	7.10	53	91	8
HP255-2811	7.14	53	91	8
HP255-2835	7.20	53	91	8
HP255-2874	7.30	53	91	8
HP255-2913	7.40	53	91	8
HP255-2953	7.50	53	91	8
HP255-2969	7.54	53	91	8
HP255-2992	7.60	53	91	8
HP255-3031	7.70	53	91	8
HP255-3071	7.80	53	91	8
HP255-3110	7.90	53	91	8
HP255-3126	7.94	53	91	8
HP255-3150	8.00	53	91	8
HP255-3189	8.10	61	103	10
HP255-3228	8.20	61	103	10
HP255-3268	8.30	61	103	10
HP255-3280	8.33	61	103	10
HP255-3307	8.40	61	103	10
HP255-3319	8.43	61	103	10
HP255-3346	8.50	61	103	10
HP255-3386	8.60	61	103	10
HP255-3425	8.70	61	103	10
HP255-3437	8.73	61	103	10
HP255-3465	8.80	61	103	10
HP255-3504	8.90	61	103	10
HP255-3543	9.00	61	103	10
HP255-3583	9.10	61	103	10
HP255-3594	9.13	61	103	10
HP255-3622	9.20	61	103	10
HP255-3642	9.25	61	103	10
HP255-3661	9.30	61	103	10
HP255-3701	9.40	61	103	10
HP255-3740	9.50	61	103	10
HP255-3748	9.52	61	103	10
HP255-3780	9.60	61	103	10
HP255-3819	9.70	61	103	10
HP255-3858	9.80	61	103	10
HP255-3898	9.90	61	103	10
HP255-3906	9.92	61	103	10
HP255-3937	10.00	61	103	10
HP255-3976	10.10	71	118	12
HP255-4016	10.20	71	118	12
HP255-4055	10.30	71	118	12
HP255-4063	10.32	71	118	12
HP255-4094	10.40	71	118	12
HP255-4134	10.50	71	118	12
HP255-4173	10.60	71	118	12
HP255-4213	10.70	71	118	12
HP255-4220	10.72	71	118	12
HP255-4252	10.80	71	118	12
HP255-4291	10.90	71	118	12

Packed: 1 pc. Available TiALN coating only.



HIGH PERFORMANCE DRILLS

Sub-Micrograin, Carbide, Coolant-Through, Drills



SERIES HP255 (CONTINUED) **NEW!**

5D, Coolant-Through

EDP Number	Diameter (D)	Flute Length (FL)	Overall Length (L)	Shank Diameter (d)
HP255-4331	11.00	71	118	12
HP255-4370	11.10	71	118	12
HP255-4374	11.11	71	118	12
HP255-4409	11.20	71	118	12
HP255-4449	11.30	71	118	12
HP255-4488	11.40	71	118	12
HP255-4528	11.50	71	118	12
HP255-4531	11.51	71	118	12
HP255-4567	11.60	71	118	12
HP255-4606	11.70	71	118	12
HP255-4646	11.80	71	118	12
HP255-4685	11.90	71	118	12
HP255-4689	11.91	71	118	12
HP255-4724	12.00	71	118	12
HP255-4764	12.10	77	124	14
HP255-4803	12.20	77	124	14
HP255-4843	12.30	77	124	14
HP255-4882	12.40	77	124	14
HP255-4921	12.50	77	124	14
HP255-4961	12.60	77	124	14
HP255-5000	12.70	77	124	14
HP255-5039	12.80	77	124	14
HP255-5079	12.90	77	124	14
HP255-5118	13.00	77	124	14
HP255-5157	13.10	77	124	14
HP255-5197	13.20	77	124	14
HP255-5236	13.30	77	124	14
HP255-5276	13.40	77	124	14
HP255-5311	13.49	77	124	14
HP255-5315	13.50	77	124	14
HP255-5394	13.70	77	124	14
HP255-5512	14.00	77	124	14
HP255-5626	14.29	83	133	16
HP255-5709	14.50	83	133	16
HP255-5780	14.68	83	133	16
HP255-5787	14.70	83	133	16
HP255-5906	15.00	83	133	16
HP255-5937	15.08	83	133	16
HP255-6102	15.50	83	133	16
HP255-6181	15.70	83	133	16
HP255-6248	15.87	83	133	16
HP255-6299	16.00	83	133	16
HP255-6496	16.50	93	143	18
HP255-6563	16.67	93	143	18
HP255-6693	17.00	93	143	18
HP255-6890	17.50	93	143	18
HP255-7087	18.00	93	143	18
HP255-7283	18.50	101	153	20
HP255-7480	19.00	101	153	20
HP255-7500	19.05	101	153	20
HP255-7677	19.50	101	153	20
HP255-7874	20.00	101	153	20

Packed: 1 pc. Available TiALN coating only.

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	M7	H6

Details:

Speeds & Feeds P130	CARBIDE	TiAlN		 30°	SHRINK FIT
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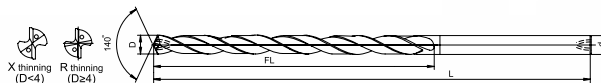


HIGH PERFORMANCE DRILLS

Sub-Micrograin, Carbide, Coolant-Through, Drills

SERIES HP258 **NEW!**

8D, Coolant-Through



EDP Number	Diameter (D)	Flute Length (FL)	Overall Length (L)	Shank Diameter (d)
HP258-1181	3.00	29	77	4
HP258-1220	3.10	36	77	4
HP258-1248	3.17	36	77	4
HP258-1260	3.20	36	77	4
HP258-1299	3.30	36	77	4
HP258-1339	3.40	36	77	4
HP258-1378	3.50	36	77	4
HP258-1406	3.57	36	77	4
HP258-1417	3.60	36	77	4
HP258-1457	3.70	36	77	4
HP258-1496	3.80	45	85	4
HP258-1535	3.90	45	85	4
HP258-1563	3.97	45	85	4
HP258-1575	4.00	45	85	4
HP258-1610	4.09	45	85	6
HP258-1614	4.10	45	85	6
HP258-1654	4.20	45	85	6
HP258-1693	4.30	45	85	6
HP258-1720	4.37	45	85	6
HP258-1732	4.40	45	85	6
HP258-1772	4.50	45	85	6
HP258-1811	4.60	45	85	6
HP258-1831	4.65	45	85	6
HP258-1850	4.70	45	85	6
HP258-1874	4.76	50	90	6
HP258-1890	4.80	50	90	6
HP258-1929	4.90	50	90	6
HP258-1969	5.00	50	90	6
HP258-2008	5.10	57	97	6
HP258-2031	5.16	57	97	6
HP258-2047	5.20	57	97	6
HP258-2087	5.30	57	97	6
HP258-2126	5.40	57	97	6
HP258-2130	5.41	57	97	6
HP258-2165	5.50	57	97	6
HP258-2189	5.56	57	97	6
HP258-2205	5.60	57	97	6
HP258-2244	5.70	57	97	6
HP258-2283	5.80	57	97	6
HP258-2323	5.90	57	97	6
HP258-2343	5.95	57	97	6
HP258-2362	6.00	57	97	6
HP258-2402	6.10	66	106	8
HP258-2441	6.20	66	106	8
HP258-2480	6.30	66	106	8
HP258-2500	6.35	66	106	8
HP258-2520	6.40	66	106	8
HP258-2559	6.50	66	106	8
HP258-2571	6.53	66	106	8
HP258-2598	6.60	66	106	8
HP258-2638	6.70	66	106	8
HP258-2657	6.75	66	106	8
HP258-2677	6.80	66	106	8
HP258-2717	6.90	76	116	8
HP258-2756	7.00	76	116	8
HP258-2795	7.10	76	116	8
HP258-2811	7.14	76	116	8
HP258-2835	7.20	76	116	8
HP258-2874	7.30	76	116	8
HP258-2913	7.40	76	116	8
HP258-2953	7.50	76	116	8

Packed: 1 pc. Available TiALN coating only.



HIGH PERFORMANCE DRILLS

Sub-Micrograin, Carbide, Coolant-Through, Drills



SERIES HP258 (CONTINUED) **NEW!**

8D, Coolant-Through

EDP Number	Diameter (D)	Flute Length (FL)	Overall Length (L)	Shank Diameter (d)
HP258-2969	7.54	76	116	8
HP258-2992	7.60	76	116	8
HP258-3031	7.70	76	116	8
HP258-3071	7.80	76	116	8
HP258-3110	7.90	76	116	8
HP258-3126	7.94	76	116	8
HP258-3150	8.00	76	116	8
HP258-3189	8.10	87	131	10
HP258-3228	8.20	87	131	10
HP258-3268	8.30	87	131	10
HP258-3280	8.33	87	131	10
HP258-3307	8.40	87	131	10
HP258-3319	8.43	87	131	10
HP258-3346	8.50	87	131	10
HP258-3386	8.60	87	131	10
HP258-3425	8.70	87	131	10
HP258-3437	8.73	87	131	10
HP258-3465	8.80	87	131	10
HP258-3504	8.90	87	131	10
HP258-3543	9.00	87	131	10
HP258-3583	9.10	95	139	10
HP258-3594	9.13	95	139	10
HP258-3622	9.20	95	139	10
HP258-3642	9.25	95	139	10
HP258-3661	9.30	95	139	10
HP258-3701	9.40	95	139	10
HP258-3740	9.50	95	139	10
HP258-3748	9.52	95	139	10
HP258-3780	9.60	95	139	10
HP258-3819	9.70	95	139	10
HP258-3858	9.80	95	139	10
HP258-3898	9.90	95	139	10
HP258-3906	9.92	95	139	10
HP258-3937	10.00	95	139	10
HP258-3976	10.10	106	155	12
HP258-4016	10.20	106	155	12
HP258-4055	10.30	106	155	12
HP258-4063	10.32	106	155	12
HP258-4094	10.40	106	155	12
HP258-4134	10.50	106	155	12
HP258-4173	10.60	106	155	12
HP258-4213	10.70	106	155	12
HP258-4220	10.72	106	155	12
HP258-4252	10.80	106	155	12
HP258-4291	10.90	106	155	12
HP258-4331	11.00	106	155	12
HP258-4370	11.10	114	163	12
HP258-4374	11.11	114	163	12
HP258-4409	11.20	114	163	12
HP258-4449	11.30	114	163	12
HP258-4488	11.40	114	163	12
HP258-4528	11.50	114	163	12

Packed: 1 pc. Available TiAlN coating only.

▶ continued on next page ▶

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	M7	H6

Details:

Speeds & Feeds P130	CARBIDE	TiAlN		 30°	SHRINK FIT
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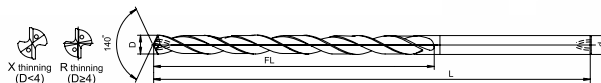


HIGH PERFORMANCE DRILLS

Sub-Micrograin, Carbide, Coolant-Through, Drills

SERIES HP258 (CONTINUED) **NEW!**

8D, Coolant-Through



EDP Number	Diameter (D)	Flute Length (FL)	Overall Length (L)	Shank Diameter (d)
HP258-4531	11.51	114	163	12
HP258-4567	11.60	114	163	12
HP258-4606	11.70	114	163	12
HP258-4646	11.80	114	163	12
HP258-4685	11.90	114	163	12
HP258-4689	11.91	114	163	12
HP258-4724	12.00	114	163	12
HP258-4764	12.10	133	182	14
HP258-4803	12.20	133	182	14
HP258-4843	12.30	133	182	14
HP258-4882	12.40	133	182	14
HP258-4921	12.50	133	182	14
HP258-4961	12.60	133	182	14
HP258-5000	12.70	133	182	14
HP258-5039	12.80	133	182	14
HP258-5079	12.90	133	182	14
HP258-5118	13.00	133	182	14
HP258-5157	13.10	133	182	14
HP258-5197	13.20	133	182	14
HP258-5236	13.30	133	182	14
HP258-5276	13.40	133	182	14
HP258-5311	13.49	133	182	14
HP258-5315	13.50	133	182	14
HP258-5394	13.70	133	182	14
HP258-5512	14.00	133	182	14
HP258-5626	14.29	152	204	16
HP258-5709	14.50	152	204	16
HP258-5780	14.68	152	204	16
HP258-5787	14.70	152	204	16
HP258-5906	15.00	152	204	16
HP258-5937	15.08	152	204	16
HP258-6102	15.50	152	204	16
HP258-6181	15.70	152	204	16
HP258-6248	15.87	152	204	16
HP258-6299	16.00	152	204	16
HP258-6496	16.50	171	223	18
HP258-6563	16.67	171	223	18
HP258-6693	17.00	171	223	18
HP258-6890	17.50	171	223	18
HP258-7087	18.00	171	223	18
HP258-7283	18.50	190	244	20
HP258-7480	19.00	190	244	20
HP258-7500	19.05	190	244	20
HP258-7677	19.50	190	244	20
HP258-7874	20.00	190	244	20

Packed: 1 pc. Available TiALN coating only.

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	M7	H6

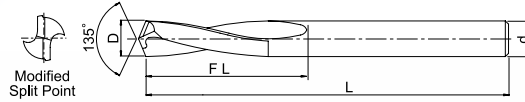
Details:

Speeds & Feeds P130	CARBIDE	TIAlN		30°	SHRINK FIT
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SERIES 215
Slow Spiral



Tolerance for cutting diameter: +.0000 - .0005

EDP Number	Diameter				Flute Length (FL)	Overall Length (L)	Shank Diameter (d)
	Wire Gauge	Letter Size	mm	Inch			
215-0394	—	—	1.00	0.0394	13	38	1.0
215-0433	—	—	1.10	0.0433	13	38	1.1
215-0472	—	—	1.20	0.0472	13	38	1.2
215-0512	—	—	1.30	0.0512	13	38	1.3
215-0551	54	—	1.40	0.0551	13	38	1.4
215-0591	—	—	1.50	0.0591	13	38	1.5
215-0630	—	—	1.60	0.0630	18	43	1.6
215-0669	51	—	1.70	0.0669	18	43	1.7
215-0709	—	—	1.80	0.0709	18	43	1.8
215-0748	—	—	1.90	0.0748	18	43	1.9
215-0787	—	—	2.00	0.0787	19	45	2.0
215-0827	—	—	2.10	0.0827	19	45	2.1
215-0866	—	—	2.20	0.0866	19	45	2.2
215-0906	—	—	2.30	0.0906	19	45	2.3
215-0945	—	—	2.40	0.0945	21	46	2.4
215-0984	—	—	2.50	0.0984	21	46	2.5
215-1024	—	—	2.60	0.1024	21	46	2.6
215-1063	—	—	2.70	0.1063	21	46	2.7
215-1102	—	—	2.80	0.1102	22	48	2.8
215-1142	—	—	2.90	0.1142	22	48	2.9
215-1181	—	—	3.00	0.1181	22	48	3.0
215-1220	—	—	3.10	0.1220	22	48	3.1
215-1260	—	—	3.20	0.1260	24	52	3.2
215-1299	—	—	3.30	0.1299	24	52	3.3
215-1339	—	—	3.40	0.1339	24	52	3.4
215-1378	—	—	3.50	0.1378	24	52	3.5
215-1417	—	—	3.60	0.1417	25	52	3.6
215-1457	—	—	3.70	0.1457	25	52	3.7
215-1496	25	—	3.80	0.1496	25	52	3.8
215-1535	—	—	3.90	0.1535	25	52	3.9
215-1575	—	—	4.00	0.1575	27	53	4.0
215-1614	—	—	4.10	0.1614	27	53	4.1
215-1654	—	—	4.20	0.1654	27	53	4.2
215-1693	—	—	4.30	0.1693	27	53	4.3
215-1732	—	—	4.40	0.1732	29	55	4.4
215-1772	16	—	4.50	0.1772	29	55	4.5
215-1811	—	—	4.60	0.1811	29	55	4.6

Packed: 1 pc. TiN, TiCN, TiAlN coatings available on request.

▶ continued on next page ▶

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.012mm	+0.000mm -0.025mm

Details:

Speeds & Feeds P131	Bright	Carbide	15°	SHRINK FIT
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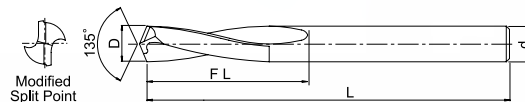


SLOW SPIRAL

Micrograin Carbide

SERIES 215 (CONTINUED)

Slow Spiral



Tolerance for cutting diameter: +.0000 - .0005

EDP Number	Diameter				Flute Length (FL)	Overall Length (L)	Shank Diameter (d)
	Wire Gauge	Letter Size	mm	Inch			
215-1850	13	—	4.70	0.1850	29	57	4.7
215-1890	12	—	4.80	0.1890	30	57	4.8
215-1929	—	—	4.90	0.1929	30	57	4.9
215-1968	—	—	5.00	0.1969	30	57	5.0
215-2008	—	—	5.10	0.2008	30	57	5.1
215-2047	—	—	5.20	0.2047	32	60	5.2
215-2087	—	—	5.30	0.2087	32	60	5.3
215-2126	—	—	5.40	0.2126	32	60	5.4
215-2165	—	—	5.50	0.2165	32	60	5.5
215-2205	—	—	5.60	0.2205	33	61	5.6
215-2244	—	—	5.70	0.2244	33	61	5.7
215-2283	—	—	5.80	0.2283	33	61	5.8
215-2323	—	—	5.90	0.2323	33	61	5.9
215-2362	—	—	6.00	0.2362	33	61	6.0
215-2402	—	—	6.10	0.2402	35	63	6.1
215-2441	—	—	6.20	0.2441	35	63	6.2
215-2480	—	—	6.30	0.2480	35	63	6.3
215-2520	—	—	6.40	0.2520	35	63	6.4
215-2559	—	—	6.50	0.2559	35	63	6.5
215-2598	—	—	6.60	0.2598	37	67	6.6
215-2638	—	—	6.70	0.2638	37	67	6.7
215-2677	—	—	6.80	0.2677	38	68	6.8
215-2717	—	I	6.90	0.2717	38	68	6.9
215-2756	—	—	7.00	0.2756	38	68	7.0
215-2795	—	—	7.10	0.2795	38	68	7.1
215-2835	—	—	7.20	0.2835	40	70	7.2
215-2874	—	—	7.30	0.2874	40	70	7.3
215-2913	—	—	7.40	0.2913	40	70	7.4
215-2953	—	—	7.50	0.2953	40	70	7.5
215-2992	—	—	7.60	0.2992	41	71	7.6
215-3031	—	—	7.70	0.3031	41	71	7.7
215-3071	—	—	7.80	0.3071	41	71	7.8
215-3110	—	—	7.90	0.3110	41	71	7.9
215-3150	—	—	8.00	0.3150	41	71	8.0
215-3189	—	—	8.10	0.3189	43	75	8.1
215-3228	—	P	8.20	0.3228	43	75	8.2
215-3268	—	—	8.30	0.3268	43	75	8.3
215-3307	—	—	8.40	0.3307	43	76	8.4
215-3346	—	—	8.50	0.3346	43	76	8.5
215-3386	—	—	8.60	0.3386	43	76	8.6
215-3425	—	—	8.70	0.3425	43	76	8.7
215-3465	—	—	8.80	0.3465	44	78	8.8
215-3504	—	—	8.90	0.3504	44	78	8.9
215-3543	—	—	9.00	0.3543	44	78	9.0
215-3583	—	—	9.10	0.3583	44	78	9.1
215-3622	—	—	9.20	0.3622	46	79	9.2
215-3661	—	—	9.30	0.3661	46	79	9.3
215-3701	—	—	9.40	0.3701	46	79	9.4
215-3740	—	—	9.50	0.3740	46	79	9.5
215-3780	—	—	9.60	0.3780	48	83	9.6
215-3819	—	—	9.70	0.3819	48	83	9.7
215-3858	—	W	9.80	0.3858	48	83	9.8
215-3898	—	—	9.90	0.3898	48	83	9.9
215-3937	—	—	10.00	0.3937	48	83	10.0
215-3976	—	—	10.10	0.3976	49	84	10.1
215-4016	—	—	10.20	0.4016	49	84	10.2
215-4055	—	—	10.30	0.4055	49	84	10.3
215-4094	—	—	10.40	0.4094	51	86	10.4
215-4134	—	—	10.50	0.4134	51	86	10.5

Packed: 1 pc. TiN, TiCN, TiAlN coatings available on request.



SERIES 215 (CONTINUED)
Slow Spiral

EDP Number	Diameter				Flute Length (FL)	Overall Length (L)	Shank Diameter (d)
	Wire Gauge	Letter Size	mm	Inch			
215-4173	—	—	10.60	0.4173	51	86	10.6
215-4213	—	—	10.70	0.4213	51	86	10.7
215-4252	—	—	10.80	0.4252	52	87	10.8
215-4291	—	—	10.90	0.4291	52	87	10.9
215-4331	—	—	11.00	0.4331	52	87	11.0
215-4370	—	—	11.10	0.4370	52	87	11.1
215-4409	—	—	11.20	0.4409	54	90	11.2
215-4449	—	—	11.30	0.4449	54	90	11.3
215-4488	—	—	11.40	0.4488	54	90	11.4
215-4528	—	—	11.50	0.4528	54	90	11.5
215-4567	—	—	11.60	0.4567	54	92	11.6
215-4606	—	—	11.70	0.4606	54	92	11.7
215-4646	—	—	11.80	0.4646	54	92	11.8
215-4685	—	—	11.90	0.4685	54	92	11.9
215-4724	—	—	12.00	0.4724	54	92	12.0

Packed: 1 pc. TiN, TiCN, TiAlN coatings available on request.

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.012mm	+0.000mm -0.025mm

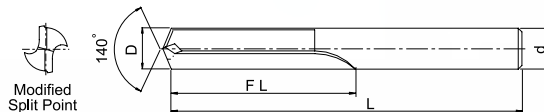
Details:

Speeds & Feeds P131	Bright	Carbide	15°	SHRINK FIT
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STRAIGHT
Micrograin Carbide

SERIES 200
Straight Flute



Tolerance for cutting diameter: +.0000 - .0005

EDP Number	Diameter				Flute Length (FL)	Overall Length (L)	Shank Diameter (d)
	Wire Gauge	Letter Size	mm	Inch			
200-0591	—	—	1.50	0.0591	13	38	1.5
200-0787	—	—	2.00	0.0787	19	44	2.0
200-0984	—	—	2.50	0.0984	21	46	2.5
200-1181	—	—	3.00	0.1181	22	48	3.0
200-1378	—	—	3.50	0.1378	24	49	3.5
200-1575	—	—	4.00	0.1575	27	54	4.0
200-1772	16	—	4.50	0.1772	29	56	4.5
200-1968	—	—	5.00	0.1969	30	57	5.0
200-2165	—	—	5.50	0.2165	32	60	5.5
200-2362	—	—	6.00	0.2362	33	62	6.0
200-2559	—	—	6.50	0.2559	35	64	6.5
200-2756	—	—	7.00	0.2756	38	68	7.0
200-2953	—	—	7.50	0.2953	40	70	7.5
200-3150	—	—	8.00	0.3150	41	71	8.0
200-3346	—	—	8.50	0.3346	43	76	8.5
200-3543	—	—	9.00	0.3543	44	78	9.0
200-3740	—	—	9.50	0.3740	46	79	9.5
200-3937	—	—	10.00	0.3937	48	83	10.0
200-4134	—	—	10.50	0.4134	51	86	10.5
200-4331	—	—	11.00	0.4331	52	87	11.0
200-4528	—	—	11.50	0.4528	54	90	11.5
200-4724	—	—	12.00	0.4724	54	92	12.0

Packed: 1 pc. TiN, TiCN, TiAlN coatings available on request.

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.000mm -0.012mm	+0.000mm -0.025mm

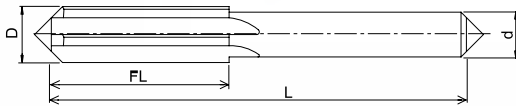
Details:

Speeds & Feeds P131	Carbide	Bright	0°	SHRINK FIT
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SERIES 300

Chucking Reamer, Right Hand Cutting



EDP Number	Diameter				Flute Length (FL)	Overall Length (L)	Shank Diameter (d)
	Wire Gauge	Letter Size	mm	Inch			
300-0315	—	—	0.80	0.0315	10	38	0.70
300-0354	—	—	0.90	0.0354	10	38	0.80
300-0394	—	—	1.00	0.0394	10	38	0.80
300-0433	—	—	1.10	0.0433	10	38	1.00
300-0472	—	—	1.20	0.0472	10	38	1.04
300-0512	—	—	1.30	0.0512	10	38	1.04
300-0551	—	—	1.40	0.0551	10	38	1.32
300-0591	—	—	1.50	0.0591	10	38	1.32
300-0630	—	—	1.60	0.0630	10	38	1.32
300-0669	—	—	1.70	0.0669	12	44	1.59
300-0709	—	—	1.80	0.0709	12	44	1.59
300-0748	—	—	1.90	0.0748	12	44	1.59
300-0787	—	—	2.00	0.0787	12	44	1.59
300-0827	—	—	2.10	0.0827	12	50	1.98
300-0866	—	—	2.20	0.0866	12	50	1.98
300-0906	—	—	2.30	0.0906	12	50	1.98
300-0945	—	—	2.40	0.0945	12	50	1.98
300-1063	—	—	2.70	0.1063	16	57	2.38
300-1181	—	—	3.00	0.1181	16	57	2.78
300-1260	—	—	3.20	0.1260	16	57	2.78
300-1417	—	—	3.60	0.1417	19	64	3.57
300-1535	—	—	3.90	0.1535	19	64	3.57
300-1614	—	—	4.10	0.1614	22	70	3.97
300-1732	—	—	4.40	0.1732	22	70	3.97
300-1929	—	—	4.90	0.1929	22	70	4.76
300-2008	—	—	5.10	0.2008	25	76	4.76
300-2047	—	—	5.20	0.2047	25	76	4.76
300-2087	—	—	5.30	0.2087	25	76	4.76
300-2126	—	—	5.40	0.2126	25	76	4.76
300-2165	—	—	5.50	0.2165	25	76	4.76
300-2205	—	—	5.60	0.2205	25	76	4.76
300-2244	—	—	5.70	0.2244	25	76	5.56
300-2283	—	—	5.80	0.2283	25	76	5.56
300-2323	—	—	5.90	0.2323	25	76	5.56
300-2362	—	—	6.00	0.2362	25	76	5.56
300-2402	—	—	6.10	0.2402	25	76	5.56
300-2441	—	—	6.20	0.2441	25	76	5.56
300-2480	—	—	6.30	0.2480	25	76	5.56
300-2520	—	—	6.40	0.2520	29	83	6.35
300-2559	—	—	6.50	0.2559	29	83	6.35
300-2598	—	—	6.60	0.2598	29	83	6.35

Packed: 1 pc.

▶ continued on next page ▶

Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.0120mm +0.0025mm	+0.0000mm -0.0120mm

Details:

Speeds & Feeds	Bright	Carbide
P131		

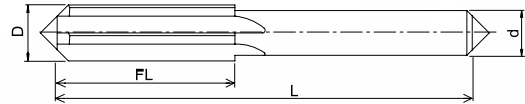


CHUCKING REAMER

Micrograin Carbide

SERIES 300 (CONTINUED)

Chucking Reamer, Right Hand Cutting



EDP Number	Diameter				Flute Length (FL)	Overall Length (L)	Shank Diameter (d)
	Wire Gauge	Letter Size	mm	Inch			
300-2638	—	—	6.70	0.2638	29	83	6.35
300-2677	—	—	6.80	0.2677	29	83	6.35
300-2717	—	—	6.90	0.2717	29	83	6.35
300-2756	—	—	7.00	0.2756	29	83	6.35
300-2795	—	—	7.10	0.2795	29	83	6.35
300-2835	—	—	7.20	0.2835	29	83	6.35
300-2874	—	—	7.30	0.2874	29	83	7.14
300-2913	—	—	7.40	0.2913	29	83	7.14
300-2953	—	—	7.50	0.2953	29	83	7.14
300-2992	—	—	7.60	0.2992	29	83	7.14
300-3031	—	—	7.70	0.3031	29	83	7.14
300-3071	—	—	7.80	0.3071	29	83	7.14
300-3110	—	—	7.90	0.3110	29	83	7.14
300-3150	—	—	8.00	0.3150	29	83	7.14
300-3189	—	—	8.10	0.3189	32	89	7.94
300-3228	—	—	8.20	0.3228	32	89	7.94
300-3268	—	—	8.30	0.3268	32	89	7.94
300-3307	—	—	8.40	0.3307	32	89	7.94
300-3346	—	—	8.50	0.3346	32	89	7.94
300-3386	—	—	8.60	0.3386	32	89	7.94
300-3425	—	—	8.70	0.3425	32	89	7.94
300-3465	—	—	8.80	0.3465	32	89	7.94
300-3504	—	—	8.90	0.3504	32	89	7.94
300-3543	—	—	9.00	0.3543	32	89	7.94
300-3583	—	—	9.10	0.3583	32	89	7.94
300-3622	—	—	9.20	0.3622	32	89	9.13
300-3661	—	—	9.30	0.3661	32	89	9.13
300-3701	—	—	9.40	0.3701	32	89	9.13
300-3740	—	—	9.50	0.3740	32	89	9.13
300-3780	—	—	9.60	0.3780	32	89	9.13
300-3819	—	—	9.70	0.3819	32	89	9.13
300-3858	—	—	9.80	0.3858	32	89	9.13
300-3898	—	—	9.90	0.3898	32	89	9.53
300-3937	—	—	10.00	0.3937	32	89	9.53
300-3976	—	—	10.10	0.3976	32	89	9.53
300-4016	—	—	10.20	0.4016	32	89	9.53
300-4055	—	—	10.30	0.4055	32	89	9.53
300-4094	—	—	10.40	0.4094	32	89	9.53
300-4134	—	—	10.50	0.4134	32	89	9.53
300-4173	—	—	10.60	0.4173	35	95	9.53
300-4213	—	—	10.70	0.4213	35	95	9.53
300-4252	—	—	10.80	0.4252	35	95	9.53
300-4291	—	—	10.90	0.4291	35	95	9.53
300-4331	—	—	11.00	0.4331	35	95	9.53
300-4370	—	—	11.10	0.4370	35	95	9.53
300-4409	—	—	11.20	0.4409	35	95	9.53
300-4449	—	—	11.30	0.4449	35	95	9.53
300-4488	—	—	11.40	0.4488	35	95	9.53
300-4528	—	—	11.50	0.4528	35	95	9.53
300-4567	—	—	11.60	0.4567	35	95	11.11
300-4606	—	—	11.70	0.4606	35	95	11.11
300-4646	—	—	11.80	0.4646	35	95	11.11
300-4685	—	—	11.90	0.4685	35	95	11.11

Packed: 1 pc.

[continued on next page](#)





SERIES 300 (CONTINUED)

Chucking Reamer, Right Hand Cutting

EDP Number	Diameter				Flute Length (FL)	Overall Length (L)	Shank Diameter (d)
	Wire Gauge	Letter Size	mm	Inch			
300-4724	—	—	12.00	0.4724	38	102	11.11
300-4764	—	—	12.10	0.4764	38	102	11.11
300-4803	—	—	12.20	0.4803	38	102	11.11
300-4843	—	—	12.30	0.4843	38	102	11.11
300-4882	—	—	12.40	0.4882	38	102	11.11
300-4921	—	—	12.50	0.4921	38	102	11.11
300-4961	—	—	12.60	0.4961	38	102	11.11
300-5039	—	—	12.80	0.5039	38	102	11.11
300-5079	—	—	12.90	0.5079	38	102	11.11
300-5118	—	—	13.00	0.5118	38	102	11.11

Packed: 1 pc.



Tolerances:

Size	Diameter	Shank Diameter
All Sizes	+0.0120mm +0.0025mm	+0.0000mm -0.0120mm

Details:

Speeds & Feeds P131	Bright	Carbide
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Notes and Comments

A series of horizontal lines for writing notes and comments, spanning the width of the page below the section header.



DRILLS TECHNICAL

Series HP243, HP245, HP253, HP255 & HP258

Work Material	Carbon Steels, Mild Steel 1010, 1050, 12L14		Alloy Steels 4140, 4130		Special Alloy Steels, Hardened Steels							
	73-106 m/min		70-99 m/min		49-73 m/min		34-56 m/min		30-46 m/min		23-30 m/min	
Drilling Speed	73-106 m/min		70-99 m/min		49-73 m/min		34-56 m/min		30-46 m/min		23-30 m/min	
Drill Dia. (mm)	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev
3	9,541	0.051 - 0.127	8,959	0.051 - 0.127	6,469	0.051 - 0.127	4,754	0.051 - 0.076	4,043	0.051 - 0.076	2,814	0.025 - 0.051
4	7,156	0.076 - 0.152	6,719	0.076 - 0.152	4,851	0.076 - 0.152	3,566	0.076 - 0.102	3,032	0.076 - 0.102	2,110	0.051 - 0.076
5	5,725	0.102 - 0.203	5,375	0.102 - 0.203	3,881	0.102 - 0.203	2,853	0.102 - 0.127	2,426	0.102 - 0.127	1,688	0.051 - 0.076
6	4,771	0.127 - 0.229	4,479	0.127 - 0.229	3,234	0.127 - 0.229	2,377	0.127 - 0.152	2,021	0.127 - 0.152	1,407	0.051 - 0.102
7	4,089	0.152 - 0.254	3,840	0.152 - 0.254	2,772	0.152 - 0.254	2,038	0.152 - 0.178	1,733	0.152 - 0.178	1,206	0.076 - 0.127
8	3,578	0.152 - 0.279	3,360	0.152 - 0.279	2,426	0.152 - 0.279	1,783	0.152 - 0.203	1,516	0.152 - 0.203	1,055	0.076 - 0.127
9	3,180	0.178 - 0.305	2,986	0.178 - 0.305	2,156	0.178 - 0.305	1,585	0.178 - 0.229	1,348	0.178 - 0.229	938	0.102 - 0.152
10	2,862	0.203 - 0.305	2,688	0.203 - 0.305	1,941	0.203 - 0.305	1,426	0.203 - 0.254	1,213	0.203 - 0.254	844	0.102 - 0.152
11	2,602	0.203 - 0.305	2,443	0.203 - 0.305	1,764	0.203 - 0.305	1,297	0.229 - 0.279	1,103	0.229 - 0.279	767	0.102 - 0.152
12	2,385	0.203 - 0.305	2,240	0.203 - 0.305	1,617	0.203 - 0.305	1,189	0.229 - 0.305	1,011	0.229 - 0.305	703	0.127 - 0.178
13	2,202	0.203 - 0.305	2,067	0.203 - 0.305	1,493	0.203 - 0.305	1,097	0.254 - 0.330	933	0.254 - 0.330	649	0.127 - 0.178
14	2,045	0.229 - 0.356	1,920	0.229 - 0.356	1,386	0.229 - 0.356	1,019	0.279 - 0.356	866	0.279 - 0.356	603	0.152 - 0.203
16	1,789	0.254 - 0.356	1,680	0.254 - 0.356	1,213	0.254 - 0.356	891	0.330 - 0.406	758	0.330 - 0.406	528	0.152 - 0.203
18	1,590	0.279 - 0.381	1,493	0.279 - 0.381	1,078	0.279 - 0.381	792	0.356 - 0.457	674	0.356 - 0.457	469	0.178 - 0.229
20	1,431	0.305 - 0.406	1,344	0.305 - 0.406	970	0.305 - 0.406	713	0.406 - 0.508	606	0.406 - 0.508	422	0.203 - 0.279

Work Material	Cast Iron		Ductile Cast Iron		Stainless Steels 400SS, 17-4PH		Cast Aluminum	
Drilling Speed	73-117 SFM		53-91 SFM		25-40 SFM		79-195 SFM	
Drill Dia. (mm)	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev
3	10,091	0.051 - 0.127	7,698	0.051 - 0.127	3,400	0.051 - 0.102	14,554	0.102 - 0.152
4	7,568	0.076 - 0.152	5,773	0.076 - 0.152	2,550	0.076 - 0.127	10,916	0.127 - 0.178
5	6,055	0.102 - 0.203	4,619	0.102 - 0.203	2,040	0.102 - 0.152	8,733	0.178 - 0.229
6	5,045	0.127 - 0.229	3,849	0.127 - 0.229	1,700	0.127 - 0.178	7,277	0.203 - 0.254
7	4,325	0.152 - 0.254	3,299	0.152 - 0.254	1,456	0.152 - 0.203	6,238	0.254 - 0.305
8	3,784	0.152 - 0.279	2,887	0.152 - 0.279	1,274	0.152 - 0.229	5,458	0.305 - 0.356
9	3,364	0.178 - 0.305	2,566	0.178 - 0.305	1,130	0.178 - 0.254	4,851	0.330 - 0.381
10	3,027	0.203 - 0.305	2,309	0.203 - 0.305	1,020	0.203 - 0.254	4,366	0.381 - 0.432
11	2,752	0.203 - 0.305	2,099	0.203 - 0.305	930	0.203 - 0.254	3,969	0.406 - 0.457
12	2,523	0.203 - 0.305	1,924	0.203 - 0.305	850	0.203 - 0.254	3,639	0.457 - 0.508
13	2,329	0.203 - 0.305	1,776	0.203 - 0.305	785	0.203 - 0.254	3,359	0.483 - 0.533
14	2,162	0.229 - 0.356	1,649	0.229 - 0.356	730	0.229 - 0.279	3,119	0.533 - 0.584
16	1,892	0.254 - 0.356	1,443	0.254 - 0.356	640	0.254 - 0.305	2,729	0.610 - 0.660
18	1,682	0.279 - 0.381	1,283	0.279 - 0.381	565	0.279 - 0.330	2,426	0.660 - 0.762
20	1,514	0.305 - 0.406	1,155	0.305 - 0.406	510	0.305 - 0.356	2,183	0.711 - 0.813



Series 215, 220, 233 & 200

Hardness					Up to 30 Hrc		30 to 38 Hrc		38 to 45 Hrc							
Work Material	Cast Iron		Mild Steels, Carbon Steels		Alloy Tool Steels, Tool Steels		Hardened Steels, Prehardened Steels		Hardened Steels, Prehardened Steels		Titanium Alloys (Annealed)		Inconel, Titanium Alloys (Solution Treated and Aged)		Aluminum	
Cutting Speed	91 m/min		91 m/min		79 m/min		66 m/min		52 m/min		40 m/min		18 m/min		183 m/min	
Drill Dia. (mm)	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev
0.8	36,700	0.018	36,700	0.025	31,810	0.008	26,300	0.005	20,800	0.005	15,900	0.008	7,340	0.005	73,400	0.015
1	29,060	0.020	29,060	0.028	25,190	0.010	20,830	0.008	16,470	0.008	12,590	0.010	5,810	0.008	58,120	0.018
1.5	18,320	0.030	18,320	0.043	15,880	0.013	13,130	0.010	10,380	0.010	7,940	0.013	3,660	0.010	36,640	0.028
2	12,210	0.046	12,210	0.064	10,580	0.020	8,750	0.015	6,920	0.015	5,290	0.020	2,440	0.015	24,410	0.041
3	9,160	0.056	9,160	0.071	7,940	0.033	6,560	0.033	5,190	0.033	3,970	0.028	1,830	0.023	18,320	0.071
4	7,330	0.061	7,330	0.079	6,350	0.036	5,250	0.036	4,150	0.036	3,180	0.030	1,470	0.023	14,660	0.076
-	6,110	0.071	6,110	0.091	5,290	0.041	4,380	0.041	3,460	0.041	2,650	0.036	1,220	0.028	12,210	0.089
5	5,230	0.089	5,230	0.097	4,540	0.048	3,750	0.058	2,970	0.058	2,270	0.038	1,050	0.030	10,470	0.109
6	4,580	0.097	4,580	0.104	3,970	0.053	3,280	0.061	2,600	0.061	1,980	0.041	920	0.036	9,160	0.117
7	4,070	0.107	4,070	0.117	3,530	0.058	2,920	0.069	2,310	0.069	1,760	0.046	810	0.038	8,140	0.130
8	3,660	0.114	3,660	0.124	3,180	0.064	2,630	0.074	2,080	0.074	1,590	0.048	730	0.041	7,330	0.140
-	3,330	0.119	3,330	0.165	2,890	0.084	2,390	0.099	1,890	0.099	1,440	0.061	670	0.048	6,660	0.168
9	3,050	0.122	3,050	0.168	2,650	0.086	2,190	0.102	1,730	0.102	1,320	0.061	610	0.048	6,110	0.170
10	2,820	0.124	2,820	0.173	2,440	0.086	2,020	0.104	1,600	0.104	1,220	0.064	560	0.051	5,640	0.175
11	2,620	0.127	2,620	0.175	2,270	0.089	1,880	0.107	1,480	0.107	1,130	0.064	520	0.051	5,230	0.178
12	2,290	0.140	2,290	0.191	1,980	0.081	1,640	0.104	1,300	0.104	990	0.066	460	0.053	4,580	0.201
14	2,040	0.152	2,040	0.208	1,760	0.089	1,460	0.114	1,150	0.114	880	0.074	410	0.058	4,070	0.218
16	1,830	0.165	1,830	0.226	1,590	0.097	1,310	0.124	1,040	0.124	790	0.079	370	0.064	3,660	0.236
18	1,670	0.178	1,670	0.244	1,440	0.104	1,190	0.135	940	0.135	720	0.084	330	0.069	3,330	0.254
20	1,530	0.203	1,530	0.279	1,320	0.119	1,090	0.152	870	0.152	660	0.097	310	0.079	3,050	0.290

When using our List 232 three flute drills we recommend the same RPM but feed rates should be increased by 25-35%. This also applies to our List 232 Coolant Hole Drills and our List 230 Parabolic Drills.

Work Material	Graphite Composite		Epoxy Fiber		Acrylic Plastics		Graphite Composite Titanium Stack	
Cutting Speed	64 SFM		64 SFM		49 SFM		5 SFM	
Drill Dia. (mm)	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev
3	8,550	0.038	8,550	0.038	6,510	0.038	650	0.025
4	6,410	0.051	6,410	0.051	4,890	0.051	490	0.025
5	4,270	0.076	4,270	0.076	3,260	0.076	330	0.051
6	3,210	0.102	3,210	0.102	2,440	0.102	240	0.051
8	2,560	0.114	2,560	0.114	1,950	0.114	200	0.076
10	2,140	0.127	2,140	0.127	1,630	0.127	160	0.102
12	1,600	0.152	1,600	0.152	1,220	0.152	120	0.102

The chart below is for materials typically used in aircraft structures. Speeds may be less than optimal because of limitations in the portable machine tools utilized.

When drilling deep holes, the recommended speeds and feeds should be reduced proportionately based on the hole depth. Below are guidelines for reducing the speeds and feeds.

Hole Depth Diameters	Reduce Spindle Speed	Reduce Infeed Rate
3 x Dia.	10%	10%
4 x Dia.	20%	10%
5 x Dia.	30%	20%
6 x Dia.	35%	20%
8 x Dia.	40%	20%

Series 300

Hardness			Up to 30 HRC		Up to 30 HRC		30 to 38 HRC		38 to 45 HRC							
Work Material	Cast Iron		Mild Steels, Carbon Steels		Alloy Tool Steels, Tool Steels		Hardened Steels, Prehardened Steels		Hardened Steels, Prehardened Steels		Titanium Alloys (Annealed)		Inconel, Titanium Alloys		Aluminum	
Cutting Speed	61 m/min		66 m/min		53 m/min		44 m/min		34 m/min		25 m/min		15 m/min		128 m/min	
Drill Dia. (mm)	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev	Speed min ⁻¹	Feed mm/rev
0.8	24,470	0.020	26,300	0.025	21,410	0.025	17,740	0.025	13,460	0.020	10,030	0.025	5,870	0.020	51,380	0.020
1	19,370	0.025	20,830	0.030	16,950	0.030	14,050	0.030	10,660	0.025	7,940	0.030	4,650	0.025	40,690	0.025
1.5	12,210	0.038	13,130	0.046	10,690	0.046	8,850	0.046	6,720	0.038	5,010	0.046	2,930	0.038	25,650	0.038
2	8,140	0.064	8,750	0.076	7,120	0.076	5,900	0.076	4,480	0.064	3,340	0.076	1,950	0.064	17,090	0.064
3	6,110	0.089	6,560	0.074	5,340	0.074	4,430	0.074	3,360	0.058	2,500	0.074	1,470	0.058	12,820	0.058
4	4,890	0.122	5,250	0.102	4,280	0.102	3,540	0.102	2,690	0.081	2,000	0.102	1,170	0.081	10,260	0.081
5	4,070	0.152	4,380	0.127	3,560	0.127	2,950	0.127	2,240	0.102	1,670	0.127	980	0.102	8,550	0.102
6	3,050	0.191	3,280	0.168	2,670	0.157	2,210	0.157	1,680	0.135	1,250	0.168	730	0.135	6,410	0.145
8	2,440	0.216	2,630	0.191	2,140	0.178	1,770	0.178	1,340	0.152	1,000	0.191	590	0.152	5,130	0.165
10	1,880	0.292	2,020	0.257	1,640	0.211	1,360	0.211	1,030	0.198	770	0.234	450	0.198	3,950	0.211
12	1,530	0.343	1,640	0.330	1,340	0.284	1,110	0.284	840	0.259	630	0.284	370	0.236	3,210	0.284
16	1,220	0.368	1,310	0.356	1,070	0.305	890	0.305	670	0.279	500	0.305	290	0.254	2,560	0.305
20	1,020	0.381	1,090	0.368	890	0.315	740	0.315	560	0.290	420	0.315	240	0.262	2,140	0.315



THREAD MILLS



Standard Carbide

Premium thread mills made from micrograin carbide.



THREAD MILLS

Thread Mills

Product	Series No.	Page	Tech Page	Coating	Description
	C922	134	136	TiAlN	ISO Metric, Metric Shank, Straight Flute
	C932	135	136	TiAlN	ISO Metric, Metric Shank, Helical Flute



◆ best
◆ good

Series No.	Aluminum		Cast Iron	Low Carbon Steel	Med. Carbon Steel	High Carbon Steel	Alloy Steels	Die Steels	Titanium	High Nickel Alloy		Stainless Steels			Hardened Steels		
	6061 7075	Casting		1010 1018	1035 1045	1065	4140 4340	20 HrC	6Al4V (30HrC)	Inconel	Kovar	300	400	17-4PH	~35 HrC	35-45 HrC	45-50 HrC
C922	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
C932	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆



THREAD MILLS

Micrograin Carbide

SERIES C922

ISO Metric, Straight and Helical Flutes



Min. Thread Dia./Pitch	Cutter Diameter	Overall Length	Length of Cut	Shank Diameter	Straight Flute	
					Part #	No. of Flutes
M3-5	2.16	50	6.00	3	C922-03500	2
M3-5-6	2.41	50	6.00	3	C922-35600	2
M4-7	2.92	50	6.30	3	C922-04700	3
M4.5-7.5	3.50	63	6.75	4	C922-45750	3
M5-8	3.70	63	8.00	4	C922-05800	3
M6-1	4.50	63	12.00	6	C922-06100	3
M8-7.5	5.90	63	15.75	6	C922-08750	3
M8-1	5.90	63	16.00	6	C922-08100	3
M8-1.25	5.90	63	16.25	6	C922-08125	3
M10-1.25	7.62	76	18.75	8	C922-10125	4
M10-1.5	7.62	76	19.50	8	C922-10150	4
M12-1	9.40	89	22.00	10	C922-12100	4
M12-1.25	9.40	89	22.50	10	C922-12125	4
M12-1.75	9.40	89	22.75	10	C922-12175	4
M14-1.25	10.92	89	25.00	12	C922-14125	4
M14-1.5	10.92	89	25.50	12	C922-14150	4
M14-2	10.92	89	26.00	12	C922-14200	4
M18-2.5	13.50	89	27.50	14	C922-18250	6
M20-1	15.25	89	25.00	16	C922-20100	6
M20-1.5	15.25	89	25.50	16	C922-20150	6
M20-2	15.25	89	26.00	16	C922-20200	6
M20-3	15.25	89	27.00	16	C922-20300	6

Packed: 1 pc. Available TiAlN coating only.

Tolerances:

Size	Shank Diameter
All Sizes	H6

Details:

Speeds & Feeds P138	CARBIDE	WX	30°	SHRINK FIT
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SERIES C932

ISO Metric, Straight and Helical Flutes

Min. Thread Dia./Pitch	Cutter Diameter	Overall Length	Length of Cut	Shank Diameter	Helical Flute	
					Part #	No. of Flutes
M3-.5	2.16	50	6.00	3	C932-03500	2
M3-.5-.6	2.41	50	6.00	3	C932-35600	2
M4-.7	2.92	50	6.30	3	C932-04700	2
M4.5-.75	3.50	63	6.75	4	C932-45750	3
M5-.8	3.70	63	8.00	4	C932-05800	3
M6-1	4.50	63	12.00	6	C932-06100	3
M8-.75	5.90	63	15.75	6	C932-08750	3
M8-1	5.90	63	16.00	6	C932-08100	3
M8-1.25	5.90	63	16.25	6	C932-08125	3
M10-1.25	7.62	76	18.75	8	C932-10125	4
M10-1.5	7.62	76	19.50	8	C932-10150	4
M12-1	9.40	89	22.00	10	C932-12100	4
M12-1.25	9.40	89	22.50	10	C932-12125	4
M12-1.75	9.40	89	22.75	10	C932-12175	4
M14-1.25	10.92	89	25.00	12	C932-14125	4
M14-1.5	10.92	89	25.50	12	C932-14150	4
M14-2	10.92	89	26.00	12	C932-14200	4
M18-2.5	13.50	89	27.50	14	C932-18250	4
M20-1	15.25	89	25.00	16	C932-20100	4
M20-1.5	15.25	89	25.50	16	C932-20150	4
M20-2	15.25	89	26.00	16	C932-20200	4
M20-3	15.25	89	27.00	16	C932-20300	4

Packed: 1 pc. Available TiAlN coating only.

Tolerances:

Size	Shank Diameter
All Sizes	H6

Details:

Speeds & Feeds P138	CARBIDE	WX	30°	SHRINK FIT
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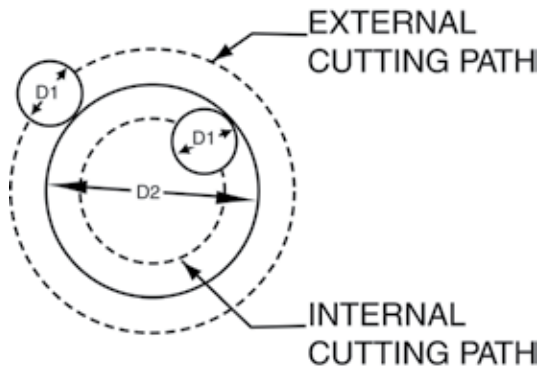
THREAD MILLS

Micrograin Carbide

SPEEDS AND FEEDS

Cutter Diameter		Steel	Stainless Steel	Cast Iron	Non-Ferrous	Hi-Temp Alloys
2.0 ~ 5.9	m/min	200	160	210	520	30
	mm/t	0.007	0.007	0.007	0.007	0.007
6.0 ~ 9.9	m/min	200	160	210	520	30
	mm/t	0.015	0.015	0.015	0.015	0.015
10.0 ~ 13.9	m/min	200	160	210	520	30
	mm/t	0.025	0.025	0.025	0.025	0.020
14.0 ~ 20.0	m/min	200	160	210	520	30
	mm/t	0.030	0.030	0.030	0.030	0.025

FEED RATE COMPENSATION



$$\text{INTERNAL} = \frac{D2-D1}{D2}$$

$$\text{EXTERNAL} = \frac{D1+D2}{D2}$$

D1 = TOOL CUTTING DIAMETER
D2 = THREAD DIAMETER

To obtain the correct feed rate for the centerline of the tool, multiply the desired feed rate at the center edge by the appropriate factor.

NOTES

This chart shows suggested speeds and feeds information only. This information should be used as a starting point only, and a guideline for calculation of your own formulas.

Material variations, part and tool fixturing, coolant flow, and the actual cutting conditions of your specific job may impact our suggested speeds and feeds recommendations.

Speeds and feeds should be adjusted as required to optimize QCT Thread Mill performance.



Notes and Comments

Lined area for notes and comments.



Notes and Comments

Lined area for notes and comments.



AEROSPACE *Composite Solutions*

High Performance Routers & Drills
Specialty Aircraft Tools - Made to Order

Micrograin Carbide Tools
CVD Diamond Tools



Composite Tool Selection Guide



Routers Pictured (Left to Right): BNC, HBC, REC, MFR & CFR

Tool	Machining Style				Machining Efficiency	Machine Type			Composite Type	
	Slotting	Side Milling	Roughing	Finishing		Hand	CNC	5-Axis or Robot	Thin	Thick
AERO-BNC	⊙	⊙	○	○	⊙	△	⊙	⊙	⊙	⊙
AERO-HBC	⊙	⊙	○	○	⊙	△	⊙	○	X	⊙
AERO-REC	⊙	⊙	⊙	X	⊙	⊙	⊙	⊙	△	⊙
AERO-MFR	X	○	X	⊙	△	X	⊙	⊙	⊙	⊙
AERO-CFR	○	○	△	△	△	○	⊙	○	⊙	⊙

Thin ≤ .100" and 0.2xD

X Not Recommended △ OK ○ Good ⊙ Best

Drills Pictured (Left to Right): TAD, LHX, DAD, TYPE N & TYPE H

Tool	Machine Type			Composite Type					
	Hand	Pneumatic	CNC	CFRP	Honeycomb (Nomex)	CFRP/Al Stack	CFRP/Ti Stack	CFRP/CRES Stack	
Composite	AERO-STAD	⊙	⊙	⊙	⊙	○	△	X	X
	AERO-LHX	X	○	⊙	⊙	X	X	X	X
	AERO-DAD	X	⊙	⊙	⊙	X	○ ²	X	X
	D-REAMER	⊙	⊙	⊙	⊙	○	X	X	X
	DREAMER	⊙	⊙	⊙	○	○	X	X	X
Stack	Type N	X	○	⊙	△ ¹	X	⊙	⊙	⊙
	Type H	X	○	⊙	X	X	⊙	⊙	⊙

1. N¹ - Reaming is Required
2. N² - Step Feed is Required

X Not Recommended △ OK ○ Good ⊙ Best





The Aerospace Industry's mission is to manufacture more environmentally progressive, longer range and faster aircrafts that require lower operating costs. QCT's cutting tools share the same mission.

All of QCT's composite tooling feature exclusive metallurgy and cutting geometries to help increase productivity, reliability and tool life while reducing machining time and scrap. QCT also offers a patented ultra-fine diamond coating, which is a prerequisite when machining composites and provides a definitive advantage over other competitor diamond coated products.

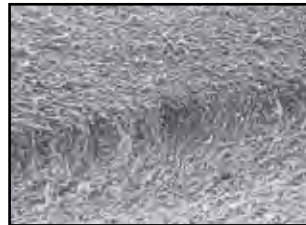
QCT'S ULTRA-FINE DIAMOND COATING: THE INDUSTRY'S BEST

Advantage #1

The Patented Ultra-Fine Grain Size



QCT Ultra-Fine Diamond Coating

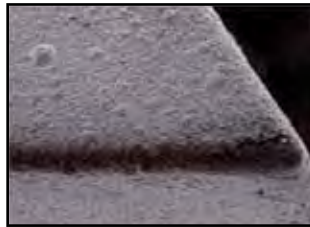


*Competitor Diamond Coating
(Industry Standard)*

QCT's patented ultra-fine diamond coating has a maximum diamond grain size diameter of 2 μ m. This strictly controlled diameter allows our coating to be super smooth and extremely sharp, which visually is easily distinguishable from our competition.

Advantage #2

Elimination of Diamond Delamination



QCT Ultra-Fine Diamond Coating



*Diamond Delamination
(Note: Large Grain Size)*

Unlike our competition, QCT manufactures all diamond products in-house. This includes using our grinding techniques on our special carbide substrate. The end result is a diamond coated product in which tool life can be consistently predicted, rather than having to endure premature diamond delamination like most of our competition.

Advantage #3

Capability of Regrinding Diamond Coated Drills



Before Regrinding

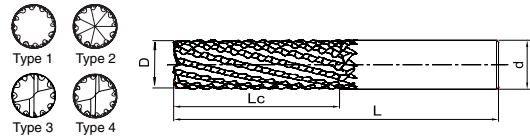


After Regrinding

In order to provide the best valued tool, QCT also offers regrinding and recoating service for our diamond coated drilling products. This service allows us to increase the yield ratio of our tools and reduces overall machining costs for our customers.



SERIES 2061 **NEW!**
Diamond Coated



EDP Number	Diameter (D)	length of Cut (Lc)	OAL (L)	Shank Diameter (d)	No. of Flutes	Type
20610116	1/8	1/4	1 1/2	1/8	6	2
20611116	1/8	3/8	1 1/2	1/8	6	3
20612116	1/8	1/2	1 1/2	1/8	8	3
20610216	3/16	3/8	2	3/16	6	2
20611216	3/16	9/16	2	3/16	6	3
20612216	3/16	3/4	2	3/16	8	3
20610316	1/4	1/2	2 1/2	1/4	8	2
20611316	1/4	3/4	2 1/2	1/4	10	3
20612316	1/4	3/4	2 1/2	1/4	10	2
20613316	1/4	1	3	1/4	10	3
20614316	1/4	1	3	1/4	10	2
20615316	1/4	1 1/4	4	1/4	12	1
20610416	5/16	1	2 1/2	5/16	10	3
20610516	3/8	3/4	2 1/2	3/8	12	2
20611516	3/8	1 1/8	3	3/8	12	3
20612516	3/8	1 1/8	3	3/8	12	2
20613516	3/8	1 1/2	4	3/8	12	3
20614516	3/8	1 1/2	4	3/8	12	2
20615516	3/8	2	4	3/8	12	1
20610716	1/2	1	3	1/2	14	3
20611716	1/2	1	3	1/2	14	2
20612716	1/2	2	4	1/2	16	2

Packed: 1 pc. Available Diamond coating only.
Type 1: No End Cut, Type 2: Bur End, Type 3: End Mill Cut, Type 4: Drill Point

Recommended Cutting Conditions

SFM	Side Milling				Slotting			
	400		800		300		600	
Depth of Cut	Aa: Up to 1.5D / Ar: Up to 1D							
	Aa: 1D				Aa: 1D			
Dia.	RPM	Feed	RPM	Feed	RPM	Feed	RPM	Feed
1/8	12000	20	24000	40	9000	10	18000	20
3/16	8000	25	16000	50	6000	12	12000	25
1/4	6000	30	12000	60	5000	15	9000	30
5/16	5000	35	10000	70	4000	18	7000	35
3/8	4000	40	8000	80	3000	20	6000	40
1/2	3000	50	6000	100	2000	25	5000	50

Note: This table's parameters are based on common material thickness of approximately 0.250" under excellent workholding conditions and less than 20% x D depth of cut (side milling). Please adjust your parameters properly for your application or call QCT for assistance. Conventional milling is recommended for better surface finishes. Higher feed rates are possible but quality of part and surface should be considered.

Feed Reduction: Recommended feed adjustments based on thickness of part. (Above table is based on approximately 1xD thickness.)

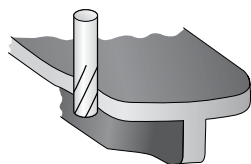
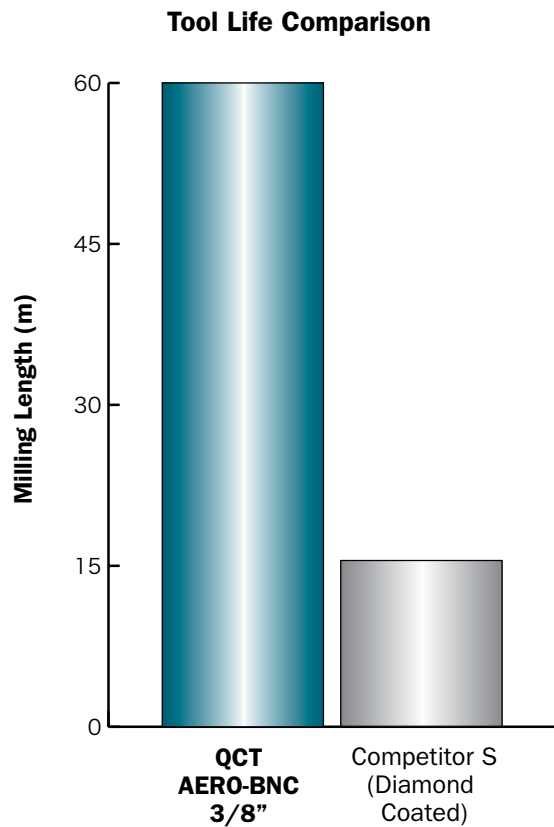
- ≤0.5D x 150%
- 0.5D-1D x 120%
- 1D-2D x 80%
- 3D-4D x 50%



The AERO-BNC is a patented diamond coated fine nicked router specifically designed for carbon fiber composite trimming. The router features a patented cutting geometry coupled with QCT's patented diamond coating.

Performance Highlights

Although the details of the machining conditions cannot be disclosed, our products achieved approximately four times the tool life versus the competitor product (from company S).



Pictured on left: End trimming of a CFRP stringer.

Applications

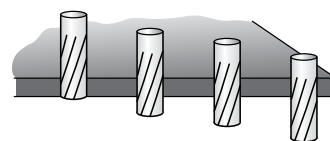
- ◆ Best in carbon fiber, also good for carbon/carbon and honeycombs
- ◆ High feed foughing and finishing
- ◆ Applied in both thick and thin laminates
- ◆ End cuts for plunging and face trimming
- ◆ **Type 2** is for ramping & helical interpolation
Type 3 is for plunging and helical interpolation

Features

- ◆ Patented nick & flute form to eliminate uncut fibers & delamination
- ◆ Extremely low cutting forces/ long tool life
- ◆ Flute management can be applied

Flute Management

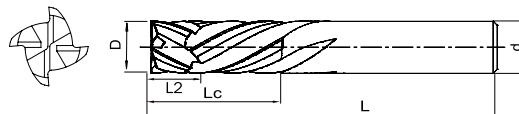
- ◆ By utilizing Flute Position Management*, tool life can be increased.



*To change the milling position at the flute



SERIES 2066 **NEW!**
Diamond Coated



EDP Number	Diameter (D)	Compression Length (L2)	Length of Cut (Lc)	OAL (L)	Shank Diameter (d)	No. of Flutes
20660116	1/8	0.125	3/8	1 1/2	1/8	4
20660316	1/4	0.250	3/4	2 1/2	1/4	4
20660516	3/8	0.375	1 1/8	3	3/8	4
20660716	1/2	0.500	1 1/8	3	1/2	4

Packed: 1 pc. Available Diamond coating only.



Recommended Cutting Conditions

SFM	Side Milling				Slotting			
	400		800		300		600	
Depth of Cut	Aa: Up to 1.5D / Ar: Up to 1D				Aa: 1D			
Dia.	RPM	Feed	RPM	Feed	RPM	Feed	RPM	Feed
1/8	12000	20	24000	40	9000	10	18000	20
1/4	6000	30	12000	60	5000	15	9000	30
3/8	4000	40	8000	70	3000	20	6000	35
1/2	3000	50	6000	100	2000	25	5000	50

Note: This table's parameters are based on common material thickness of approximately 0.250" under excellent workholding conditions and less than 20% x D depth of cut (side milling). Please adjust your parameters properly for your application or call QCT for assistance. Conventional milling is recommended for better surface finishes. Higher feed rates are possible but quality of part and surface should be considered.

Feed Reduction by Thickness of Part: Recommended feed adjustments based on thickness of part. (Above table is based on approximately 1xD thickness.)

- ≤0.5D x 150%
- 0.5D-1D x 120%
- 1D-2D x 80%
- 3D-4D x 50%



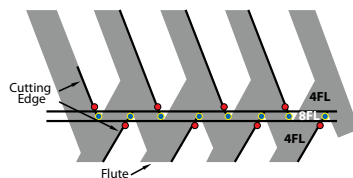
The AERO-HBC is a diamond coated herringbone style router for high feed rates and excellent surface finishes. The router features a compression cutting mechanism along with QCT's patented diamond coating.

Performance Highlights

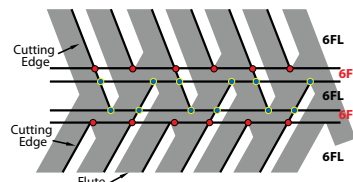
The AERO-HBC showed excellent performance and surface finished at high feed rates. The 4-flute herringbone design was able to mill up to 480 IPM without leaving streak marks on the composite.

Tool	QCT - Series 2066	Competitor
	Herringbone Router - Diamond Coated	
Material	Carbon Fiber Composite	
Diameter	0.500"	
Number of Flutes	4	6
Milling Method	Side Milling	
Speed	6000 RPM	
Feed	Various (24 to 480 IPM)	
DOC	Aa: 0.250" / Ar: 0.125"	
Coolant	Dry	
Machine	VMC	

QCT AERO-HBC
(Series 2066)
Clean milling at 480 IPM



Competitor
Streaking and Torn/Uncut Fibers



Applications

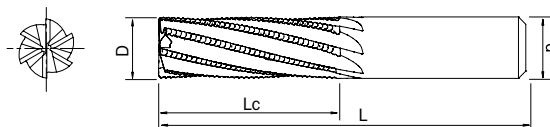
- ◆ Excels in carbon and glass composites and honeycombs
- ◆ High feed routing and finishing
- ◆ Best in thick laminates (Ref. L2 length on page 6)
- ◆ Excellent in thermoplastic matrix

Features

- ◆ Compression mechanism to neutralize cutting forces to prevent delamination on both top and bottom laminates
- ◆ Low cutting forces/ long tool life



SERIES 2680 **NEW!**
Diamond Coated



EDP Number	Diameter (D)	Length of Cut (Lc)	OAL (L)	Shank Diameter (d)	No. of Flutes
26809316	15/64	3/4	2 1/2	1/4	4
26805316	1/4	1/2	2 1/2	1/4	4
26800316	1/4	3/4	2 1/2	1/4	4
26809416	11/32	1 1/8	3	3/8	6
26809516	23/64	1 1/8	3	3/8	6
26805516	3/8	3/4	3	3/8	6
26800516	3/8	1 1/8	3	3/8	6
26809616	7/16	1 1/2	3	1/2	8
26809716	31/64	1 1/2	3	1/2	8
26805716	1/2	1	3	1/2	8
26800716	1/2	1 1/2	3	1/2	8

Packed: 1 pc. Available Diamond coating only.



Recommended Cutting Conditions

SFM	Side Milling				Slotting			
	400		800		300		600	
Depth of Cut	Aa: Up to 1.5D / Ar: Up to 1D				Aa: 1D			
Dia.	RPM	Feed	RPM	Feed	RPM	Feed	RPM	Feed
1/4	6000	60	12000	180	5000	45	9000	90
3/8	4000	120	8000	240	3000	60	6000	120
1/2	3000	150	6000	300	2000	75	5000	150

Note: This table's parameters are based on common material thickness of approximately 0.250" under excellent workholding conditions and less than 20% x D depth of cut (side milling). Please adjust your parameters properly for your application or call QCT for assistance. Conventional milling is recommended for better surface finishes. Higher feed rates are possible but quality of part and surface should be considered.

Feed Reduction by Thickness of Part: Recommended feed adjustments based on thickness of part. (Above table is based on approximately 1xD thickness.)

- ≤0.5D x 150%
- 0.5D-1D x 120%
- 1D-2D x 80%
- 3D-4D x 50%



The AERO-REC is a diamond coated roughing router for roughing and semi-finishing of composites. The AERO-REC uses extremely low cutting forces for low rigid fixtures and weak spindles.

Performance Highlights

Due to the roughing nick profile AERO-REC can reduce cutting force over competitor herringbone 6 flute and our AERO-BNC.

Comparison of Surface Finish

Router size: 0.3937"		Aa: 1" Ar: 0.3937"
Coolant: Dry		Cutting Speed: 656 SFM
Material: CFRP		Cutting Feed: 15.7 IPM

QCT AERO-REC	QCT AERO-BNC	Competitor Herringbone 6FL

Applications

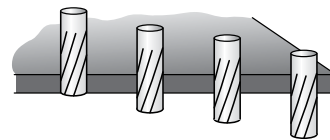
- ◆ Low rigid fixtures & setups and weak spindles
- ◆ Can be used in combination with AERO-MFR for finishing

Features

- ◆ Roughing nicks for efficient milling providing extremely low cutting forces

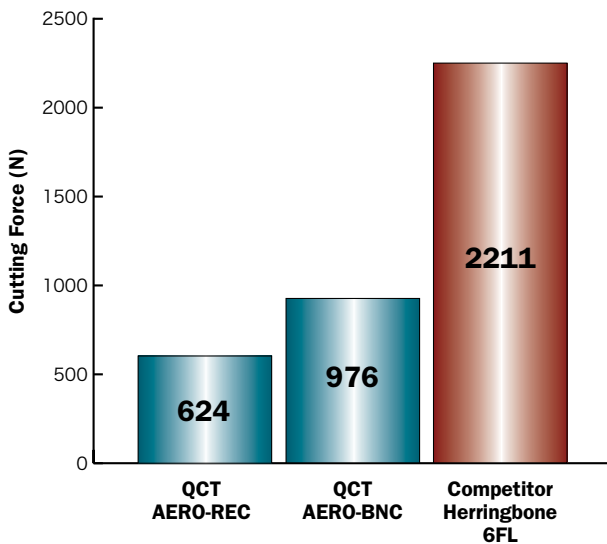
Flute Management

- ◆ By utilizing Flute Position Management*, tool life can be increased.



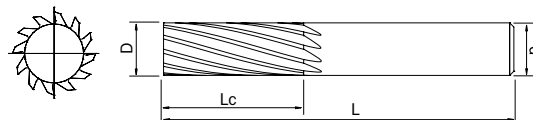
*To change the milling position at the flute

Cutting Force Comparison





SERIES 2650 **NEW!**
Diamond Coated



EDP Number	Diameter (D)	Length of Cut (Lc)	OAL (L)	Shank Diameter (d)	No. of Flutes
26500316	1/4	3/4	2 1/2	1/4	8
26501316	1/4	1	3	1/4	8
26500616	3/8	1 1/8	3	3/8	12
26501516	3/8	1 1/2	3	3/8	12
26500716	1/2	1 1/2	4	1/2	14
26501716	1/2	2	4	1/2	14

Packed: 1 pc. Available Diamond coating only.

Recommended Cutting Conditions

SFM	Side Milling			
	400		800	
Depth of Cut	Aa: Up to 1.5D / Ar: Up to 1D			
Diameter	RPM	Feed	RPM	Feed
1/4	6000	400	12000	800
3/8	4000	500	8000	1000
1/2	3000	400	6000	800

Note: This table's parameters are based on common material thickness of approximately 0.250" under excellent workholding conditions and less than 20% x D depth of cut (side milling). Please adjust your parameters properly for your application or call QCT for assistance. Conventional milling is recommended for better surface finishes. Higher feed rates are possible but quality of part and surface should be considered.

Overhang RPM Reduction: Recommended feed adjustments based on thickness of part. (Above table is based on approximately 1xD thickness.)

- ≤0.5D x 150%
- 0.5D-1D x 120%
- 1D-2D x 80%
- 3D-4D x 50%



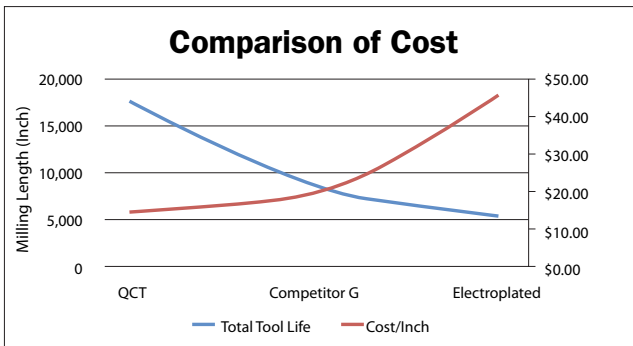
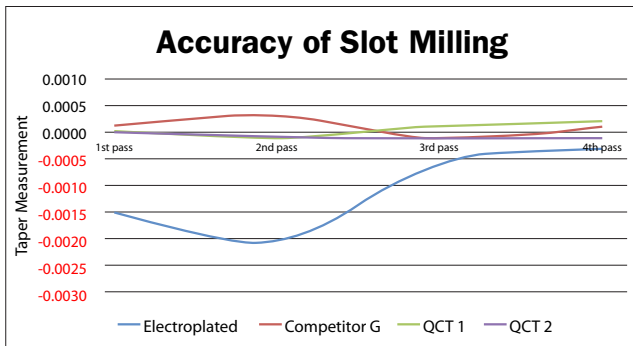
The AERO-MFR is a highly rigid multi-fluted finishing router designed for high precision & accuracy requirements. This router features a high rigid body with multi-flutes along with QCT's patented diamond coating.

Performance Highlights

The AERO-MFR showed the best accuracy versus carbide diamond coated competition as well as electroplated products.



Tool	QCT Series 2650	Competitor G	Electroplated
Material	Carbon / Carbon		
Diameter	8mm		
Milling Method	Slot Milling		
Speed	2700 RPM	9795 RPM	
Feed	50 IPM		
DOC	Aa: 0.400"		
Coolant	Dry		



Applications

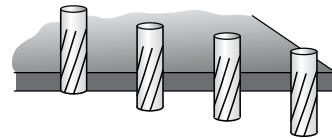
- ◆ Excellent for tight tolerance & high precision applications
- ◆ Can be used in combination with AERO-REC for roughing

Features

- ◆ Multi fluted for super finishes
- ◆ Large core for ultra rigidity

Flute Management

- ◆ By utilizing Flute Position Management*, tool life can be increased.



*To change the milling position at the flute



AERO-D-STAR

Triple Angle Drill

D-STAR

Diamond Coated

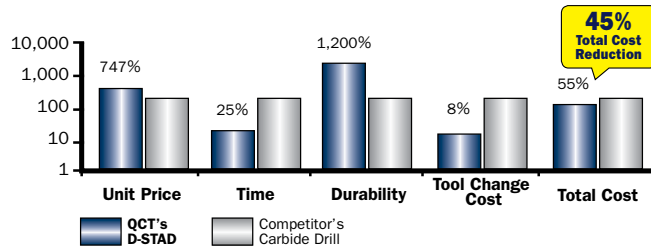
The D-STAR is a patent pending diamond coated drill specifically designed to eliminate fiber breakout and delamination issues on both entry and exit of drilled holes.



Performance Highlights

QCT's Triple Angle Drill vs. Competitor's Carbide Tapered Drill

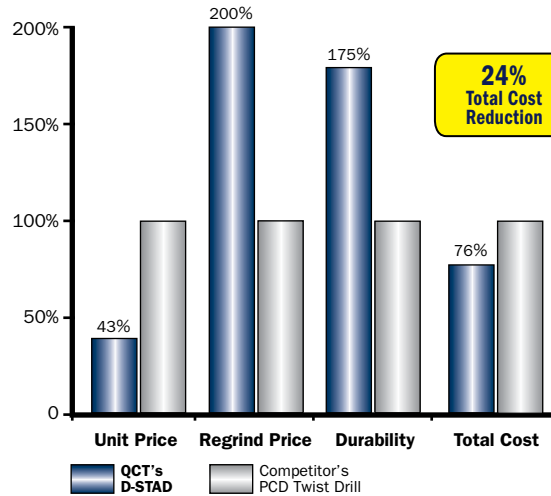
Initial Cost of D-STAR > Competitor • Total Cost for D-STAR < Competitor



QCT's Triple Angle Drill vs. Competitor's PCD Twist Drill

Tool Life of D-STAR > Competitor's Twist Drill

Diameter	Speed	Feed	Thickness
φ0.251	V=330SFM	f=0.0025IPR	.750"



Applications

- ◆ Excels in carbon and glass composites and honeycombs
- ◆ For non-countersunk holes
- ◆ Excellent in CFRP & AI stack applications

Features

- ◆ Patented triple angle geometry to reduce push-out exit delamination
- ◆ Straight-fluted to eliminate the pull-up entrance delamination





DAD
Diamond Coated

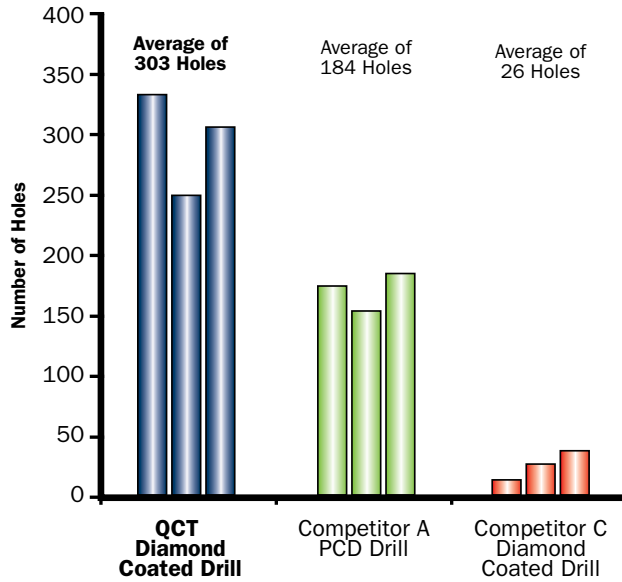
The DAD drill features our double angle point geometry paired with our patented diamond coating specifically designed to eliminate delamination on the exit side only.



Performance Highlights

QCT's new drill design for composite materials combines sharpness, low cutting resistance geometries, and our diamond coating to maximize performance.

Tool Dia	.2510"
Work Material	CFRP
Drilling Speed	200SFM (3,000min ⁻¹)
Feed	9IPM (0.003IPR)
Depth of Hole	.675" (.225" Depth Three-layer Stack) (Through)
Coolant	Dry
Machine	Special Machine for Drilling
Tool Life	Delamination



The above graph illustrates the average of three individual trials.

Applications

- ◆ Excels in carbon and glass composites and honeycombs
- ◆ Best applied for countersunk holes
- ◆ Excellent in CFRP & Al stack applications

Features

- ◆ Double angle to reduce push-out exit delamination
- ◆ Double margin for increased balance and concentric holes
- ◆ High helix for ultra sharp cutting edges





LHX
Diamond Coated

The AERO-LHX is a diamond coated drill specifically for tough to drill laminates. It is designed to completely eliminate uncut fibers and delamination.

Performance Highlights

Total Cost Performance Analysis

	Entrance	Exit
QCT AERO-LHX		
Competitor A		
Competitor B		
Competitor C		
Competitor D		
Competitor E		

When drilling carbon fiber composites, quality of holes can easily be seen from the first few drilled holes. The pictures above show the first hole drilled by a variety of drill designs. As can be seen, the LHX showed the best quality when drilling this particular carbon fiber laminate.

Tool Diameter	.2510"
Work Material	Carbon Fiber Composite
Drilling Speed	3000 RPM
Feed	.001 IPR
Depth of Hole	0.25
Coolant	Dry
Machine	VMC
Quality Criteria	Uncut Fibers

Applications

- ◆ Excels in tough carbon fiber composites

Features

- ◆ Triple angle geometry to reduce push-out exit delamination
- ◆ Low helix providing a sharper cutting edge to help shear tough fibers

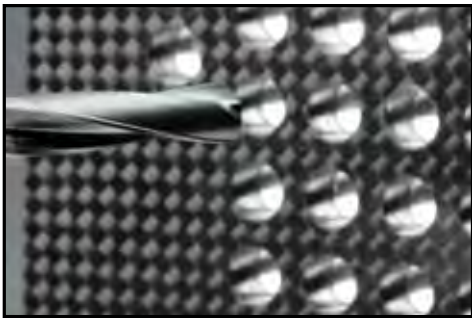


TYPE N & TYPE H

Bright & Diamond Coated

QCT has a positive history and good success in stack drilling applications; a process where both a composite laminate is integrated into a match drilling stack applicaton with a metal.

Performance Highlights



Stack Drilling is a process where both a composite laminate (typically CFRP) is integrated into a match drilling stack applicaton with a metal (typically aluminum, titanium and or stainless steel). These applications are challenging and unique to each airframe manufacturer. QCT has a positive history and good success in stack drilling applicatons. The following are a few of our solutions.

Type N - A diamond coated carbide drill specifically designed for drilling carbon fiber/ titanium stack applications. It features a special point geometry with enhanced flute form for optimal chip evacuation to minimize "washout" or "reverse countersink" effect.

Type H - A high helix carbide drill for drilling CFRP/Metal stacks. It features a high helix and special flute form to assist in chip evacuation.

Applications

- ◆ Excels in carbon & metal stacks
- ◆ Type N - low thrust requirements
- ◆ Type H - for general purpose stacks

Features

- ◆ Type N - nick geometry to break metal chips to easily managable pieces
- ◆ Type H - high helix for sharp cutting edges and easy chip evacuation
- ◆ Flute form for enhanced chip room
- ◆ Coolant through for cooling and chip evacuation

Drilling Recommended Cutting Conditions (Composite Only)

Dc Inch	Speed (SFM)	RPM	Feed Rate (IPR)	Feed (IPM)
.1915	165~260	3,900	0.0012 - 0.002	6.0
.251		3,000	0.0015 - 0.003	6.0
.376		2,000	0.002 - 0.003	4.0

1. The usage of coolant is not necessary, but be sure to provide appropriate measures against dust particles (such as a vacuum dust collection system).
 2. Step drilling is not necessary on holes less than 3xD. When hole depth exceeds 3xD, we recommend step drilling while paying close attention to chip evacuation.
 3. Machinability of CFRP is significantly affected by its resin properties and content, as well as work holding condition. Adjust the feed rate in accordance with the table above per application.
 4. When drilling in thick laminates, set the drilling speed to the lower condition.
 5. The drilling speed can be set upwards to 700 SFM if wet drilling with an approved coolant.





Special Drilling Tools

Made Upon Request

Spacematic Drill/Countersink

Carbide drill and countersink with internal thread and 60-degree cone seat straight shank style with pin spanner wrench holes or optional wrench flats for slotted type drill wrenches. Application: Spacematic Drill motors with 1" stroke.



Drivematic Drill/Countersink

Carbide drill and countersink with solid shank used in aerospace drivematic drill riveting machines.



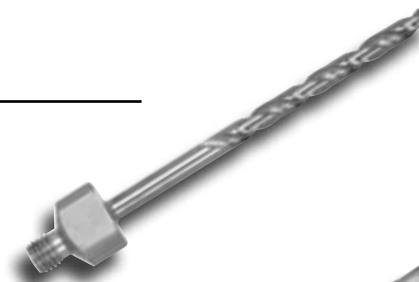
Dagger Drill

Designed to produce holes in composite materials without delamination around the hole or fraying the composite materials.



Threaded Hex Shank Adapter Drill

Carbide adapter drill manufactured to NAS 907 construction with 135-degree split points. Used for general to medium duty drilling in low tensile strength materials in confined areas.



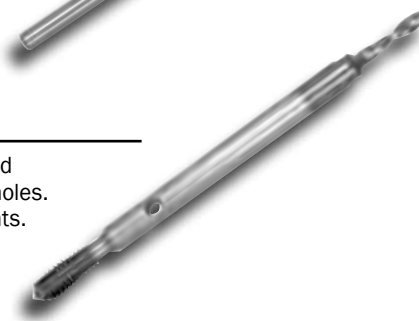
NAS 937 Jobbers Length Double Margin Step Drill

Carbide drill with 135-degree split point. Used for drilling close tolerance holes in low tensile strength materials. Can also be supplied in taper and screw machine lengths, or special lengths.



Nutplate Drill/Countersink

Carbide drill and countersink with 135-degree split point. External thread and 60-degree cone seat straight shank style with pin spanner wrench holes. Application: Nutplate and motors with nutplate pressure foot attachments.



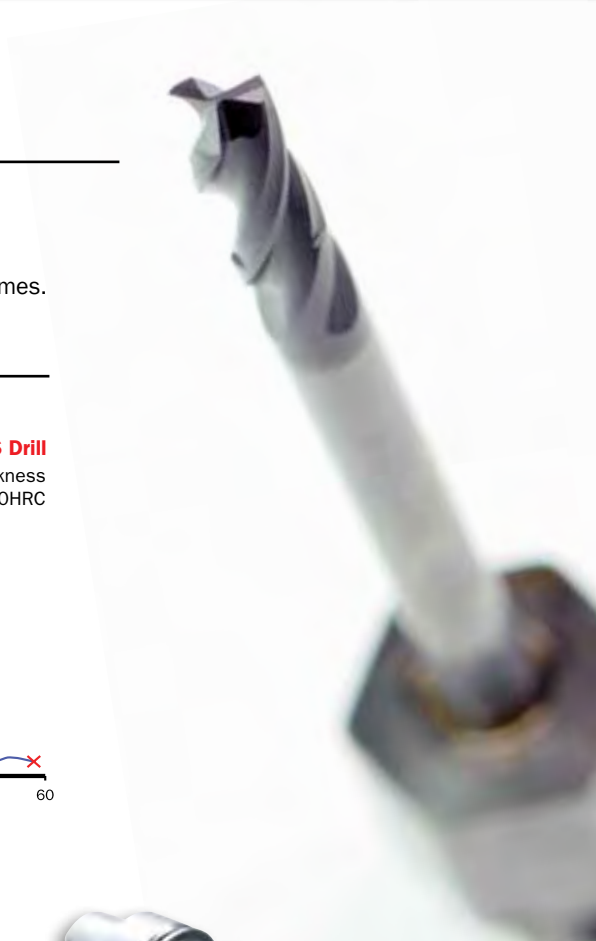
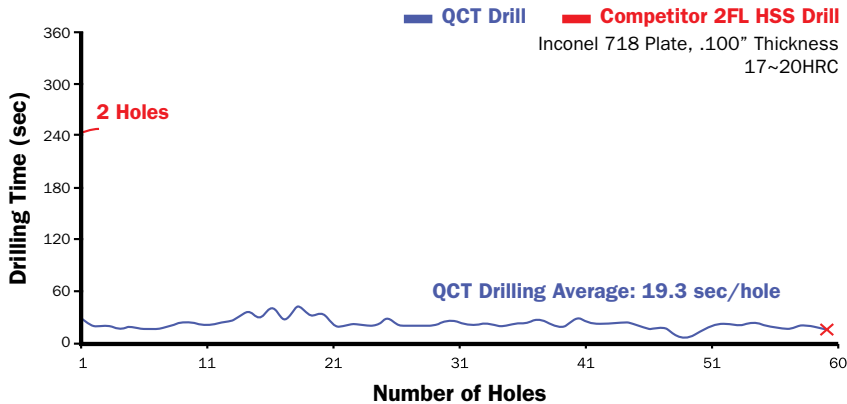


Innovative Hand Drill for a Wide Variety of Tough to Machine Alloys

Applications: Inconel, titanium alloys, stainless steel & aluminum
Features: Engineered for efficient hand drilling, 3 Flutes, TiAlN Coated
Benefits: Reduction of cycle time by 12.5 percent; increased tool life by 60 times.

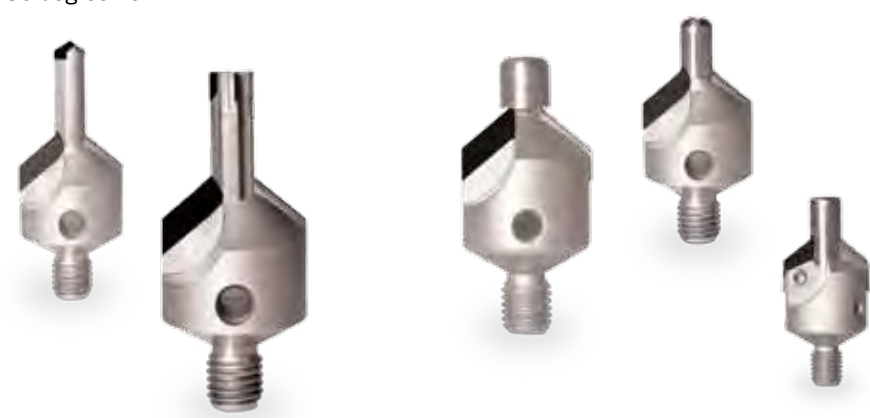
Customer's Test Result

Tool Life Criteria: Chipping or Breakage



PCD Drills & Countersinks

- PCD Countersinks - integral pilot, interchangeable pilot and countersink with interchangeable PCD blade and pilot. The interchangeable pilot and countersink are both available with controlled fillet radius. Also available with brazed PCD.
- PCD Reamers - available in straight or threaded shank with optional pilot.
- PCD Counterbores - aircraft counterbores both in straight and threaded shank. Available with controlled corner radius.
- PCD Drills - shown here in straight flute, 15-degree helix and 30-degree helix.





Notes and Comments



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HP258-3346	120	HP410L-0552	34	HP418-0392	44	HP421-2756	24	HP433-3150	36
HP258-3543	120	HP410L-0591	34	HP418-0780	44	HP421-2756-BN	39	HP433-3151	36
HP258-3740	120	HP410L-0592	34	HP418-0781	44	HP421-3150	24	HP433-3152	36
HP258-3748	120	HP410L-0630	34	HP418-0782	44	HP421-3150-BN	39	HP433-3153	36
HP258-3937	120	HP410L-0631	34	HP418-1180	44	HP421-3543	24	HP433-3930	36
HP258-4016	120	HP410L-0709	34	HP418-1181	44	HP421-3543-BN	39	HP433-3931	36
HP258-4134	120	HP410L-0710	34	HP418-1570	44	HP421-3937	24	HP433-3932	36
HP258-4331	120	HP410L-0711	34	HP418-1571	44	HP421-3937-BN	39	HP433-3933	36
HP258-4528	120	HP410L-0787	34	HP418-1960	44	HP421-4331	24	HP433-3934	36
HP258-4724	120	HP410L-0788	34	HP418-1961	44	HP421-4331-BN	39	HP433-4720	36
HP258-4921	120	HP410L-0789	34	HP418-2360	44	HP421-4724	24	HP433-4721	36
HP258-5000	120	HP411-1181	33	HP418-2361	44	HP421-4724-BN	39	HP433-4722	36
HP258-5118	120	HP411-1378	33	HP418-3150	44	HP421-5512	24	HP433-4723	36
HP258-5315	120	HP411-1575	33	HP418-3151	44	HP421-5512-BN	39	HP433-4724	36
HP258-5512	120	HP411-1969	33	HP418-3930	44	HP421-6299	24	HP434-1181	37
HP258-5709	120	HP411-2362	33	HP418-3931	44	HP421-6299-BN	39	HP434-1182	37
HP258-5906	120	HP413-0394	41	HP418-4720	44	HP421-7087	24	HP434-1575	37
HP258-6102	120	HP413-0472	41	HP418-4721	44	HP421-7087-BN	39	HP434-1576	37
HP258-6299	120	HP413-0551	41	HP419-0197	42	HP421-7874	24	HP434-1577	37
HP258-6496	120	HP413-0591	41	HP419-0236	42	HP421-7874-BN	39	HP434-1960	37
HP258-6693	120	HP413-0630	41	HP419-0315	42	HP421-8661	24	HP434-1961	37
HP258-6890	120	HP413-0709	41	HP419-0394	42	HP421-8661-BN	39	HP434-1962	37
HP258-7087	120	HP413-0787	41	HP419-0472	42	HP421-9843	24	HP434-2360	37
HP258-7283	120	HP413-0984	41	HP419-0551	42	HP421-9843-BN	39	HP434-2361	37
HP258-7480	120	HP413-1181	41	HP419-0591	42	HP432-1181	35	HP434-2362	37
HP258-7500	120	HP413-1378	41	HP419-0630	42	HP432-1182	35	HP434-2363	37
HP258-7677	120	HP413-1575	41	HP419-0709	42	HP432-1575	35	HP434-2364	37
HP258-7874	120	HP413-1969	41	HP419-0787	42	HP432-1576	35	HP434-3150	37
HP400-1181	32	HP413-2362	41	HP419-0984	42	HP432-1577	35	HP434-3151	37
HP400-1575	32	HP416-0394	45	HP419-1181	42	HP432-1960	35	HP434-3152	37
HP400-1968	32	HP416-0472	45	HP419-1378	42	HP432-1961	35	HP434-3153	37
HP400-2362	32	HP416-0551	45	HP419-1575	42	HP432-1962	35	HP434-3930	37
HP400-3150	32	HP416-0591	45	HP419-1969	42	HP432-2360	35	HP434-3931	37
HP400-3937	32	HP416-0630	45	HP419-2362	42	HP432-2361	35	HP434-3932	37
HP400-4724	32	HP416-0709	45	HP419L-0236	42	HP432-2362	35	HP434-3933	37
HP400-6299	32	HP416-0787	45	HP419L-0315	42	HP432-2363	35	HP434-3934	37
HP400-7874	32	HP416-0984	45	HP419L-0394	42	HP432-2364	35	HP434-4720	37
HP400-9843	32	HP416-1181	45	HP419L-0472	42	HP432-3150	35	HP434-4721	37
HP407-1181-BN	46	HP416-1378	45	HP419L-0551	42	HP432-3151	35	HP434-4722	37
HP407-1575-BN	46	HP416-1575	45	HP419L-0591	42	HP432-3152	35	HP434-4723	37
HP407-1969-BN	46	HP416-1576	45	HP419L-0630	42	HP432-3153	35	HP434-4724	37
HP407-2362-BN	46	HP416-1772	45	HP419L-0709	42	HP432-3930	35	HP435-1181	38
HP407-3150-BN	46	HP416-1969	45	HP419L-0787	42	HP432-3931	35	HP435-1182	38
HP407-3937-BN	46	HP416-2165	45	HP419L-1181	42	HP432-3932	35	HP435-1575	38
HP407-4724-BN	46	HP416-2362	45	HP421-0394	24	HP432-3933	35	HP435-1576	38
HP410-0197	34	HP416-2559	45	HP421-0394-BN	39	HP432-3934	35	HP435-1577	38
HP410-0236	34	HP416-2756	45	HP421-0591	24	HP432-4720	35	HP435-1960	38
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HP440-2362	16	HP450-4724	28	HP470-2362	18	VG434-4726	23
HP440-2363	16	HP450-5512	28	HP470-3150	18	VG434-6299	23
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HP441-1181	25	HP453-2362	30	HP475-6299	20		
HP441-1181-BN	40	HP453-3150	30	HP475-7874	20		
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Fraction, Wire Gauge, Letter and Metric Decimal Equivalents

Decimal Equivalent Chart

Sizes	Decimal Inches	Sizes	Decimal Inches	Sizes	Decimal Inches	Sizes	Decimal Inches	Sizes	Decimal Inches
	97.0059	1.35mm.0531		26.1470		F.2570		Z.4130	
	96.0063	54.0550		3.75mm.1476		6.6mm.2598		10.5mm.4134	
	95.0067	1.4mm.0551		25.1495		G.2610		27/64.4219	
	94.0071	1.45mm.0571		3.8mm.1496		6.7mm.2638		11mm.4331	
	93.0075	1.5mm.0591		24.1520		17/64.2656		7/16.4375	
	92.0079	53.0595		3.9mm.1535		6.75mm.2657		11.5mm.4528	
	0.2mm.0079	1.55mm.0610		23.1540		H.2660		29/64.4531	
	91.0083	1/16.0625		5/32.1562		6.8mm.2677		15/32.4688	
	90.0087	1.6mm.0630		22.1570		6.9mm.2717		12mm.4724	
	0.22mm.0087	52.0635		4mm.1575		I.2720		31/64.4844	
	89.0091	1.65mm.0650		21.1590		7mm.2756		12.5mm.4921	
	88.0095	1.7mm.0669		20.1610		J.2770		1/2.5000	
	0.25mm.0098	51.0670		4.1mm.1614		7.1mm.2795		13mm.5118	
	87.0100	1.75mm.0689		4.2mm.1654		K.2810		33/64.5156	
	86.0105	50.0700		19.1660		9/32.2812		17/32.5312	
	85.0110	1.8mm.0709		4.25mm.1673		7.2mm.2835		13.5mm.5315	
	0.28mm.0110	1.85mm.0728		4.3mm.1693		7.25mm.2854		35/64.5469	
	84.0115	49.0730		18.1695		7.3mm.2874		14mm.5512	
	0.3mm.0118	1.9mm.0748		11/64.1719		L.2900		9/16.5625	
	83.0120	48.0760		17.1730		7.4mm.2913		14.5mm.5709	
	82.0125	1.95mm.0768		4.4mm.1732		M.2950		37/64.5781	
	0.32mm.0126	5/64.0781		16.1770		7.5mm.2953		15mm.5906	
	81.0130	47.0785		4.5mm.1772		19/64.2969		19/32.5938	
	80.0135	2mm.0787		15.1800		7.6mm.2992		39/64.6094	
	0.35mm.0138	2.05mm.0807		4.6mm.1811		N.3020		15.5mm.6102	
	79.0145	46.0810		14.1820		7.7mm.3031		5/8.6250	
	1/64.0156	45.0820		13.1850		7.75mm.3051		16mm.6299	
	0.4mm.0157	2.1mm.0827		4.7mm.1850		7.8mm.3071		41/64.6406	
	78.0160	2.15mm.0846		4.75mm.1870		7.9mm.3110		16.5mm.6496	
	0.45mm.0177	44.0860		3/16.1875		5/16.3125		21/32.6562	
	77.0180	2.2mm.0866		4.8mm.1890		8mm.3150		17mm.6693	
	0.5mm.0197	2.25mm.0886		12.1890		O.3160		43/64.6719	
	76.0200	43.0890		11.1910		8.1mm.3189		11/16.6875	
	75.0210	2.3mm.0906		4.9mm.1929		8.2mm.3228		17.5mm.6890	
	0.55mm.0217	2.35mm.0925		10.1935		P.3230		45/64.7031	
	74.0225	42.0935		9.1960		8.25mm.3248		18mm.7087	
	0.6mm.0236	3/32.0938		5mm.1969		8.3mm.3268		23/32.7188	
	73.0240	2.4mm.0945		8.1990		21/64.3281		18.5mm.7283	
	72.0250	41.0960		5.1mm.2008		8.4mm.3307		47/64.7344	
	0.65mm.0256	2.45mm.0965		7.2010		Q.3320		19mm.7480	
	71.0260	40.0980		13/64.2031		8.5mm.3346		3/4.7500	
	0.7mm.0276	2.5mm.0984		6.2040		8.6mm.3386		49/64.7656	
	70.0280	39.0995		5.2mm.2047		R.3390		19.5mm.7677	
	69.0292	38.1015		5.2055		8.7mm.3425		25/32.7812	
	0.75mm.0295	2.6mm.1024		5.25mm.2067		11/32.3438		20mm.7874	
	68.0310	37.1040		5.3mm.2087		8.75mm.3445		51/64.7969	
	1/32.0312	2.7mm.1063		4.2090		8.8mm.3465		20.5mm.8071	
	0.8mm.0315	36.1065		5.4mm.2126		S.3480		13/16.8125	
	67.0320	2.75mm.1083		3.2130		8.9mm.3504		21mm.8268	
	66.0330	7/64.1094		5.5mm.2165		9mm.3543		53/64.8281	
	0.85mm.0335	35.1100		7/32.2188		T.3580		27/32.8438	
	65.0350	2.8mm.1102		5.6mm.2205		9.1mm.3583		21.5mm.8465	
	0.9mm.0354	34.1110		2.2210		23/64.3594		55/64.8594	
	64.0360	33.1130		5.7mm.2244		9.2mm.3622		22mm.8661	
	63.0370	2.9mm.1142		5.75mm.2264		9.25mm.3642		7/8.8750	
	0.95mm.0374	32.1160		1.2280		9.3mm.3661		22.5mm.8858	
	62.0380	3mm.1181		5.8mm.2283		U.3680		57/64.8906	
	61.0390	31.1200		5.9mm.2323		9.4mm.3701		23mm.9055	
	1mm.0394	3.1mm.1220		A.2340		9.5mm.3740		29/32.9062	
	60.0400	1/8.1250		15/64.2344		3/8.3750		59/64.9219	
	59.0410	3.2mm.1260		6mm.2362		V.3770		23.5mm.9252	
	1.05mm.0413	3.25mm.1280		B.2380		9.6mm.3780		15/16.9375	
	58.0420	30.1285		6.1mm.2402		9.7mm.3819		24mm.9449	
	57.0430	3.3mm.1299		C.2420		9.75mm.3839		61/64.9531	
	1.1mm.0433	3.4mm.1339		6.2mm.2441		9.8mm.3858		24.5mm.9646	
	1.15mm.0453	29.1360		D.2460		W.3860		31/32.9688	
	56.0465	3.5mm.1378		6.25mm.2461		9.9mm.3898		25mm.9843	
	3/64.0469	28.1405		6.3mm.2480		25/64.3906		63/64.9844	
	1.2mm.0472	9/64.1406		E.2500		10mm.3937		11.0000	
	1.25mm.0492	3.6mm.1417		1/4.2500		X.3970			
	1.3mm.0512	27.1440		6.4mm.2520		Y.4040			
	55.0520	3.7mm.1457		6.5mm.2559		13/32.4062			



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