IABP4F/ABP4F

MOLDINO
The Edge To Innovation

Four Flute Indexable Ball End Mills for High Efficiency Finishing

SHANK STYLE

MODULAR STYLE

FEATURES

Four flute design provides improved productivity compared to traditional two-flute design

Radius tolerance of ±0.01mm across three inserts

Extended gauge lengths are ideal for deep cavity milling

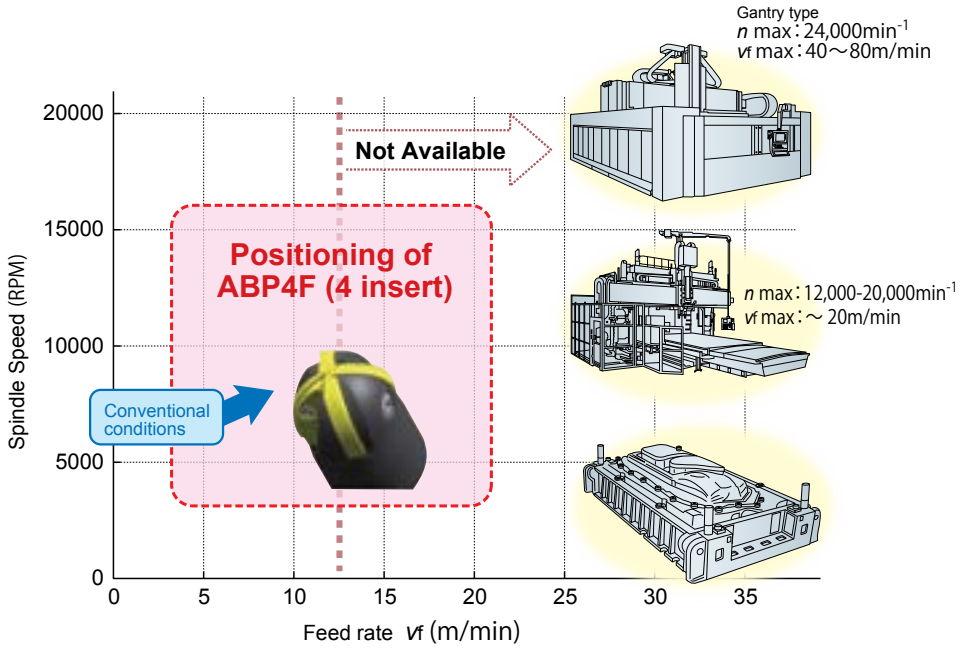
Three insert grades for machining everything from cast iron to high-hardness steels.

MOLDINO Tool Engineering, Ltd.

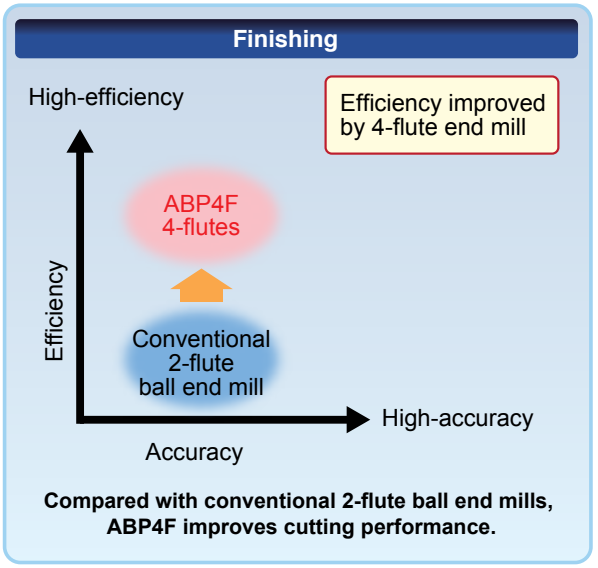
1. New Product

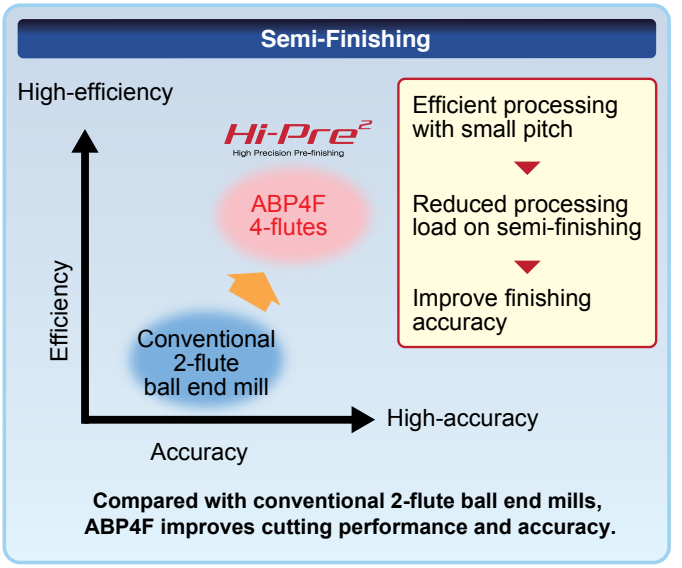
The ABP4F Four Flute Ball Nose Indexable End Mills are designed to improve semi-finishing and finishing productivity and accuracy. The unique four flute design delivers a radius tolerance of ±0.01mm across all three inserts. Available in diameters of 20 – 30mm in a wide range of gauge lengths, these tools are ideal for deep cavity work in larger dies and molds.

Example of large press die for automotive parts

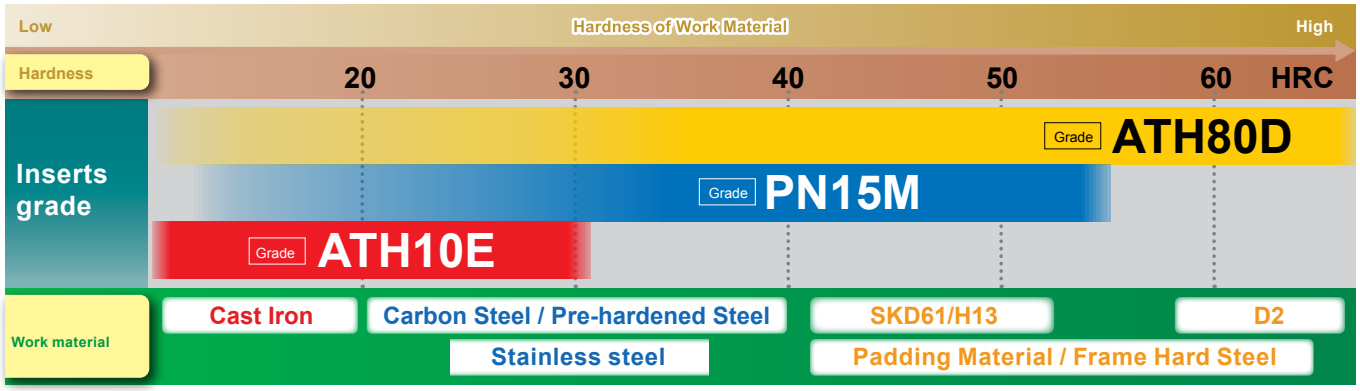


2. Advantage of Machining with Four Flute End Mills





3. Recommended Coating Grade Map



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Shank Style
Inch

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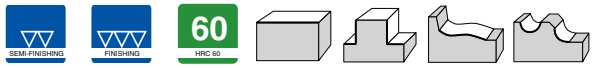
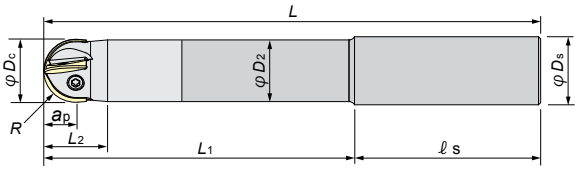
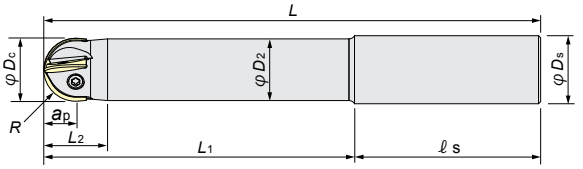




Carbide Shank



Steel Shank

D	±0.01

IABP4F-Inch (Shank Style)

	Part No.	øDc	R	L	ap	L2	L1	ls	øDs	øD2	Insert
Carbide Shank	**IABP4F16S16W-5-2**	1	0.5	5	0.5	0.83	2	3	1	0.94	IZDFG160**
	IABP4F16S16W-8-5	1	0.5	8	0.5	0.83	5	3	1	0.94	IZDFG160**
Steel Shank	**IABP4F16S16-6-3**	1	0.5	6	0.5	0.83	3	3	1	0.94	IZDFG160**
	IABP4F16S16-7-4	1	0.5	7	0.5	0.83	4	3	1	0.94	IZDFG160**


Inserts p. 8

Part No.	Clamp Screw	Clamp Screw	Screwdriver / Wrench				Screw Anti-Seizure Agent
** Wrench and screw anti-seizure agent not included with IABPF(M)16 (sold separately)*			 A		 B		
ABP4F(M)20 ○○○	155-158	250-140	104-T15	A	104-T6	A	
ABP4F(M)25/IABP4F(M)16 ○○○	155-159	250-141	104-T15	A	104-T8	A	P-37
ABP4F(M)30 ○○○	155-160	265-141	105-T20	B	104-T10	A	

IABP4F/ABP4F

Shank Style
Metric

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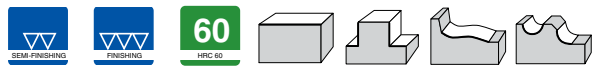
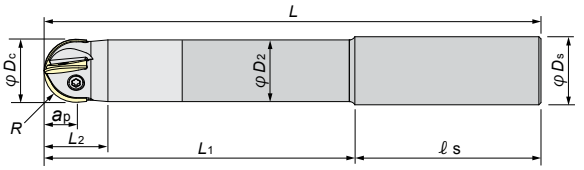
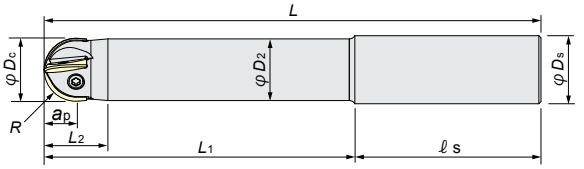




Carbide Shank



Steel Shank

D	±0.01

ABP4F-Metric (Shank Style)

	Part No.	øDc	R	L	ap	L2	L1	ls	øDs	øD2	Insert
Carbide Shank	**ABP4F20S20WL80**	20	10.0	160	10.0	17.0	80	80	20	19	ZDFG200**
	ABP4F20S20WL100	20	10.0	180	10.0	17.0	100	80	20	19	ZDFG200**
	ABP4F20S20WL120	20	10.0	200	10.0	17.0	120	80	20	19	ZDFG200**
	ABP4F25S25WL100	25	12.5	180	12.5	23.5	100	80	25	24	ZDFG250**
	ABP4F25S25WL120	25	12.5	200	12.5	23.5	120	80	25	24	ZDFG250**
	ABP4F25S25WL150	25	12.5	230	12.5	23.5	150	80	25	24	ZDFG250**
	ABP4F30S32WL100	30	15.0	180	15.0	30.0	100	80	32	28	ZDFG300**
	ABP4F30S32WL120	30	15.0	200	15.0	30.0	120	80	32	28	ZDFG300**
	ABP4F30S32WL150	30	15.0	230	15.0	30.0	150	80	32	28	ZDFG300**
Steel Shank	**ABP4F20S20L60**	20	10.0	140	10.0	17.0	60	80	20	19	ZDFG200**
	ABP4F20S20L80	20	10.0	160	10.0	17.0	80	80	20	19	ZDFG200**
	ABP4F20S20L100	20	10.0	180	10.0	17.0	100	80	20	19	ZDFG200**
	ABP4F25S25L100	25	12.5	180	12.5	23.5	100	80	25	24	ZDFG250**
	ABP4F25S25L120	25	12.5	200	12.5	23.5	120	80	25	24	ZDFG250**
	ABP4F25S25L150	25	12.5	230	12.5	23.5	150	80	25	24	ZDFG250**
	ABP4F30S32L100	30	15.0	180	15.0	30.0	100	80	32	29	ZDFG300**
	ABP4F30S32L120	30	15.0	200	15.0	30.0	120	80	32	29	ZDFG300**
	ABP4F30S32L150	30	15.0	230	15.0	30.0	150	80	32	29	ZDFG300**

Inserts p. 8

Part No.	Clamp Screw	Clamp Screw	Screwdriver / Wrench				Screw Anti-Seizure Agent
** Wrench and screw anti-seizure agent not included with IABPF(M)16 (sold separately)*			 A	 B			
ABP4F(M)20 ○○○	155-158	250-140	104-T15	A	104-T6	A	
ABP4F(M)25/IABP4F(M)16 ○○○	155-159	250-141	104-T15	A	104-T8	A	P-37
ABP4F(M)30 ○○○	155-160	265-141	105-T20	B	104-T10	A	

IABP4F/ABP4F

Modular Style
Inch + Metric

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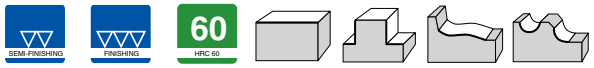

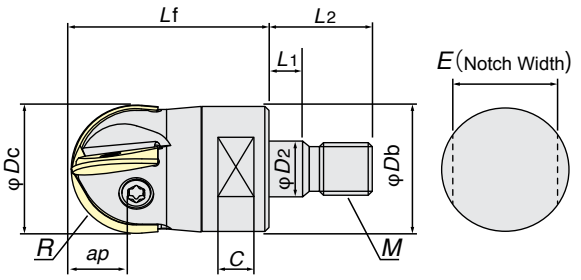

D	±0.01

IABP4F-Inch (Modular Style)

Part No.	øDc	R	Lf	øD2	ap	M	øDb	L1	L2	C	E	Insert
IABP4FM16	1	0.5	1.496	12.5mm	0.5	M12	0.819	5.5mm	22mm	10mm	17mm	IZDFG160**

ABP4F-Metric (Modular Style)

Part No.	øDc	R	Lf	øD2	ap	M	øDb	L1	L2	C	E	Insert
ABP4FM20	20	10	38	10.5	10	M10	17.8	5.5	19	10	15	ZDFG200**
ABP4FM25	25	12.5	38	12.5	12.5	M12	20.8	5.5	22	10	17	ZDFG250**
ABP4FM30	30	15	43	17	15	M16	28.8	6	23	12	22	ZDFG300**


Inserts p. 8

Part No.	Clamp Screw	Clamp Screw	Screwdriver / Wrench				Screw Anti-Seizure Agent
** Wrench and screw anti-seizure agent not included with IABPF(M)16 (sold separately)*			 A		 B		
ABP4F(M)20 ○○○	155-158	250-140	104-T15	A	104-T6	A	
ABP4F(M)25/IABP4F(M)16 ○○○	155-159	250-141	104-T15	A	104-T8	A	P-37
ABP4F(M)30 ○○○	155-160	265-141	105-T20	B	104-T10	A	

IABP4F/ABP4F

Modular Shank
Inch + Metric

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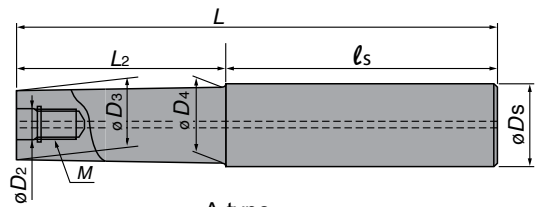
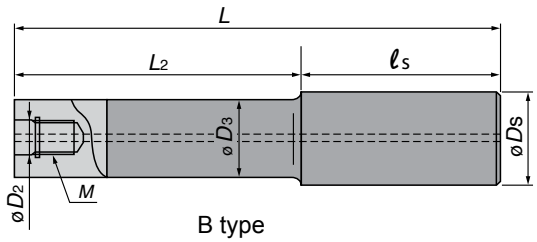


A type



B type

Carbide Shank-Inch

Part No.	Stock	ØD2	M	L	L_2	ℓs	øD3	øDs	øD4	Type	Cutter Body	Coolant Thru
IASC0.75-M10-5-2.5Z	•	10.5mm	M10	5	3	3	0.689	0.75	0.728	A	ø20mm	○
IASC0.75-M10-8-4Z	•	10.5mm	M10	8	4	4	0.689	0.75	0.728			○
IASC1-M12-6-3Z	•	12.5mm	M12	6	3	3	0.906	1	0.945		ø1"	○
IASC1-M12-8-4Z	•	12.5mm	M12	8	4	4	0.906	1	0.945			○

Carbide Shank-Metric

Part No.	Stock	ØD2	M	L	L_2	ℓs	øD3	øDs	øD4	Type	Cutter Body	Coolant Thru
ASC18-M10-125-0Z	•	10.5	M10	125	-	125	18	18	-	A	ø20	○
ASC20-10.5-120-50Z	☐			120	50	70	18.5	20	19.5			
ASC20-10.5-170-90Z	•			170	90	80						
ASC20-10.5-220-120Z	•			220	120	100						
ASC20-10.5-270-150Z	☐			270	150	120						
ASC20-10.5-220-50Z	☐			220	50	170						
ASC20-10.5-270-50Z	☐			270		220						
ASC25-12.5-145-65	☐	12.5	M12	145	65	80	23	25	-	B	ø25 or 1"	○
ASC25-M12-150-0Z	•			150	-	159	25					
ASC25-12.5-215-115	•			215	115	100	23					
ASC25-12.5-265-145	•			265	145	120						
ASC25-12.5-315-195	☐			315	195	120						
ASC25-12.5-265-65	☐			265	65	200						
ASC25-12.5-315-65	☐			315		250						
ASC32-17-160-80	☐	17	M16	160	80	80	28	32	-	B	ø30	○
ASC32-17-210-110	•			210	110	100						
ASC32-17-260-140	•			260	140	120						
ASC32-17-310-190	☐			310	190	120						
ASC32-17-360-240	☐			360	240	120						
ASC32-17-260-80	☐	17	M16	260	80	180	28	32	-	B	ø30	○
ASC32-17-310-80	☐			310		230						
ASC32-17-360-80	☐			360		280						

• = Stocked items in US ☐ = Stocked items in Japan ○ = Tool With Air Hole

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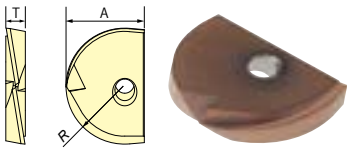
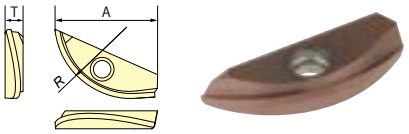
Inserts



Main Insert



Sub Insert

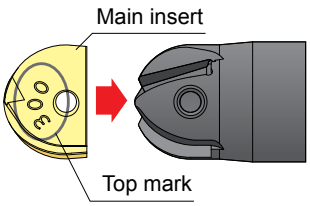
Inserts-Metric

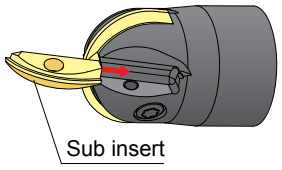
Part No.	ATH10E	ATH80D	PN15M	R	A	T*	Set Items
ZDFG200SET	•	•	•	10.0	13.8	3.2/2.4	Inserts are packaged with one main insert and two sub inserts
ZDFG250SET	•	•	•	12.5	16.8	4.0/3.0	
ZDFG300SET	•	•	•	15.0	20.0	5.0/3.6	

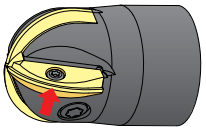
Inserts-Inch

Part No.	ATH10E	ATH80D	PN15M	R	A	T*	Set Items
IZDFG160SET		•	•	0.5	0.75	0.157/0.118	Inserts are packaged with one main insert and two sub inserts

***Main insert / Sub insert**







Set up Procedures of Inserts

To meet the specification for radius tolerance of ±0.01mm, attach inserts according to this procedure.

Inserts must be set up in order of main insert then sub insert. Clean the insert seat by using compressed air. Apply the screw anti-seizure agent to the whole clamp screw. Excessive tightening torque applied to the screw can cause screw damage and seize the screw in place. *DO NOT exceed the recommended tightening torque*

Set-up Procedure of Main Insert

1. Place top mark of the insert as shown toward screw tightening side.
2. Tighten the insert screw while applying minimal pressure to insert.

Set-up Procedure of Sub Insert

3. Install sub insert along the restraining wall.
4. Tighten the insert screw while applying firm pressure to insert.

***Inserts must be removed in the order of Sub Insert then Main Insert.**

Recommended Tightening Torque

Diameter (mm)	Main Insert (N•m)	Sub Insert (N•m)
ø20	2.2	0.5
ø25 or 1”	2.9	1.1
ø30	4.9	2.0

COATING MATERIALS FOR INSERTS

Material name ISO Classification	Coating Name Coating Type	Application	Features
ATH80D P01-K01	**ATH Coating** PVD	For hardened steels (45~65HRC)	Multi-layer structure provides improved adhesion strength, coating hardness, and oxidation resistance.
ATH10E K01	**ATH Coating** PVD	For cast iron	Multi-layer structure provides improved adhesion strength, coating hardness, and oxidation resistance. Suitable for finishing of cast iron.
PN15M P10	**PN Coating** PVD	General purpose for steel	It adopts PN coating which is excellent in heat resistance with higher hardness. Suitable for finishing of common steels.

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Cutting Conditions
Inch

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Work Materials	Insert Grade		ø	20mm			1" or 25mm			30mm		
					Finishing			Finishing			Finishing	
	Semi-finishing	Finishing	Cutting Condition	Semi-finishing	General	Hi-Speed	Semi-finishing	General	Hi-Speed	Semi-finishing	General	Hi-Speed
Carbon Steel Alloy Steel (<30HRC)	PN15M	PN15M	N(rpm)	4,780	9,240	10,350	4,460	8,790	10,190	3,820	7,640	10,080
			Vc(sfm)	984	1,902	2,132	1,148	2,263	2,624	1,181	2,362	3,116
			Vf(in/min)	135	262	359	141	277	353	120	241	349
			fz(in/t)	0.007	0.007	0.009	0.008	0.008	0.009	0.008	0.008	0.009
			ap(in)	0.012	0.004	0.004	0.016	0.004	0.004	0.020	0.004	0.004
			ae(in)	0.047	0.016	0.016	0.055	0.018	0.018	0.059	0.020	0.020
Carbon Steel Alloy Steel (30-45HRC)	PN15M ATH80D	PN15M ATH80D	N(rpm)	3,670	6,850	7,960	3,060	6,880	8,280	2,650	6,050	8,490
			Vc(sfm)	754	1,410	1,640	787	1,771	2,132	820	1,870	2,624
			Vf(in/min)	104	194	251	96	217	261	83	191	267
			fz(in/t)	0.007	0.007	0.008	0.008	0.008	0.008	0.008	0.008	0.008
			ap(in)	0.012	0.004	0.004	0.016	0.004	0.004	0.020	0.004	0.004
			ae(in)	0.039	0.016	0.016	0.055	0.018	0.018	0.059	0.020	0.020
Cast Iron	ATH80D PN15M	ATH10E ATH80D PN15M	N(rpm)	6,690	10,190	11,150	5,930	10,570	11,460	5,940	9,550	11,670
			Vc(sfm)	1,378	2,099	2,296	1,525	2,722	2,952	1,837	2,952	3,608
			Vf(in/min)	190	321	439	187	333	451	187	301	459
			fz(in/t)	0.007	0.008	0.010	0.008	0.008	0.010	0.008	0.008	0.010
			ap(in)	0.012	0.004	0.004	0.016	0.004	0.004	0.020	0.004	0.004
			ae(in)	0.047	0.016	0.016	0.055	0.018	0.018	0.059	0.020	0.020
Hardened Steel (45-55HRC)	ATH80D PN15M	ATH80D PN15M	N(rpm)	1,910	4,780	6,690	1,790	4,460	6,120	1,700	4,240	5,840
			Vc(sfm)	394	984	1,378	459	1,148	1,574	525	1,312	1,804
			Vf(in/min)	54	135	211	51	141	193	48	134	184
			fz(in/t)	0.007	0.007	0.008	0.007	0.008	0.008	0.007	0.008	0.008
			ap(in)	0.008	0.004	0.004	0.012	0.004	0.004	0.016	0.004	0.004
			ae(in)	0.031	0.012	0.012	0.035	0.016	0.016	0.039	0.020	0.020
Hardened Steel (55-62HRC)	ATH80D	ATH80D	N(rpm)	1,600	3,190	5,420	1,410	3,570	5,230	1,270	3,820	5,200
			Vc(sfm)	328	656	1,115	361	918	1,345	394	1,181	1,607
			Vf(in/min)	45	91	170	40	113	165	36	120	164
			fz(in/t)	0.007	0.007	0.008	0.007	0.008	0.008	0.007	0.008	0.008
			ap(in)	0.008	0.004	0.004	0.012	0.004	0.004	0.016	0.004	0.004
			ae(in)	0.020	0.012	0.012	0.024	0.016	0.016	0.031	0.020	0.020
			Maximum fz(in/t)	< 0.020			< 0.023			< 0.027		
			Maximum ap(in)	< 0.4			< 0.5			< 0.6		

1. These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
2. The above table is for an overhang of <4Dc using a carbide shank as the standard. When using a steel shank, reduce the cutting conditions by approximately 20%.
3. When overhang is 4Dc or more, values in the above table should be adjusted by refering to the table at right.

Overhang ratio	Vc (sfm)	Vf(in/min)
<4 Dc	100%	100%
4Dc~8Dc	85%	85%

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Cutting Conditions Metric

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			ø	20mm			1" or 25mm			30mm		
	Insert Grade				Finishing			Finishing			Finishing	
Work Materials	Semi-finishing	Finishing	Cutting Condition	Semi-finishing	General	Hi-Speed	Semi-finishing	General	Hi-Speed	Semi-finishing	General	Hi-Speed
Carbon Steel Alloy Steel (<30HRC)	PN15M	PN15M	N(min^{-1})	4,780	9,240	10,350	4,460	8,790	10,190	3,820	7,640	10,080
			Vc(m/min)	300	580	650	350	690	800	360	720	950
			Vf(mm/min)	3,440	6,650	9,110	3,570	7,030	8,970	3,060	6,110	8,870
			fz(mm/t)	0.18	0.18	0.22	0.2	0.2	0.22	0.2	0.2	0.22
			ap(mm)	0.3	0.1	0.1	0.4	0.1	0.1	0.5	0.1	0.1
			ae(mm)	1.2	0.4	0.4	1.4	0.45	0.45	1.5	0.5	0.5
Carbon Steel Alloy Steel (30-45HRC)	PN15M ATH80D	PN15M ATH80D	N(min^{-1})	3,670	6,850	7,960	3,060	6,880	8,280	2,650	6,050	8,490
			Vc(m/min)	230	430	500	240	540	650	250	570	800
			Vf(mm/min)	2,640	4,930	6,370	2,450	5,510	6,630	2,120	4,840	6,790
			fz(mm/t)	0.18	0.18	0.2	0.2	0.2	0.2	0.2	0.2	0.2
			ap(mm)	0.3	0.1	0.1	0.4	0.1	0.1	0.5	0.1	0.1
			ae(mm)	1	0.4	0.4	1.4	0.45	0.45	1.5	0.5	0.5
Cast Iron	ATH80D PN15M	ATH10E ATH80D PN15M	N(min^{-1})	6,690	10,190	11,150	5,930	10,570	11,460	5,940	9,550	11,670
			Vc(m/min)	420	640	700	465	830	900	560	900	1,100
			Vf(mm/min)	4,820	8,150	11,150	4,740	8,460	11,460	4,750	7,640	11,670
			fz(mm/t)	0.18	0.2	0.25	0.2	0.2	0.25	0.2	0.2	0.25
			ap(mm)	0.3	0.1	0.1	0.4	0.1	0.1	0.5	0.1	0.1
			ae(mm)	1.2	0.4	0.4	1.4	0.45	0.45	1.5	0.5	0.5
Hardened Steel (45-55HRC)	ATH80D PN15M	ATH80D PN15M	N(min^{-1})	1,910	4,780	6,690	1,790	4,460	6,120	1,700	4,240	5,840
			Vc(m/min)	120	300	420	140	350	480	160	400	550
			Vf(mm/min)	1,380	3,440	5,350	1,290	3,570	4,890	1,220	3,400	4,670
			fz(mm/t)	0.18	0.18	0.2	0.18	0.2	0.2	0.18	0.2	0.2
			ap(mm)	0.2	0.1	0.1	0.3	0.1	0.1	0.4	0.1	0.1
			ae(mm)	0.8	0.3	0.3	0.9	0.4	0.4	1	0.5	0.5
Hardened Steel (55-62HRC)	ATH80D	ATH80D	N(min^{-1})	1,600	3,190	5,420	1,410	3,570	5,230	1,270	3,820	5,200
			Vc(m/min)	100	200	340	110	280	410	120	360	490
			Vf(mm/min)	1,150	2,300	4,330	1,010	2,860	4,180	920	3,060	4,160
			fz(mm/t)	0.18	0.18	0.2	0.18	0.2	0.2	0.18	0.2	0.2
			ap(mm)	0.2	0.1	0.1	0.3	0.1	0.1	0.4	0.1	0.1
			ae(mm)	0.5	0.3	0.3	0.6	0.4	0.4	0.8	0.5	0.5
Maximum fz(mm/t)				< 0.5			< 0.6			< 0.7		
Maximum ap(mm)				< 10.0			< 12.5			< 15.0		

1. These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
2. The above table is for an overhang of <4Dc using a carbide shank as the standard. When using a steel shank, reduce the cutting conditions by approximately 20%.
3. When overhang is 4Dc or more, values in the above table should be adjusted by refering to the table at right.

Overhang ratio	Vc (sfm)	Vf(in/min)
<4 Dc	100%	100%
4Dc~8Dc	85%	85%

Notes

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