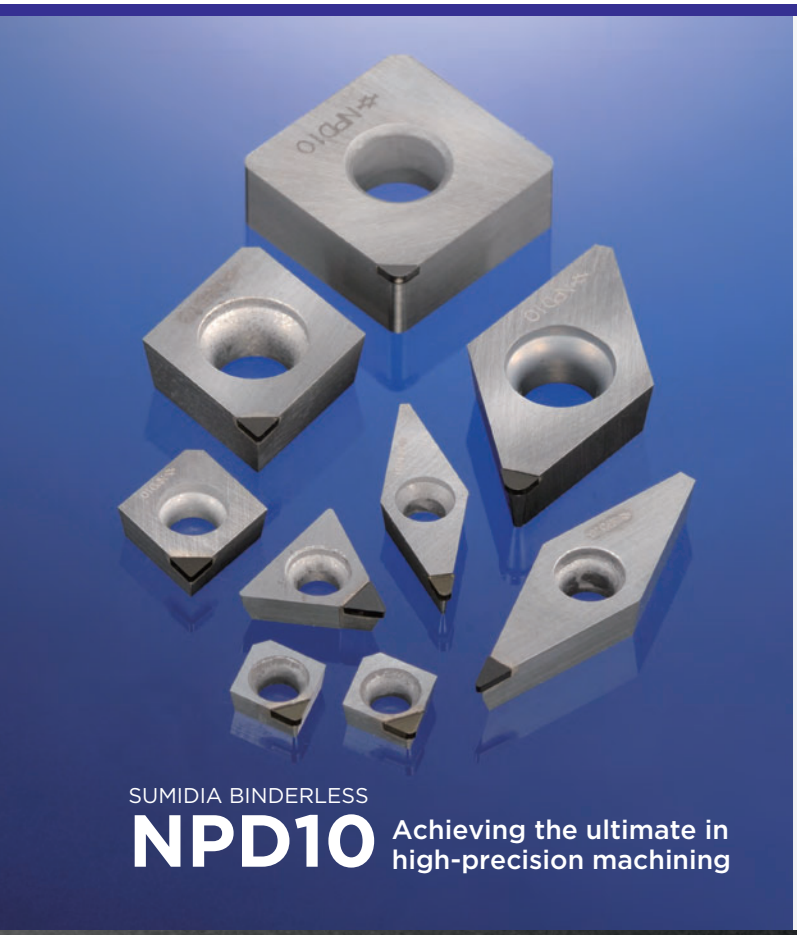
SUMITOMO
CARBIDE - CBN - DIAMOND
Global Support, Global Solutions.

PCD Tools for Carbide and Hard Brittle Material Turning

SUMIDIA BINDERLESS NPD10 / SUMIDIA New DA1090



SUMIDIA BINDERLESS
NPD10 Achieving the ultimate in high-precision machining

SUMIDIA
New **DA1090** Coarse-grained polycrystalline diamond that takes on even higher-load machining

SumiSmall

SUMIDIA BINDERLESS (NPD10) Small Diameter Boring Bars
New **DABX series** Ideal for high-precision machining of small diameters (ø3mm and up)
Switching from electrical discharge machining to cutting reduces machining time and total costs

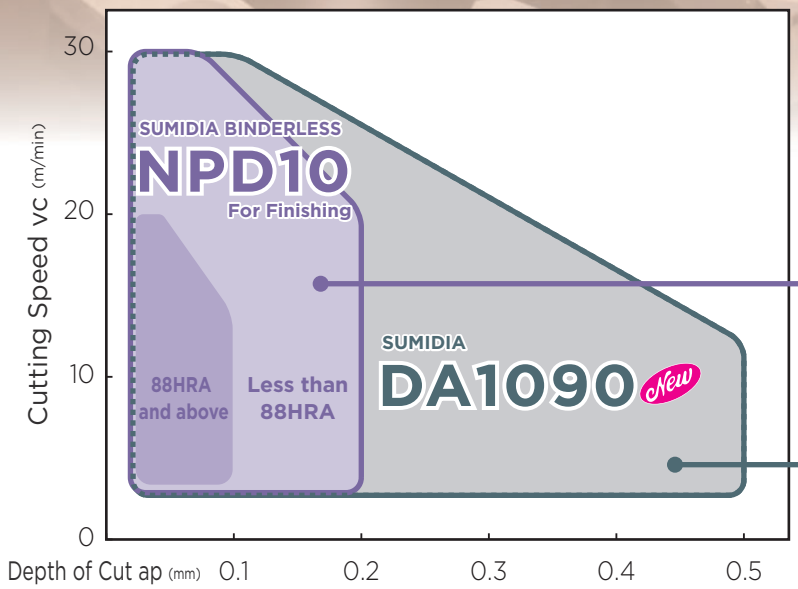
P M K N S H Carbide Hard Brittle Material

SUMITOMO ELECTRIC GROUP

SUMIDIA BINDERLESS SUMIDIA

NPD10/DA1090 New

■ Application Range (Cemented Carbide)



● NPD10

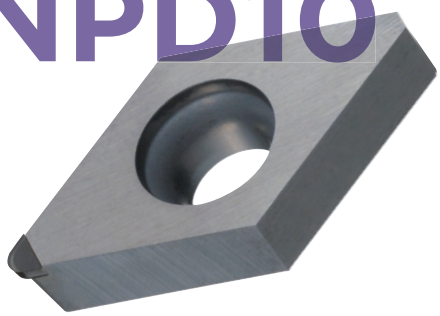
Displays outstanding wear resistance under cemented carbide finishing conditions, suppressing dimensional variations

● DA1090 New

Realises stable tool life in machining of cemented carbide with sintered surface

SUMIDIA BINDERLESS

NPD10



Cutting edge is 100% diamond material made from high-hardness nano-crystalline diamond which, unlike single-crystal diamonds, has no anisotropy.
Achieves longer tool life and higher machining accuracy than conventional diamonds in the machining of cemented carbide and other hard brittle materials.

Ideal for finishing of cemented carbide and other hard brittle materials

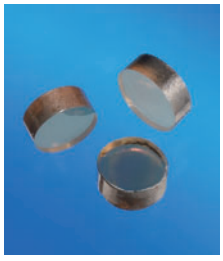
The outstanding wear resistance of nano-polycrystalline diamond enables high-precision machining of cemented carbides

Maintains excellent dimensional accuracy for a long time

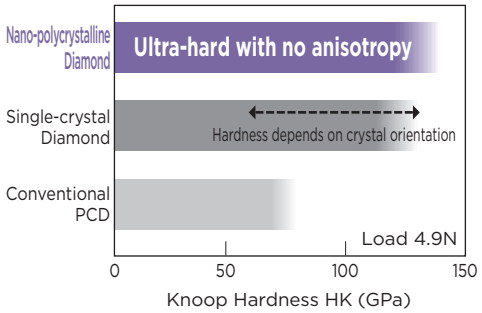
Compared to conventional diamond tools, the number of tool changes is drastically reduced, improving work efficiency and reducing total costs.

● Nano-polycrystalline diamond

Nano-polycrystalline diamond is a polycrystalline diamond that directly binds nano-order diamond particles with high strength without using any binders.
Harder than single-crystal diamond, it has no cleavability, enabling machining of hard brittle materials such as cemented carbide and making new machining methods possible.

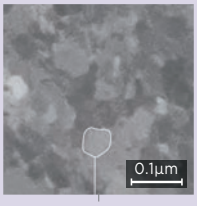
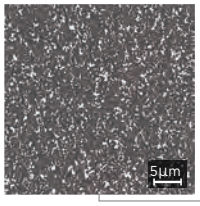
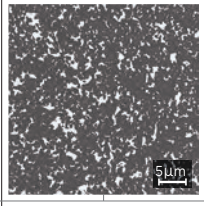
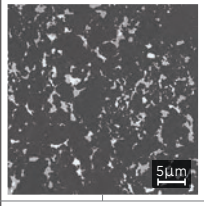
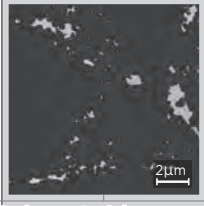
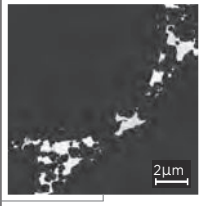


● Hardness



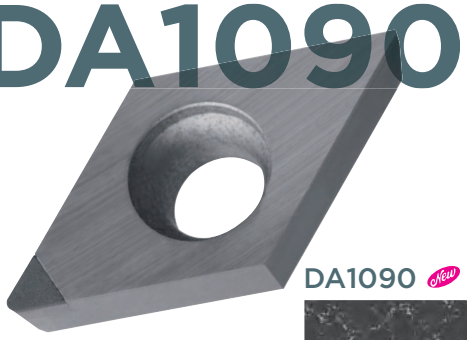
NPD10/DA1090 New

■ SUMIDIA Grades List

Grade	SUMIDIA BINDERLESS **NPD10**	SUMIDIA **DA1000**	SUMIDIA **DA2200**	SUMIDIA **DA150**	SUMIDIA New **DA1090**	SUMIDIA **DA90**
Structure	 Diamond particles					
		* White areas in the image are the binder material				
Binder	—	Co	Co	Co	Co	Co
Grain Size (μm)	up to 0.05	up to 0.5	0.5	5	up to 50	50
Content (%)	100	90 to 95	85 to 90	85 to 90	92 to 97	90 to 95

SUMIDIA

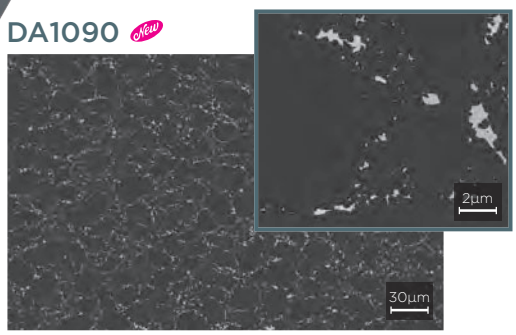
DA1090



New

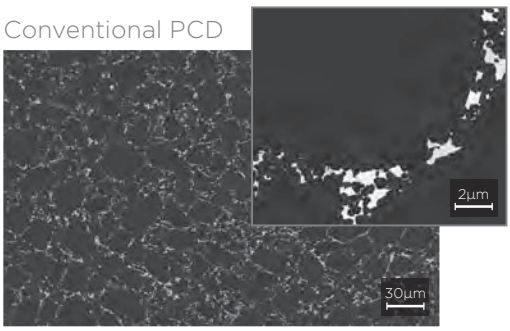
A polycrystalline diamond material with the highest diamond content, made by sintering coarse diamond particles at high density.
High density and enhanced particle binding strength exhibit excellent wear and fracture resistance.

DA1090 New



Realising high density and enhanced particle binding strength

Conventional PCD



*Black areas in image are diamond particles

Ideal for roughing of cemented carbide and other hard brittle materials

Coarse-grain polycrystalline diamond with excellent wear resistance and enhanced particle binding strength improve fracture resistance, realising stable machining in high-load roughing of cemented carbide and other hard brittle materials

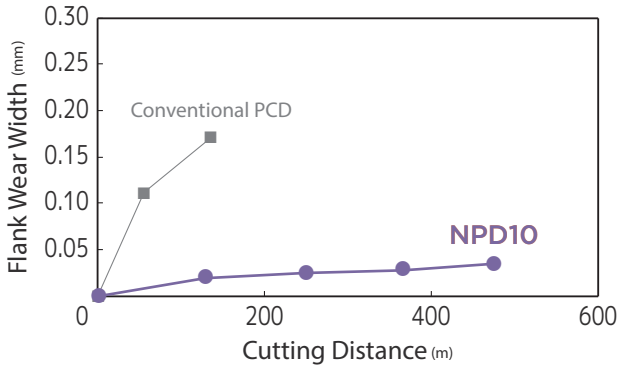
■ Applications of NPD10 and DA1090 (Cemented Carbide Machining)

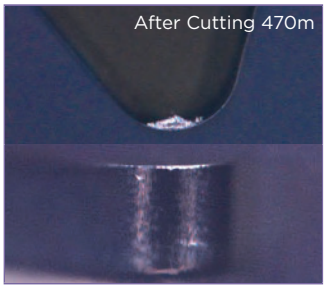
Grade	SUMIDIA BINDERLESS **NPD10**		SUMIDIA New **DA1090**	
Dimensional Tolerance	◎	Best	△	The first recommendation is **NPD10**
Tool Life (Wear Resistance)	◎	Best	○	ap = 0.2mm or above can also be used
Machining Cemented Carbide With Sintered Surface	×	Not Applicable	◎	Best
Machined Surface Quality	◎	Best	△	The first recommendation is **NPD10**

NPD10/DA1090 New

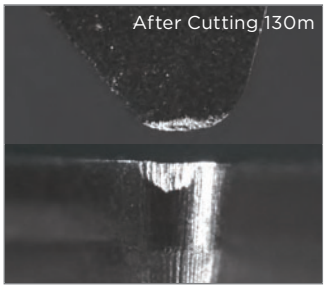
■ NPD10 Wear Resistance Performance

Shows outstanding wear resistance





NPD10
(VB = 0.034mm)

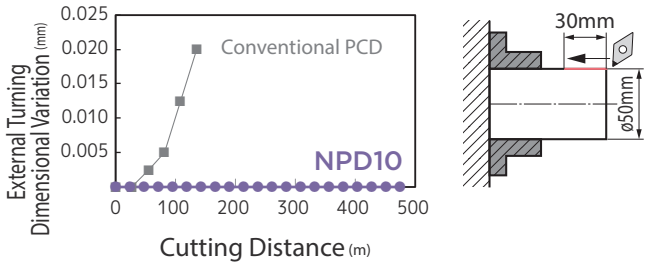


Conventional PCD
(VB = 0.171mm)

Work Material: Cemented Carbide (87HRA) Tool: DCMW11T304RH
Cutting Conditions: vc=20m/min f=0.1mm/rev ap=0.1mm Dry

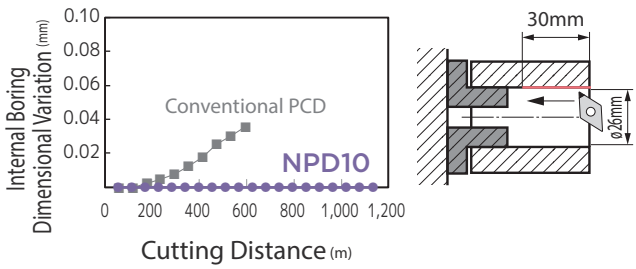
■ NPD10 Machining Precision

No dimensional variation even after 450m of cutting



Work Material: Cemented Carbide VC50 (87HRA)
Tool: DCMW11T304RH
Cutting Conditions: vc = 20m/min f = 0.1mm/rev
ap = 0.1mm Dry

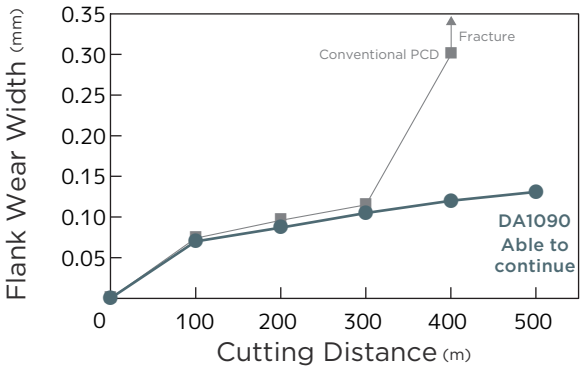
No dimensional variation even after 1,100m of cutting



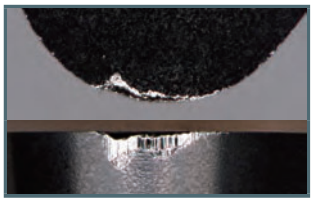
Work Material: Cemented Carbide VM30 (91HRA)
Tool: DCMW11T304RH
Cutting Conditions: vc = 20m/min f = 0.05mm/rev
ap = 0.05mm Dry

■ DA1090 Wear Resistance Performance

Displays excellent wear resistance in roughing conditions

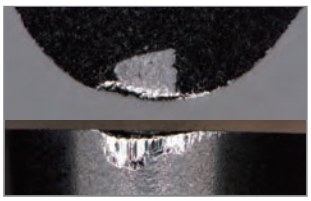


DA1090 New



Normal wear

Conventional PCD



Large wear and flaking

Work Material: Cemented Carbide VM30 Equivalent (91HRA)
Tool: NF-DCMW11T308
Cutting Conditions: vc=30m/min f=0.05mm/rev ap=0.2mm Dry

DABX series New

■ Features

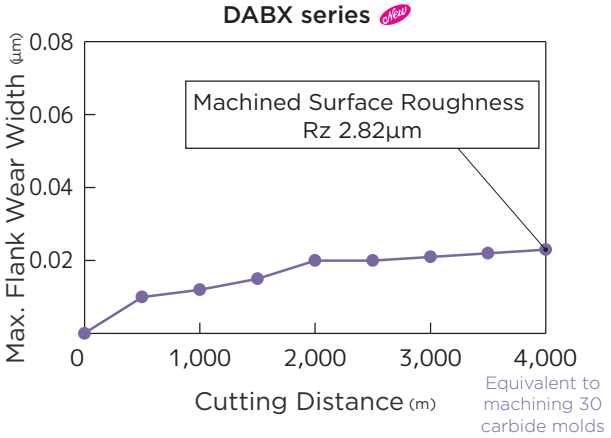
Lineup of SUMIDIA BINDERLESS Small Diameter Boring Bars for internal boring (ø3.0mm, ø4.0mm)

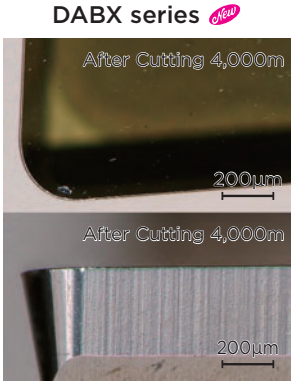
The use of a high-rigidity shank design and nano-polycrystalline diamond tip enables finishing of cemented carbide

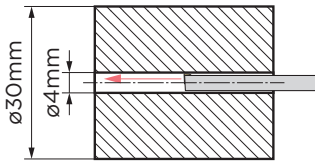
* For internal boring of ø5mm or above, NPD10 inserts with indexable type holders can also be used.
Refer to the chapter on "Boring Bars" in the General Catalogue for details.

Superior wear resistance maintains cutting edge sharpness for a long time

Wear resistance evaluation on cemented carbide (88HRA)







Work Material: Cemented Carbide (88HRA)
Tool: DABX035R-02
Cutting Conditions: vc = 10m/min
f = 0.04mm/rev
ap = 0.03mm Dry

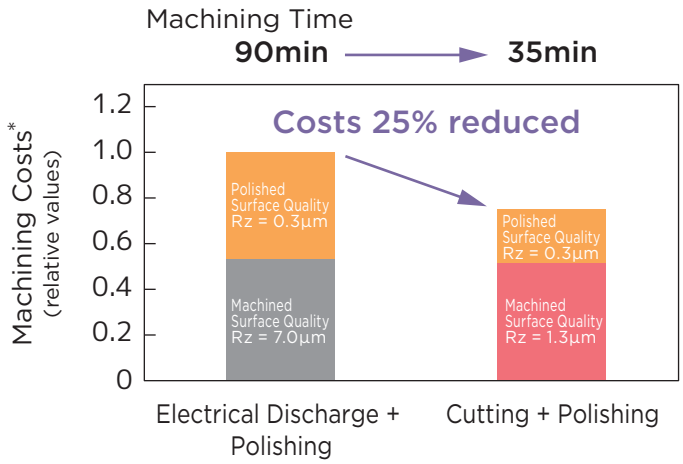
Minimal wear even after cutting distance of 4,000m

Utilising cutting to reduce machining time and total costs

Switch from electrical discharge machining (EDM) to cutting

Cemented Carbide G5 (88HRA) Header Former Mold

2.5 Times the Machining Efficiency



- Cutting
- Electrical Discharge Machining
- Polishing

Switching from EDM to cutting - Surface roughness of cutting: Rz1.3µm, against Surface roughness of EDM: Rz7.0µm, thus Shortening time for polishing (Rz0.3µm) Achieving 2.5x higher machining efficiency with 25% total cost reduction.

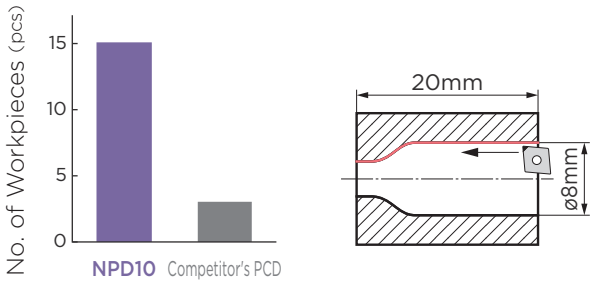
*Assuming ø4.0 → ø4.5 × L20 turning with machining costs at 3,500 JPY/h, calculating tool life at 30 units/pc

NPD10/DA1090 New

■ Application Examples (Inserts)

Cemented Carbide VC40 (89HRA) Die Mold

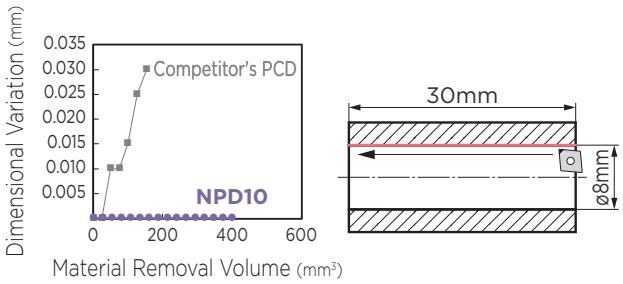
NPD10 achieves 5 times the tool life of competitors' PCD



Tool: CCMW04X104RH (NPD10) Internal Boring
Cutting Conditions: vc = 15m/min f = 0.015mm/rev ap = 0.07mm Dry

Cemented Carbide VM70 (84HRA) Die Mold

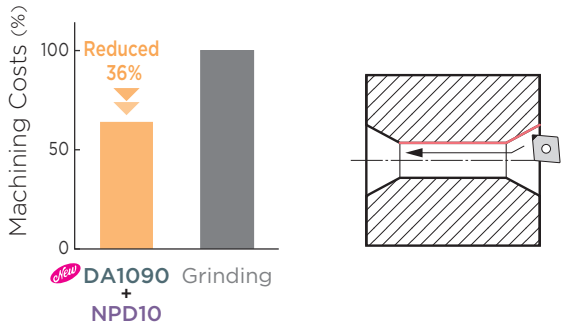
NPD10 has 4 times higher machining efficiency and more stable dimensional tolerance than competitor's PCD



Tool: CCMW03X102RH (NPD10) Internal Boring
Cutting Conditions: NPD10 vc = 25m/min f = 0.05mm/rev ap = 0.05mm Dry
Competitors' PCD vc = 5m/min f = 0.03mm/rev ap = 0.10mm Dry

Cemented Carbide VM30 (91HRA) Die Mold

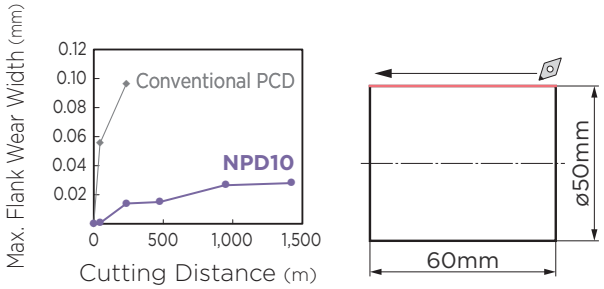
Machining costs reduced by 36% compared to conventional grinding by using DA1090 for roughing and NPD10 for finishing



Tool : Roughing NF-CCMW060202 (DA1090) Internal Boring
Finishing CCMW060202RH (NPD10) Internal Boring
Cutting Conditions : Roughing vc = 20m/min f = 0.10mm/rev ap = 0.10mm Dry
Finishing vc = 20m/min f = 0.02mm/rev ap = 0.02mm Dry

Alumina (99% pure)

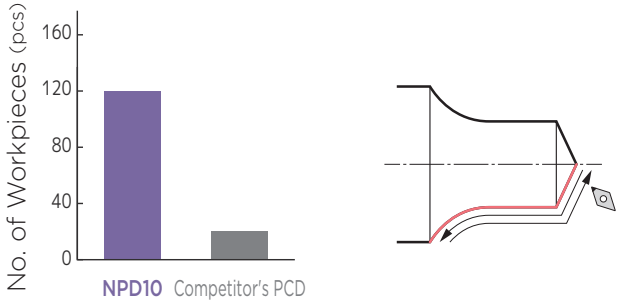
NPD10 displays excellent wear resistance even on alumina material



Tool: DNMA150408RH (NPD10) External Turning
Cutting Conditions: vc = 300m/min f = 0.03mm/rev ap = 0.01mm Wet

Cemented Carbide VF10 (93HRA) Carbide Pin

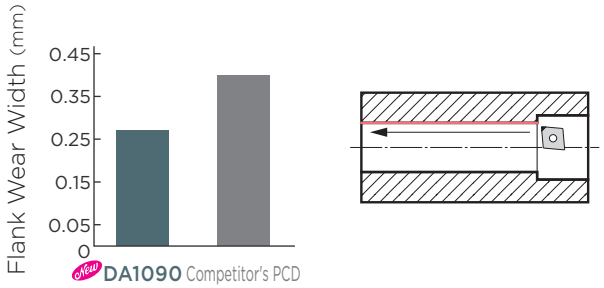
NPD10 achieves 6 times the tool life of competitors' PCD



Tool: DCMW11T302 (NPD10) External Turning
Cutting Conditions: vc = 30m/min f = 0.01mm/rev ap = 0.1mm Dry

Cemented Carbide VC70 (84HRA) Carbide Mold

DA1090 reduces wear by 35% with excellent wear resistance

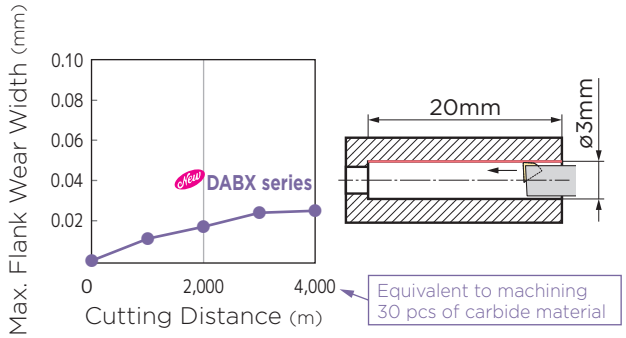


Tool: NF-CCMW060204 (DA1090) Internal Boring
Cutting Conditions: vc=15m/min f=0.09mm/rev ap=0.1mm Dry

■ Application Examples (Boring Bars)

Cemented Carbide G5 (88HRA) Header Former Mold

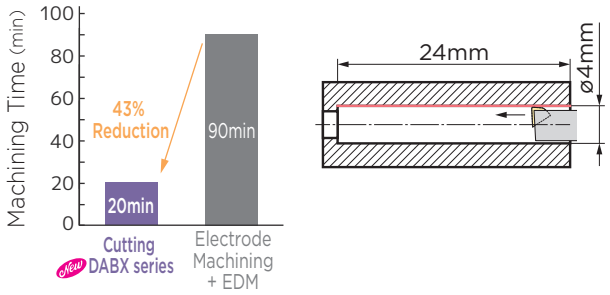
DABX series displays excellent wear resistance in small-diameter machining of cemented carbide



Tool: DABX025R-02 (NPD10) Internal Boring
Cutting Conditions: vc = 10m/min f = 0.05mm/rev ap = 0.025mm Dry

Cemented Carbide G5 (88HRA) Header Former Mold

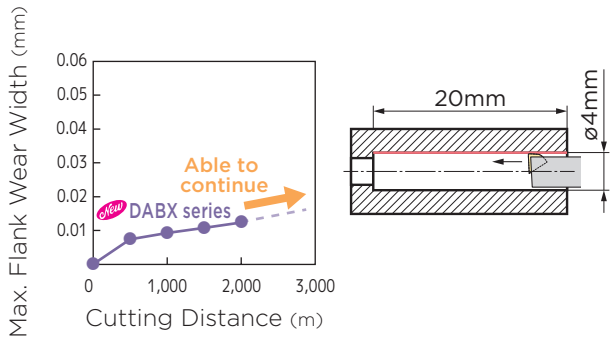
Achieving more than 3x higher machining efficiency by switching from EDM to small-diameter cutting of cemented carbide



Tool: DABX035R-04 (NPD10) Internal Boring
Cutting Conditions: vc = 10m/min f = 0.05mm/rev ap = 0.05mm Dry

Cemented Carbide G2 (91HRA) Header Former Mold

DABX series displays excellent wear resistance even in small-diameter machining of high-hardness cemented carbide



Tool: DABX035R-02 (NPD10) Internal Boring
Cutting Conditions: vc = 10m/min f = 0.05mm/rev ap = 0.025mm Dry

NPD10/DA1090 New

■ NPD10 Stock List

Negative Inserts

Shape	Cat. No.	Stock NPD10	CBN Cutting Length	Dimensions (mm) Inscribed Circle	Thickness	Hole Dia.	Corner Radius
	**DNMA 150408RH**	●	1.8	12.7	4.76	5.16	0.8
	150412RH	●	1.8				1.2
	**SNMA 120408RH**	●	1.7	12.7	4.76	5.16	0.8
	120412RH	●	1.7				1.2
	**VNMA 160408RH**	●	1.8	9.525	4.76	3.81	0.8
	160412RH	●	1.5				1.2

Positive Inserts

Shape	Relief Angle	Cat. No.	Stock NPD10	CBN Cutting Length	Dimensions (mm) Inscribed Circle	Thickness	Hole Dia.	Corner Radius
	7°	**CCMW 03X102RH**	●	1.3	3.5	1.4	1.9	0.2
		03X104RH	●	1.3				0.4
		04X102RH	●	1.7	4.3	1.8	2.3	0.2
		04X104RH	●	1.7				0.4
		**CCMW 060202RH**	●	1.7	6.35	2.38	2.8	0.2
		060204RH	●	1.7				0.4
		CCMW 09T302RH	●	1.7	9.525	3.97	4.4	0.2
		09T304RH	●	1.7				0.4
		09T308RH	●	1.6				0.8
	7°	**DCMW 070202RH**	●	2.1	6.35	2.38	2.8	0.2
		070204RH	●	2.0				0.4
		DCMW 11T302RH	●	2.1	9.525	3.97	4.4	0.2
		11T304RH	●	1.9				0.4
		11T308RH	●	1.6				0.8
	11°	**TPMW 080202RH**	●	1.2	4.76	2.38	2.3	0.2
		080204RH	●	1.0				0.4
		TPMW 110302RH	●	1.5	6.35	3.18	3.4	0.2
		110304RH	●	1.3				0.4
		110308RH	●	1.0				0.8
		TPMW 160402RH	●	2.2	9.525	4.76	4.4	0.2
		160404RH	●	2.0				0.4
		160408RH	●	1.6				0.8
	7°	**VCMW 080201RH**	●	2.2	4.76	2.38	2.3	0.1
		080202RH	●	1.9				0.2
		080204RH	●	1.5				0.4
		VCMW 110302RH	●	2.1	6.35	3.18	2.8	0.2
		110304RH	●	1.7				0.4
		VCMW 160402RH	●	2.1	9.525	4.76	4.4	0.2
		160404RH	●	1.7				0.4
		160408RH	●	1.8				0.8
		160412RH	●	1.5				1.2

* The radius portion of the cutting edge is cylindrical shaped.

■ DA1090 Stock List

Negative Inserts NF type

Shape	Cat. No.	Stock DA1090 New	CBN Cutting Length	Dimensions (mm) Inscribed Circle	Thickness	Hole Dia.	Corner Radius
	**NF-DNMA 150408**	●	2.0	12.7	4.76	5.16	0.8
	150412	●	2.0				1.2
	**NF-SNMA 120408**	●	2.4	12.7	4.76	5.16	0.8
	120412	●	2.4				1.2
	**NF-VNMA 160408**	●	1.9	9.525	4.76	3.81	0.8
	160412	●	1.7				1.2

Positive Inserts NF type

Shape	Relief Angle	Cat. No.	Stock DA1090 New	CBN Cutting Length	Dimensions (mm) Inscribed Circle	Thickness	Hole Dia.	Corner Radius
	7°	**NF-CCMW 03X102**	●	1.1	3.5	1.4	1.9	0.2
		03X104	●	1.1				0.4
		NF-CCMW 04X102	●	1.5	4.3	1.8	2.3	0.2
		04X104	●	1.5				0.4
		NF-CCMW 060202	●	2.4	6.35	2.38	2.8	0.2
		060204	●	2.4				0.4
		NF-CCMW 09T302	●	2.4	9.525	3.97	4.4	0.2
		09T304	●	2.4				0.4
		09T308	●	2.3				0.8
	7°	**NF-DCMW 070202**	●	2.6	6.35	2.38	2.8	0.2
		070204	●	2.4				0.4
		NF-DCMW 11T302	●	2.6	9.525	3.97	4.4	0.2
		11T304	●	2.4				0.4
		11T308	●	2.0				0.8
	11°	**NF-TPMW 080202**	●	2.5	4.76	2.38	2.3	0.2
		080204	●	2.4				0.4
		NF-TPMW 110302	●	2.5	6.35	3.18	3.4	0.2
		110304	●	2.4				0.4
		110308	●	2.1				0.8
		NF-TPMW 160402	●	2.5	9.525	4.76	4.4	0.2
		160404	●	2.4				0.4
		160408	●	2.1				0.8
	7°	**NF-VCMW 080202**	●	3.2	4.76	2.38	2.3	0.2
		080204	●	2.8				0.4
		NF-VCMW 110302	●	3.2	6.35	3.18	2.8	0.2
		110304	●	2.8				0.4
		NF-VCMW 160402	●	3.7	9.525	4.76	4.4	0.2
		160404	●	3.3				0.4
		160408	●	2.4				0.8
		160412	●	2.1				1.2

* The radius portion of the cutting edge is cylindrical shaped.

■ ALNEX ANX series Blade Stock List

Shape	Cat. No.	Stock DA1090 New	CBN Cutting Length (mm)	Wiper Flat Shape	Applications
	**ANB 1600R-GB**	●	6.0	Arc-Shaped	Bi-metal Milling*

*Cast Iron/Aluminum Alloy
For details on the ANX series cutter body, see Tooling News No. 53 "ALNEX ANX series" and the General Catalogue.

● mark: Standard stocked item

DABX series New

New 93° Binderless PCD

SUMIDIA BINDERLESS
Brazed

SumiSmall

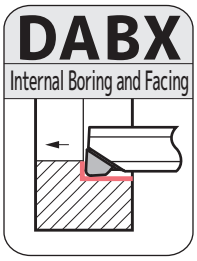
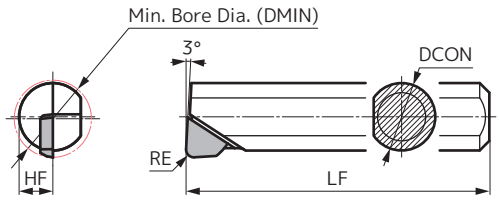


Fig 1



■ DABX series Boring Bar Stock List

Dimensions (mm)

Cat. No.	Stock NPD10	Min. Bore Dia. DMIN	Diameter DCON	Cutting Edge Distance HF	Overall Length LF	Corner Radius RE	Applicable Sleeves	Fig
DABX025R-01	●	3	2.5	1.25	40	0.1	HBX2516	1
DABX025R-02	●	3	2.5	1.25	40	0.2	HBX2516	1
DABX025R-04	●	3	2.5	1.25	40	0.4	HBX2516	1
DABX035R-01	●	4	3.5	1.75	40	0.1	HBX3516	1
DABX035R-02	●	4	3.5	1.75	40	0.2	HBX3516	1
DABX035R-04	●	4	3.5	1.75	40	0.4	HBX3516	1

DABX bars can be used with HBB type sleeves, but HBX type sleeves are recommended for machining when rigidity is required.

Fig 1

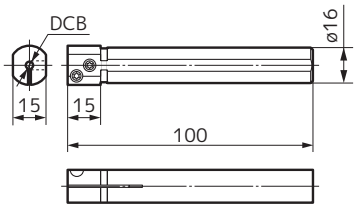
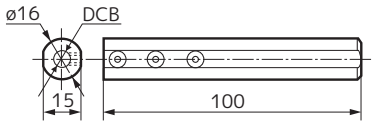


Fig 2



■ Sleeves (HBX type)

Dimensions (mm)

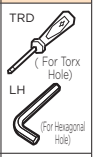
Cat. No.	Stock	Bore Dia. DCB	Applicable Boring Bar	Fig
HBX 2516	●	2.5	DABX 025R	1
HBX 3516	●	3.5	DABX 035R	1

■ Sleeves (HBB type)

Dimensions (mm)

Cat. No.	Stock	Bore Dia. DCB	Applicable Boring Bar	Fig
HBB 2516	●	2.5	DABX 025R	2
HBB 3516	●	3.5	DABX 035R	2

■ Parts (for Adapter Sleeve)

Applicable Sleeve	Flat Insert Screw		Set Screw	Wrench
		N·m		
HBX 2516	BFTX0409N	**1.5**	BT06035T	TRD15
HBX 3516	BFTX0409N	**3.0**	BT06035T	TRD15
HBB ○○○○	—	—	BT0404	LH020

● mark: Standard stocked item

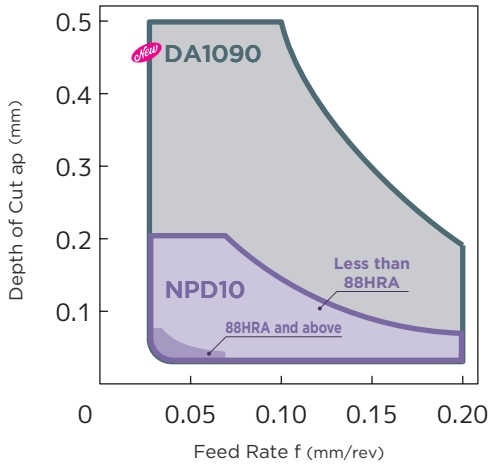
NPD10/DA1090 New

■ Recommended Cutting Conditions

Work Material				Grades	Cutting Conditions		
Classification		Hardness (HRA)	Our Grades		Cutting Speed vc (m/min)	Feed Rate f (mm/rev)	Depth of Cut ap (mm)
VM,VC	40	88 or more	G5,D2	NPD10	5 - **15** - 20	0.03 - **0.05** - 0.07	0.03 - **0.05** - 0.07
VM,VC	70,60,50	83 to less than 88	G7,G6	NPD10	5 - **20** - 30	0.03 - **0.10** - 0.20	0.03 - **0.10** - 0.20
VM,VC	-	83 or more	G7,G6,G5,D2	New DA1090	5 - **20** - 30	0.03 - **0.10** - 0.20	0.03 - **0.10** - 0.50

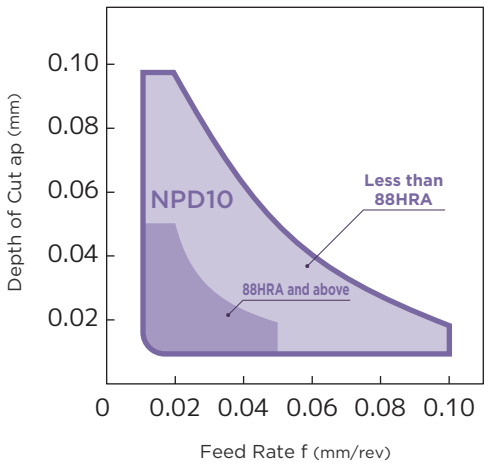
Min. - **Optimum** - Max. Lubrication: Dry

■ Application Range for NPD10 and DA1090



* Carbide shanked holders are recommended for internal boring.

■ Application Range for DABX series Boring Bars



MEMO

< SAFETY NOTES >

- Very hot or lengthy chips may be discharged while the machine is in operation. Therefore, machine guards, safety goggles or other protective covers must be used. Fire safety precautions must also be considered.
- Please handle with care as this product has sharp edges.
- Improper cutting conditions or mis-handling of the tool may result in breakages or projectiles. Therefore, please use the tool within its recommended conditions.
- When using non-water soluble cutting oil, precautions against fire must be taken and please ensure that a fire extinguisher is placed near the machine.

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