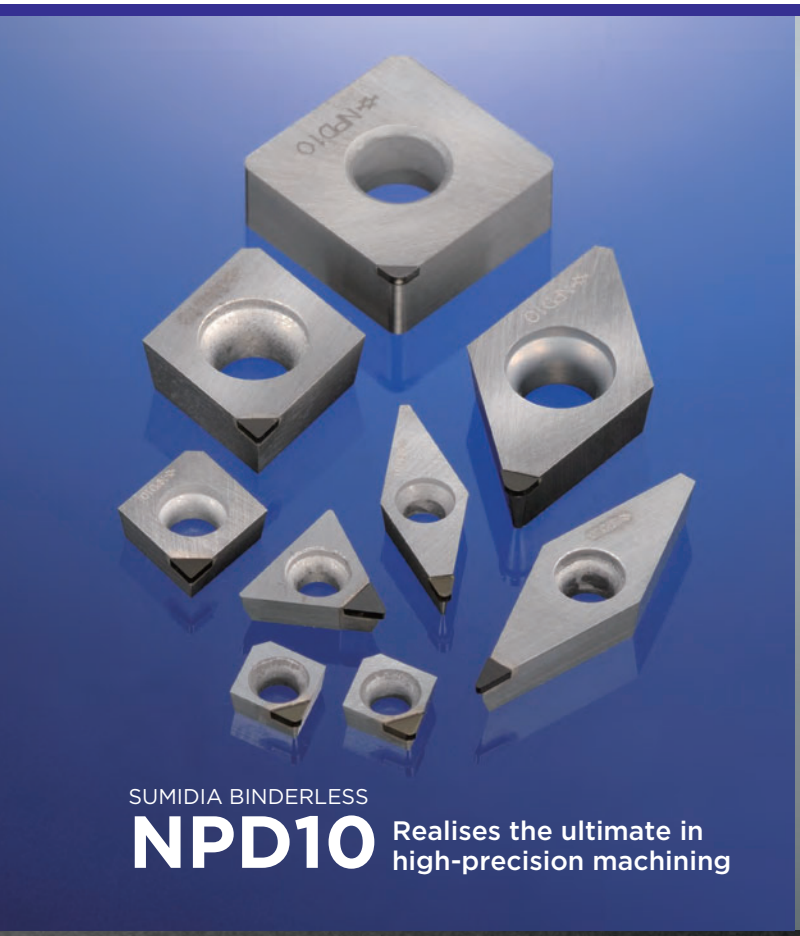
SUMITOMO
CARBIDE - CBN - DIAMOND
Global Support, Global Solutions.

PCD Tools for Carbide and Hard Brittle Material Turning

SUMIDIA BINDERLESS NPD10 / SUMIDIA DA90

Rev.2



SUMIDIA BINDERLESS
NPD10 Realises the ultimate in high-precision machining

SUMIDIA
DA90 The trump card for roughing of cemented carbide and hard brittle materials

SumiSmall

SUMIDIA BINDERLESS (NPD10) Small Diameter Boring Bars

New **Introducing the DABX series** Ideal for high-precision machining of small diameters (ø3mm and up)

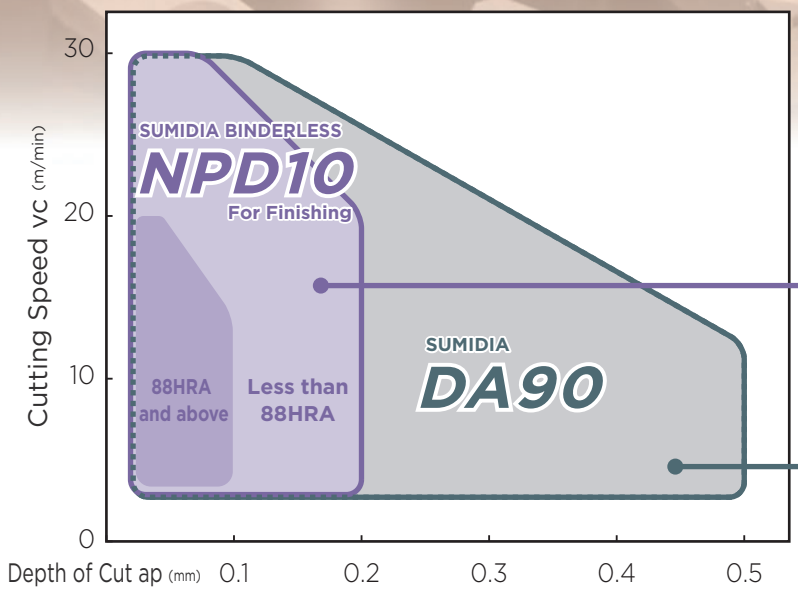
P M K N S H Carbide Hard Brittle Material

SUMITOMO ELECTRIC GROUP

SUMIDIA BINDERLESS SUMIDIA

NPD10/DA90

■ Application Range (Cemented Carbide)



● NPD10

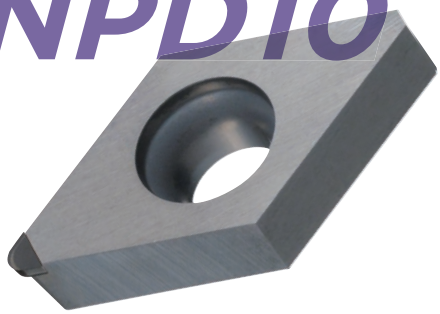
Displays outstanding wear resistance under cemented carbide finishing conditions, suppressing dimensional variation

● DA90

Realises stable tool life in sintered surface machining of cemented carbide

SUMIDIA BINDERLESS

NPD10



Made from high-hardness nano-polycrystalline diamond, the pure diamond material used for the cutting edge has no anisotropy, unlike single-crystal diamonds.
It achieves extended tool life and machining accuracy superior to conventional diamond tools when machining hard brittle materials such as cemented carbide.

Ideal for finishing of hard brittle materials including cemented carbide

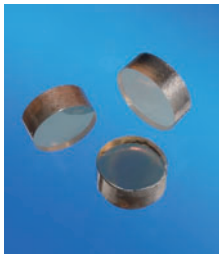
The outstanding wear resistance of nano-polycrystalline diamond enables high-precision machining of cemented carbides

Superior dimensional accuracy maintained for a long time

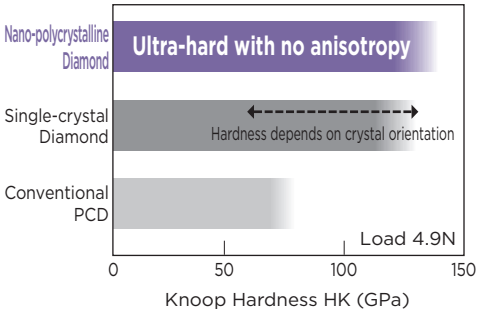
Number of tool changes can be drastically reduced compared to conventional diamond tools, enabling work efficiency to be improved and total costs to be reduced.

● Nano-polycrystalline diamond

Nano-polycrystalline diamond is 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.

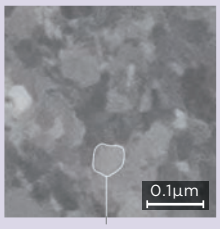
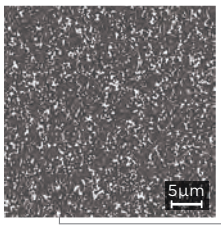
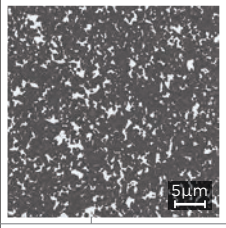
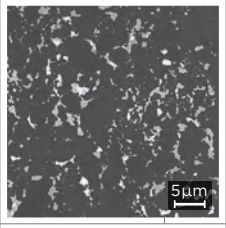
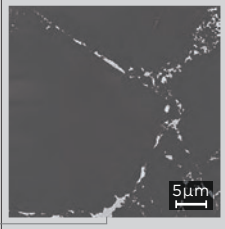


● Hardness



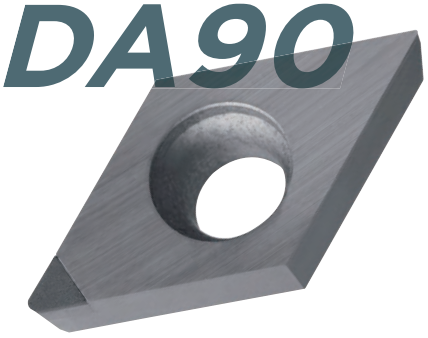
NPD10/DA90

■ SUMIDIA Grade List

Grade	SUMIDIA BINDERLESS **NPD10**	SUMIDIA **DA1000**	SUMIDIA **DA2200**	SUMIDIA **DA150**	SUMIDIA **DA90**
Structure	 Diamond particles		 * The white part of the image is the binder		
Binder	—	Co	Co	Co	Co
Grain Size (μm)	up to 0.05	up to 0.5	0.5	5	50
Content (%)	100	90 to 95	85 to 90	85 to 90	90 to 95

SUMIDIA

DA90



A polycrystalline diamond grade in which coarse diamond particles have been sintered to form a dense structure.
The high diamond content, with high wear resistance, makes it ideal for roughing of cemented carbide and hard brittle materials.
Optimised design and mass production technology have been developed, achieving the same performance as conventional tools with higher cost-performance.

Ideal for roughing of hard brittle materials including cemented carbide

Stable tool life in sintered surface machining of cemented carbide and roughing of hard brittle materials thanks to the outstanding wear resistance of nano-polycrystalline diamond

Uses SUMIDIA NF Insert

Optimised design and mass production technology have been developed, achieving the same performance as conventional tools with higher cost-performance.

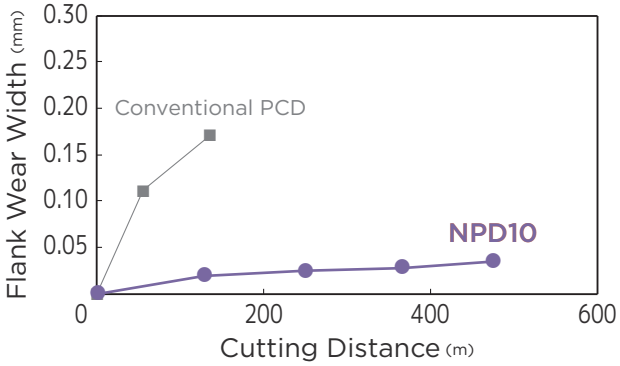
Inserts for machining of cemented carbide and hard brittle materials newly stocked

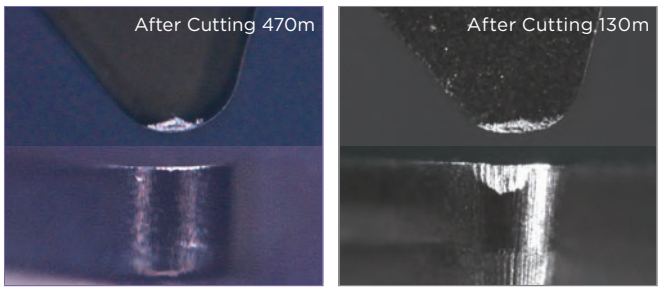
■ Applications of NPD10 and DA90 (Cemented Carbide Machining)

Grades	SUMIDIA BINDERLESS **NPD10**		SUMIDIA **DA90**	
Dimensional Tolerance	◎	Best	△	The first recommendation is **NPD10**
Tool Life (Wear Resistance)	◎	Best	○	ap = 0.2mm or above can also be used
Sintered surface machining of cemented carbide	×	Impossible	◎	Best
Machined Surface Quality	◎	Best	△	The first recommendation is **NPD10**

■ NPD10 Wear Resistance Performance

Shows outstanding wear resistance





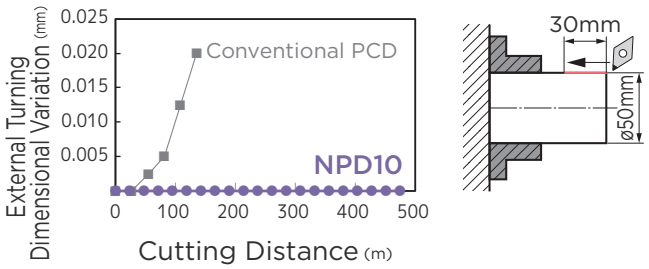
NPD10
(V_B = 0.034mm)

Conventional PCD
(V_B = 0.171mm)

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

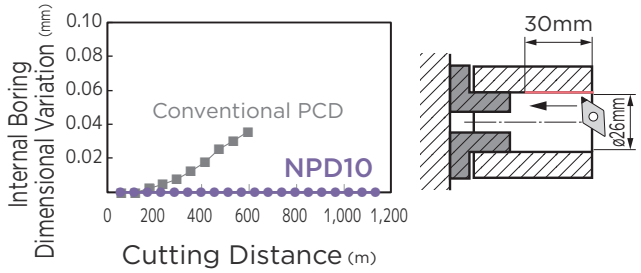
■ NPD10 Machining Precision

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

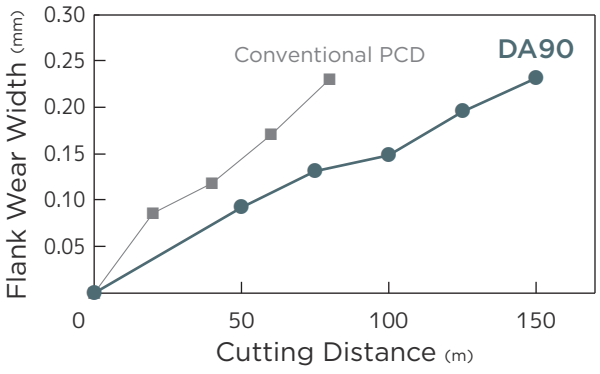
No dimensional variation even after 1,100m of cutting



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

■ DA90 Wear Resistance Performance

Displays excellent wear resistance in roughing conditions



Work Material: Cemented Carbide VC50 (87HRA)
Tool: NF-DCMW070204
Cutting Conditions: vc = 20m/min f = 0.1mm/rev
ap = 0.2mm Wet

DABX series New

■ Features

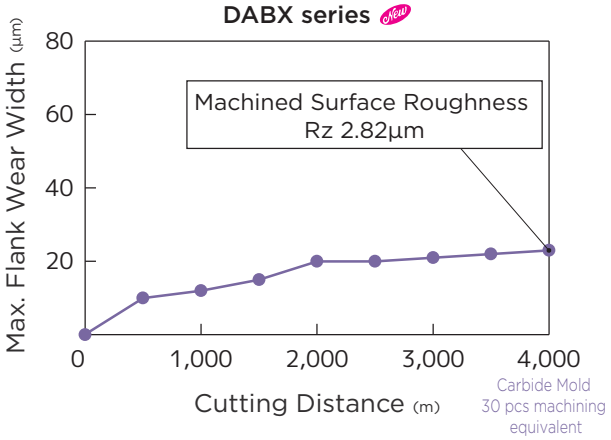
Lineup of SUMIDIA BINDERLESS Small Diameter Boring Bars for small-diameter machining (ø3.0mm, ø4.0mm)

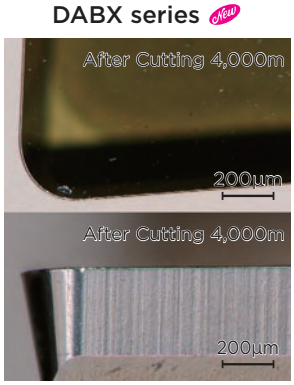
Ideal for small-diameter turning, with a high-rigidity shank shape and the excellent wear resistance of nano-polycrystalline diamond

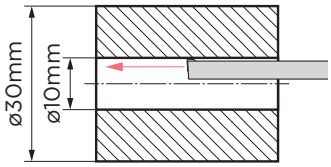
* For internal boring of ø5mm or above, NPD10 inserts and cutting edge indexable holders can also be used.
Refer to the chapter on "Boring Bars" in the General Catalogue for details.

Superior wear resistance maintains cutting edge sharpness for a long time

Wear resistance evaluation with cemented carbide (88HRA)







Minimal wear as of cutting distance 4,000m

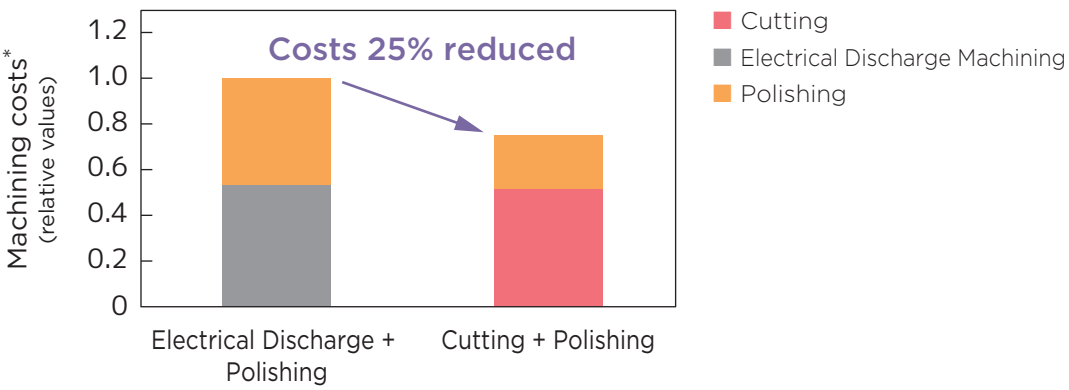
Use of cutting reduces machining time and total costs

Switch from electrical discharge machining to cutting

Cemented Carbide G5 (88HRA) Header Former Mold

2.5 Times the Machining Efficiency

Machining Time
86min → 35min



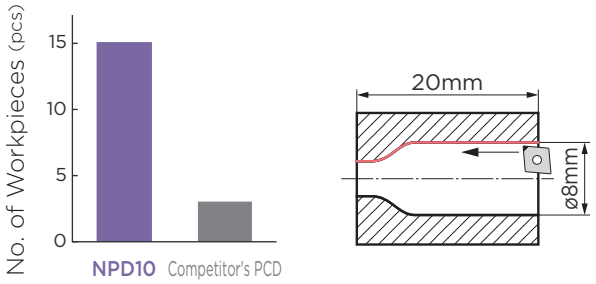
*Assuming ø4.0 → ø4.5 × L20 turning with machining costs at 3,500 JPY/h, calculating tool life at 30 units/pc

The switch from electrical discharge machining to cutting reduces polishing time
Machining efficiency 2.5x, total costs 25% reduced

■ Application Examples (Inserts)

Cemented Carbide VC40 (89HRA) Die Mold

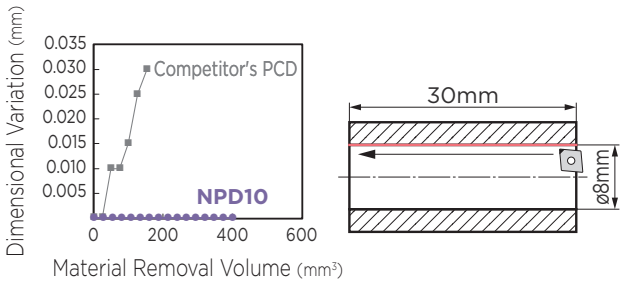
NPD10 achieves 5 times the tool life of competitors' PCD



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

Cemented Carbide VM70 (84HRA) Die Mold

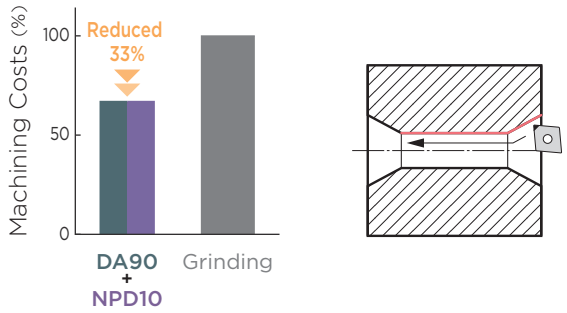
NPD10 reaches machining efficiency 4 times that of competitors' PCD, with stable dimensional tolerance as well



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

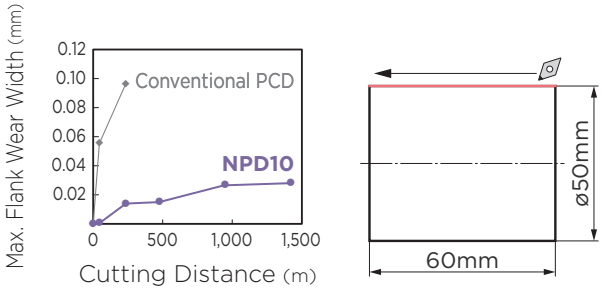
Machining costs reduced by 33% compared to conventional grinding by using DA90 for roughing and NPD10 for finishing



Tool : Roughing NF-CCMW060202 (DA90) 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)

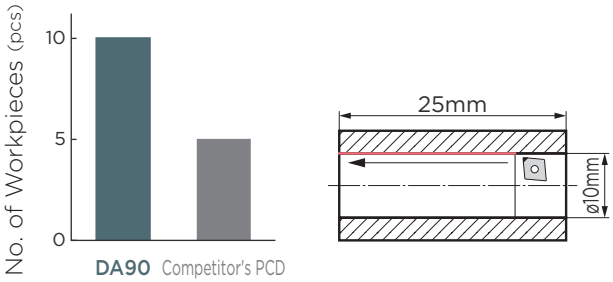
NPD10 displays excellent wear resistance performance with alumina as well



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

Cemented Carbide VC70 (85HRA) Die Mold

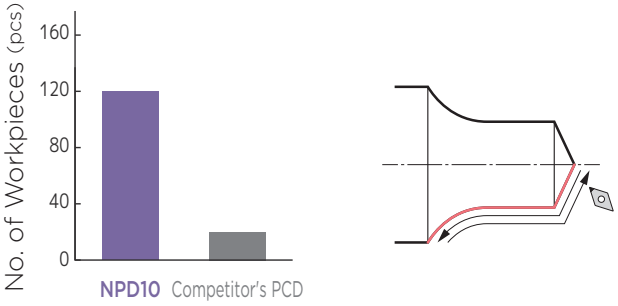
DA90 achieves 2 times the tool life of competitors' PCD



Tool: NF-CCMW04X102 (DA90) Internal Boring
Cutting Conditions: vc = 20m/min f = 0.075mm/rev ap = 0.1mm Wet

Cemented Carbide VF10 (93HRA) Carbide Pin

NPD10 achieves 6 times the tool life of competitors' PCD

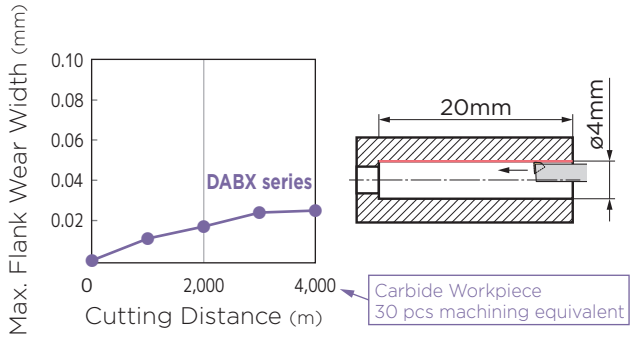


Tool: DCMW11T302 (NPD10) External Turning
Cutting Conditions: vc = 30m/min f = 0.01mm/rev ap = 0.1mm Dry

■ Application Examples (Boring Bars)

Cemented Carbide G5 (88HRA) Header Former Mold

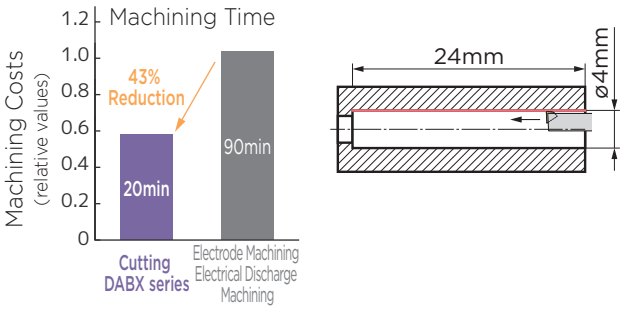
The DABX series displays excellent wear resistance in small-diameter machining of carbides as well



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

Cemented Carbide G5 (88HRA) Header Former Mold

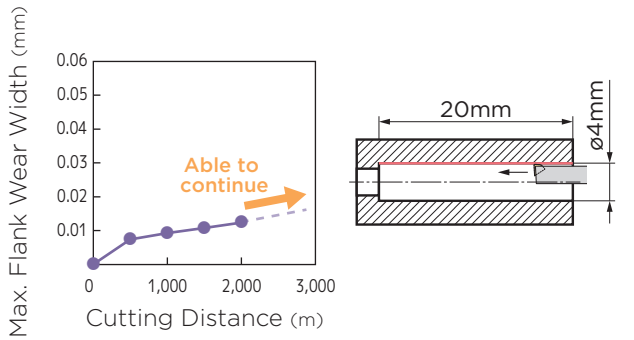
Machining efficiency improved by 3x or more through switching from electrical discharge machining to cutting in small-diameter machining of carbides



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

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

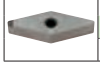


Tool: DABX035R-02 (NPD10) Internal Boring
Cutting Conditions: vc = 10m/min f = 0.05mm/rev ap = 0.025mm Dry

NPD10/DA90

■ NPD10 Stock List

Negative

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

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

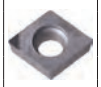
* The radius portion of the cutting edge is cylindrical shaped.

■ DA90 Stock List

Neg. NF

Shape	Cat. No.	Stock DA90	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

Pos. NF

Shape	Relief Angle	Cat. No.	Stock DA90	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
		110302	●	3.2				0.2
		NF-VCMW 110304	●	2.8	6.35	3.18	2.8	0.4
		160402	●	3.7				0.2
		160404	●	3.3	9.525	4.76	4.4	0.4
		160408	●	2.4				0.8
		160412	●	2.1				1.2

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

● mark: Standard stocked item

DABX series New

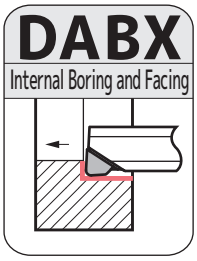
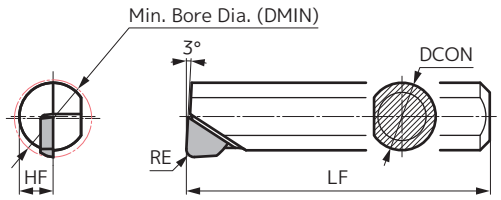


Fig 1



SUMIDIA BINDERLESS
Brazed

SumiSmall

■ DABX series Boring Bar Stock List

Dimensions (mm)

Cat. No.	Stock NPD10	Min. Bore Dia. DMIN	Diameter DCON	Cutting Edge Height 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 requiring rigidity.

Fig 1

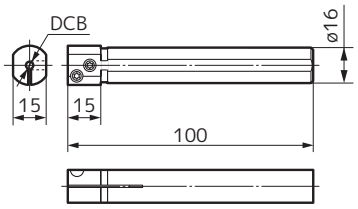
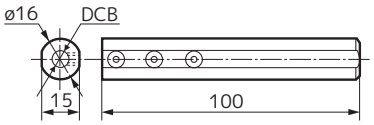


Fig 2



■ Sleeves (HBX type)

Dimensions (mm)

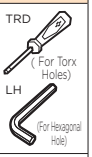
Cat. No.	Stock	Bore Dia. DCB	Applicable Tool Holder	Fig
HBX 2516	●	2.5	DABX 025R	1
HBX 3516	●	3.5	DABX 035R	1

■ Sleeves (HBB type)

Dimensions (mm)

Cat. No.	Stock	Bore Dia. DCB	Applicable Tool Holder	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

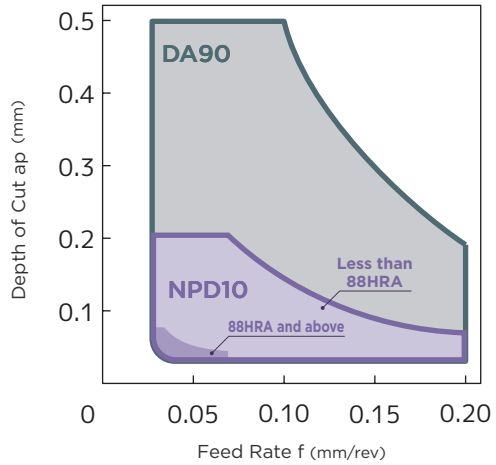
NPD10/DA90

■ 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	DA90	5 - **20** - 30	0.03 - **0.10** - 0.20	0.03 - **0.10** - 0.50

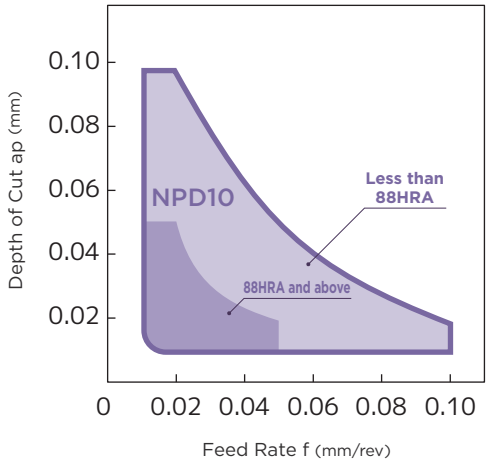
Min. - **Optimum** - Max. Lubrication: Dry (NPD10) / Wet (DA90)

■ Application Range for NPD10 and DA90



* Carbide shank holder is 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.

Sumitomo Electric Industries, Ltd.

Hardmetal Division

Global Marketing Department : 1-1-1, Koyakita, Itami, Hyogo 664-0016, Japan

https://www.sumitool.com/global

R(2024.5)II 1810 TP/AK