SAKURA
Profile Grinding Wheel

	INTRODUCTION OF PRODUCT	MAIN PURPOSE
1. WHEEL	Surface grinder, Cylindrical grinder, Inner surface grinder	
	Tool grinder, Jig grinder, PG grinder	
	Wheel for Non-spherical grinding	
Type of Bond		
1-1: Metal	Metallic powder molding	
MS	Standard	Tool grinding
MSD	Standard PG (conc.100%)	Tool grinding
MSA	Good cutting edge, Longer life (Good)	Surface grinding, Cylindrical grinding, tool grinding
MG	For glass	Surface grinding, Cylindrical grinding
MHP	Keep edge shape that is not easy to change shape	PG,Surface grinding, PG = Standard
MHR	More resistant to change shape than MHP	PG,Surface grinding, PG = Good abrasion at edge
MHT	More resistant to change shape than MHP	PG,Surface grinding, PG = Best abrasion at edge
MB	Soft metal	Heavy grinding
1-2: DB	Metallic Composite Bond	
DB	Standard	PG, Surface grinding, Cylidrical grinding, PG = Standard Groove machining
DB90	Strength DB<DB90	PG, Surface grinding, Cylidrical grinding, PG = Best for Groove machining
DB105	Strength DB<DB90<DB105	PG, Surface grinding, Cylidrical grinding, PG = Best for Groove machining
DB120	Strength DB<DB90<DB105<DB120	PG, Surface grinding, Cylidrical grinding, PG = Best for Groove machining
DB320	With flexibility, rigidity	Edge retention

1-3: Resin	Resin power molding	
BG	For glass	
BS	Standard	Surface grinding,Cylidrical grinding, Tool grinding
BSX	Increase hardness of Standard goods	PG,Surface grinding,Cylidrical grinding,Tool grinding
BSA	Good cutting edge. Priority to grindability	Surface grinding,Cylidrical grinding,Tool grinding, Inner surface grinding
BHJ	Good grindability and cutting edge	Surface grinding,Cylidrical grinding,Tool grinding
BHN	Good cutting edge. Better heat-resistance than BSA, More than 100%	Surface grinding,Cylidrical grinding
BHP	Resistant to change shape. Good heat-resistance.	PG,Surface grinding, PG = Standard
BHR	More resistant to change shape than BHP, good heat-resistance	PG,Surface grinding, PG = Best for surface roughness
BHT	Good heat-resistance & abrasion. BHP<BHR<BHT	PG,Surface grinding, PG = Best for surface roughness
BC	For ceramic	Surface grinding,Cylidrical grinding
BCM	For cermet	Surface grinding,Cylidrical grinding
BFE	For simultaneous grinding	Surface grinding,Cylidrical grinding
BSM	For mirror surface	Surface grinding,Cylidrical grinding
1-4: Vitrified	Ceramic powder molding	
VS	Standard	
VSA	Good cutting edge. Priority to grindability. With air hole	Surface grinding,Cylidrical grinding
VAP	No air hole VAP<VCP<VEP<VGP<VHP	Diamond (Single crystal, sintered compact) CBN
VCP	No air hole VAP<VCP<VEP<VGP<VHP	Diamond (Single crystal, sintered compact) CBN
VEP	No air hole VAP<VCP<VEP<VGP<VHP	Diamond (Single crystal, sintered compact) CBN
VGP	No air hole VAP<VCP<VEP<VGP<VHP	Diamond (Single crystal, sintered compact) CBN
VHP	No air hole VAP<VCP<VEP<VGP<VHP	Diamond (Single crystal, sintered compact) CBN
1-5: Electroplating	Nickel plating	
P	Grit, dresser, Internal for CMP	Jig grinding, Inner surface grinding, CMP
	File, Forming wheel, etc	

2.Cutting Tool	Bit, Throwaway tip, Reamer, End mill, etc	CPX, Single crystal
3. Abrasion-resistance tool	Center, centerless blade, shoe plate	CPX, Single crystal
	V block	
4.Dresser	Single point dresser, Multiple point dresser	
5. Abrasive grain product	Powder, paste, Slurry, paper	
5-1: Slurry		
SK	SK200 ~SK001	
6. Stick	Standard dimension: 15 angles x 100L	
STF	Mainly for non-air hole bit	#1500V~#5000V, #1000B~, #1000M~
STL	Mainly for non-air hole bit	#600V~, #600B~, #600M~
STN	Mainly for non-air hole bit	#270V~
	Standard dimension: 20 angles x 100L	
W(1)	Mainly for Resin, Metal	#80B~#200B, #80M~#200M
W(2)	Mainly for Resin, Metal	#140B~#325B, #80M~#200M
W(4)	Mainly for Resin, Metal	#270B~#800B, #270M~#800M, #270V~
7. Others	Special tool	
	Development, design, production and sales of above tools	
	Revised on 2008.61.10 mita	

BOND FOR PG

	Name of Bond	Feature	Purpose
1. Resin Bond	1 - 1. BHN	Priority to grindability	For wider & straight
	1 - 2. BHP	Standard. Relatively hard	For straight & edge
	1 - 3. BHR	Harder than BHP	For using edge
	1 - 4. BHT	Harder than BHP	For using edge
2. Metal Bond	2 - 1. MSA	Cheap	
	2 - 2. MHP	Standard for PG	For using edge
	2 - 3. MHR	Harder than MHP	For using edge. Optimum bond
	2 - 4. MHT	Harder than MHP	For using edge
3. Composite Bond	3 - 1. DB	With rigidity	Good for thin slot machining. Good for edge
	3 - 2. DB90	More rigidity than DB	Good for thin slot machining. Good for edge
	3 - 3. DB105		Good for thin slot machining. Good for edge
	3 - 4. DB120		Good for thin slot machining. Good for edge, Optimum bond
	3 - 5. DB320	With flexibility & rigidity	Retention of edge

Selection Criteria for PG wheel

Type 1.4B2, Type 14K1

Outer dimension	30D~180D
Edge angle	5V~ 30V~
Type of abrasive grain	DIA・CBN
Grain size	#3000~#80
Corner R dimension	0.01R~ 0.2R~
Surface roughness	Ra, Rz, Ry

Reference data

Relationship b/w grain size and surface roughness

(Standard value for Metal bond)

Grain size	#140	#200	#270	#400	#600	#800	#1000	-
Roughness (Ry)	1.5	1	0.7	0.5	0.3	0.27	0.25	-

Relationship b/w grain size and Edge R

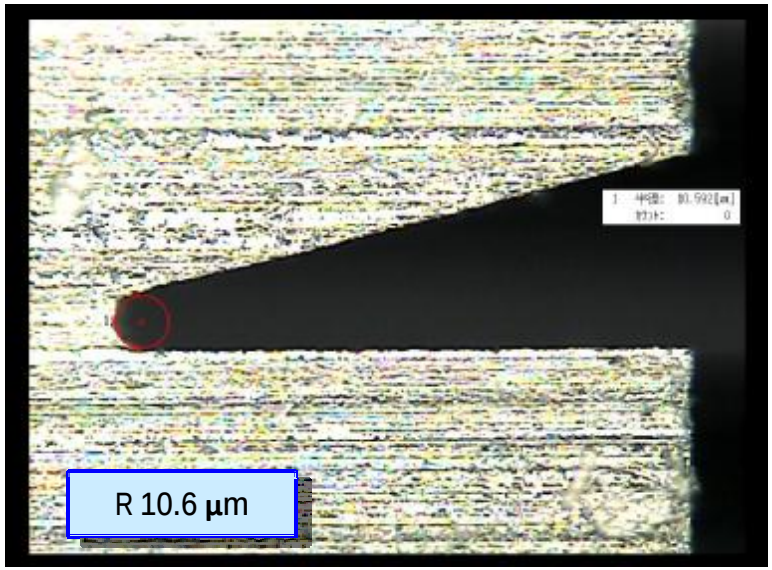
(Standard value for Metal bond)

Grain size	#140	#200	#270	#400	#600	#800	#1000	#1500
Edge R(mm)	0.15	0.08	0.07	0.05	0.03	0.025	0.02	0.01

Micro Edge Wheel

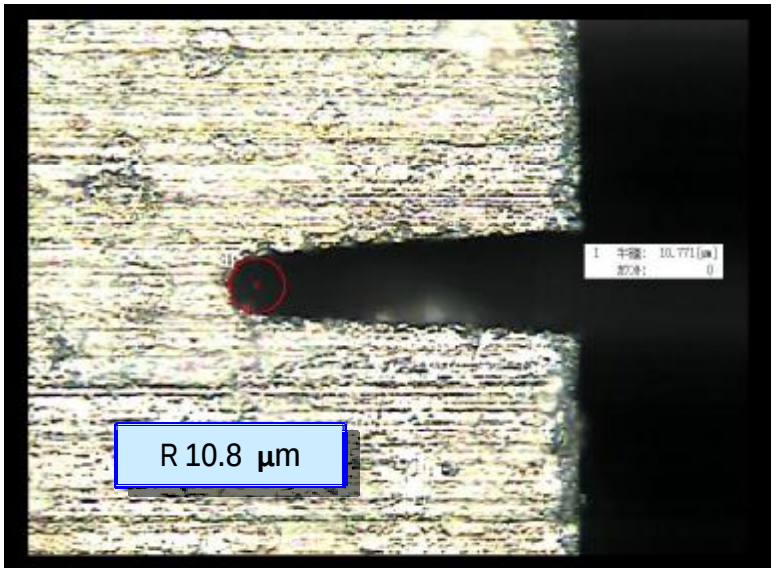
With micronization of electronic parts, pitch of lead frame or connector terminal has been in the process of finer pitch. Plastic molding tool with fine pitch electronic parts requires microscopic and highly-accurate fine groove for inserting fine pitch terminal that stamping is done. In order to change shape of terminal when inserting, this groove requires high-pitch accuracy and Core R with less than R0.02.

User		Company M
Grinding machine	Model	AMADA WASINO Co.,Ltd. Profile grinder, GLS - 5P
	Flange	TC-20 High speed spindle
Wheel	Suppliers	Sakura Diamond Tool Institute
	Specification	4B2(One V)・ SD1500MHP (Metal Bond)
	Dimension	75Dx5Wx1Xx15 ゜x0.01Rx5Tx22.23H
	Prod. Numbe	SA90305-01
Measurement	Measuring device	Laser microscope 2009/3/23



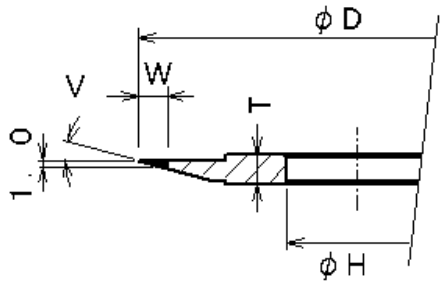
Radius: 10.592 [µm]
Count: 0

User		Company Y
Grinding machine	Model	AMADA WASINO Co.,Ltd. Profile grinder, GLS - 5
	Flange	TC-20 High speed spindle
Wheel	Suppliers	Sakura Diamond Tool Institute
	Specification	14K1(Both V)・ SD1500MHP (Metal Bond)
	Dimension	75Dx5Wx1x8 ゜x0.01Rx5Tx22.23H
	Prod. Numbe	SA80603-01
Measurement	Measuring device	Laser microscope 2009/3/23

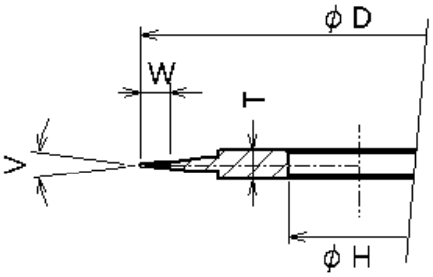


Radius: 10.771 [µm]
Count: 0

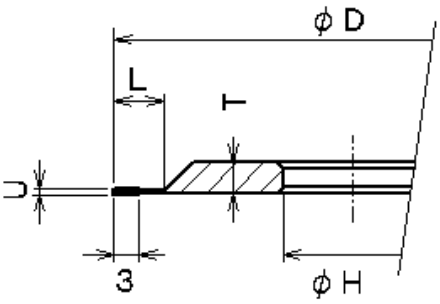
2-1: Dimension Chart

type	D	T	H	W	V	Grain size	Bond
4B2 type 	30	4	4.77, 8, 12, 13	3	5-30 (Standard 15 degree)	#3000 - #80	Resin Bond Metal Bond Composite Bond
	50 65 75 80	5	8 12 13 22.23 24	5			
	100 125 150 180	8	22.23 24 31.75 32 40 50.8	7			

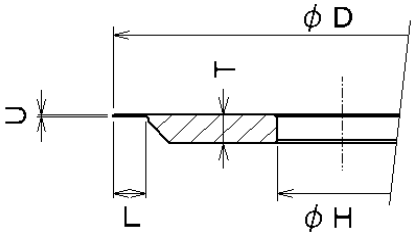
2-2: Dimension Chart

Type	D	T	H	W	V	Grain size	Bond
14K1 type 	30	4	4.77, 8, 12, 13	3	5-30 (Standard 15 degree)	#3000 - #80	Resin Bond Metal Bond Composite Bond
	50 65 75 80	5	8 12 13 22.23 24	5			
	100 125 150 180	8	22.23 24 31.75 32 40 50.8				

2-3: Dimension Chart

Type	D	T	H	U	L	Grain size	Bond
3A1 type 	30	4	4.77, 8, 12, 13	0.5 1 1.5 2 2.5 3	4	#3000 - #80	Resin Bond Metal Bond Composite Bond
	50 65 75 80	5	8 12 13 22.23 24		8 10 15		
	100 125 150 180	8	22.23 24 31.75 32 40 50.8				

2 - 4. Dimension List

Type	D	T	H	U	L	Grain size	Bond
3A1 type 	30	4	4.77, 8, 12	0.06~ 0.2~ 0.5~ 1~	Refer to below list	# 3000 ~ # 325	Composite Bond
	50 65 75 80	5	8 12 13 22.23 24				
	100 125 150 180	8	22.23 24 31.75 32 40 50.8				

Dimension list for grooving wheel (Effective under-neck length L)

D \ U	0.06	0.1	0.12	0.15	0.2	0.3	0.4~
30	2	2	3	4			
75				5	7	8	
100	-					8	10
125		-					
150							
180			-				

Thickness of grooving wheel

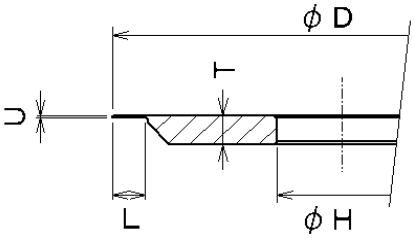
Groove machining size tends to wider against wheel thickness due to flange accuracy or vibration at the setup.

Based on additional length target of wheel OD, consider finishing allowance and select the thickness.

φD (mm)	~75	~100	~125	~150	~180
Additional (μm)	10~15	10~15	10~20	20~30	25~35

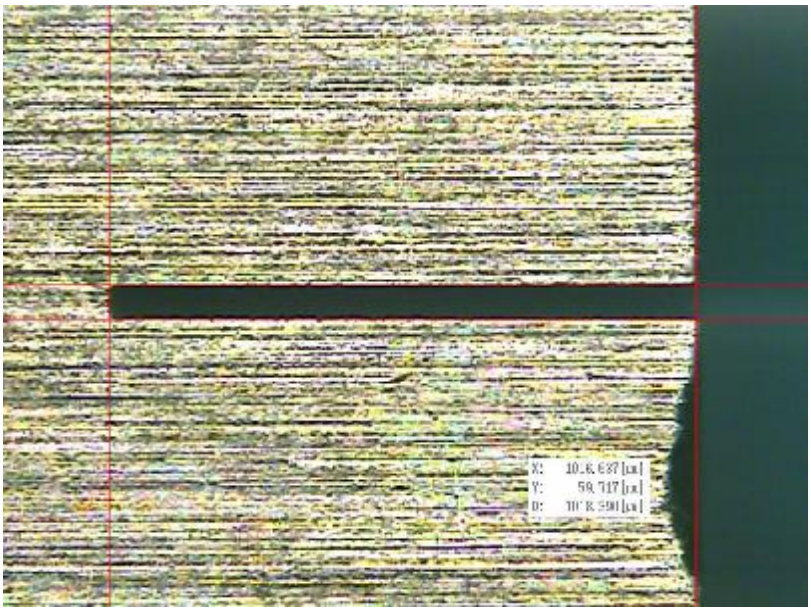
Example of Groove Machining

User		Company K
Wheel	Supplier	Sakura Diamond Tool Institute
	Specification	3A1・ SD800DB120 (Metallic composite bond)
	Dimension	100Dx0.050Ux2Lx31.75H
	Prod. Number	SA80107-04
Measurement	Measuring device	Laser microscope 2009/3/6



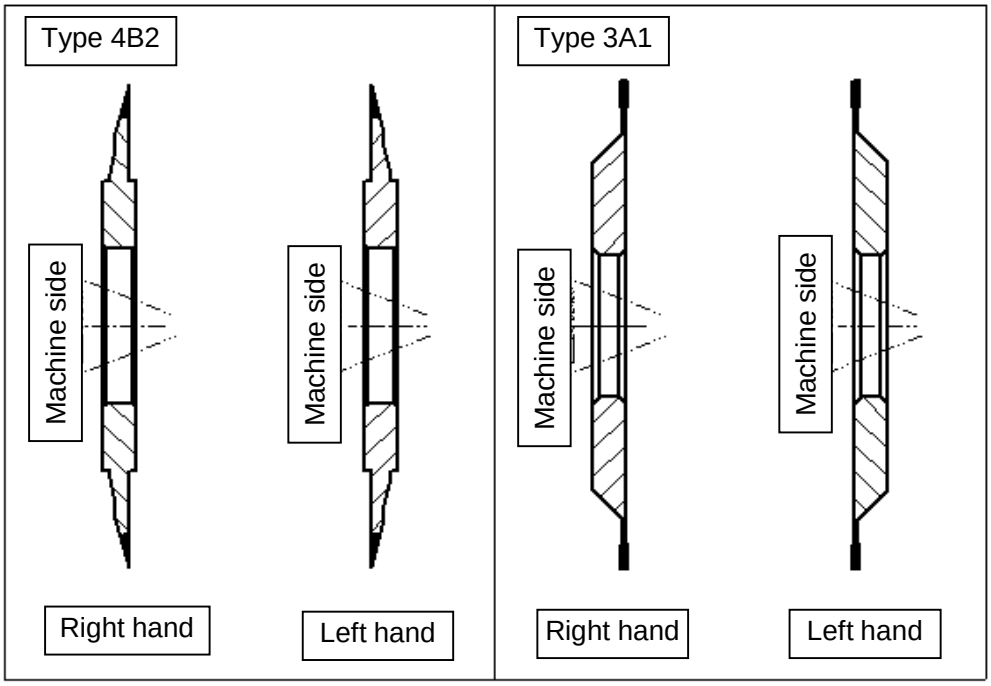
D=100mm
U=0.050mm
L=2mm
H=31.75H7
T=8mm

Machining groove width	0.0597mm
Machining groove depth	1mm

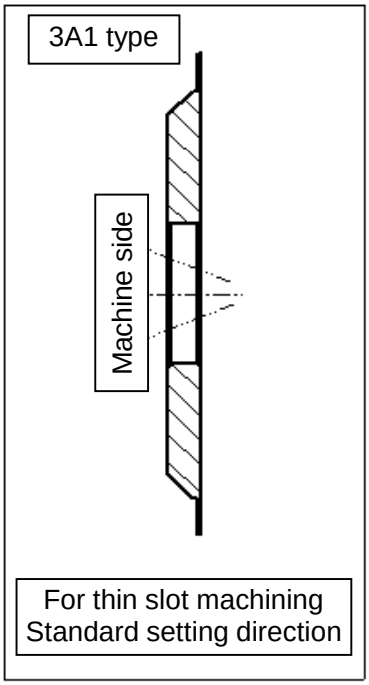


Flange Setting Direction

Decide Flange setting referring to the below.



Setting as below is the standard for Thin Slot Wheel.



How to correct Straight-Wheel?

To correct outer circumference of straight-wheel with narrow-width.

1. Use Sharpening Stone

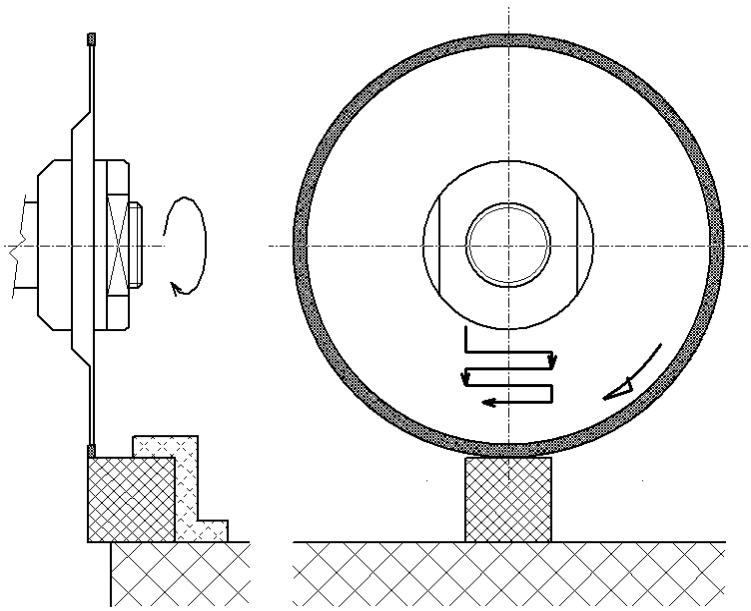
Procedure

1. Fix the stone on the table.
2. Soak the stone sufficiently in the grinding liquid.
3. Make down feed.
4. Swing left and right.

Machining requirement.

1. Wheel speed: 400 - 800m/min
2. Down feed: 1-2 micron
3. Swing distance 0.1 - 0.5m/min
4. Select the sharpening stone: WA#200 - #600
5. Select the grindstone: WA#200 - #600, SIC #200 - #600

1. Do not change the lateral side of wheel. Possible to cause "run-out".
2. Do not apply strong load. Possible to cause "run-out" of the lateral side.



Picture - 1

09.2.10

How to correct Straight-Wheel?

To correct outer circumference of straight-wheel with narrow-width.

1. Use Motor-operated grindstone

Procedure

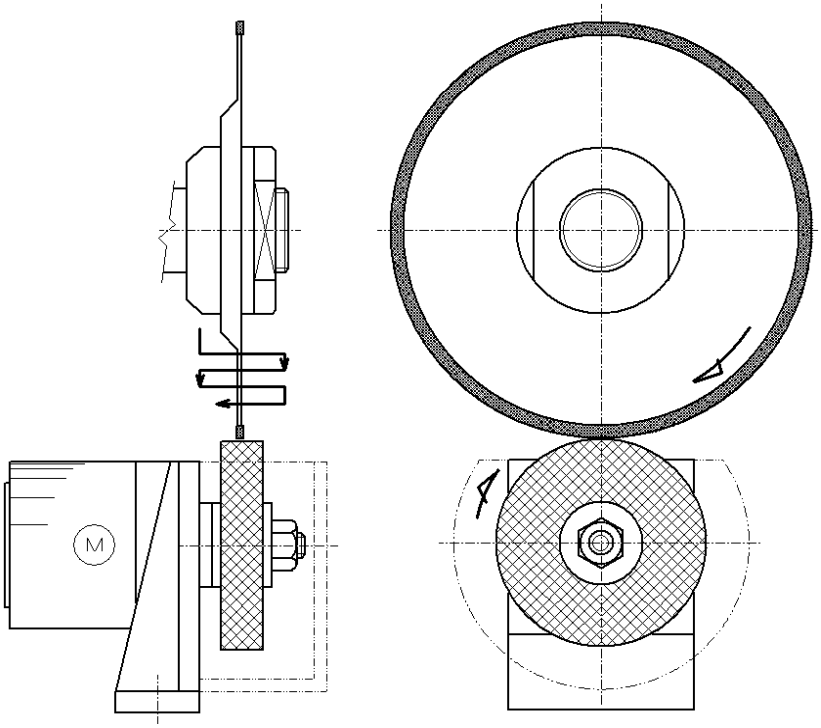
1. Fix the stone on the table.
2. Soak the grindstone sufficiently in the grinding liquid.
3. Make down feed.
4. Swing left and right.

Machining requirement.

1. Wheel speed: 400 - 800m /min
2. Grindstone speed: 100 - 200m /min
3. Down feed: 1-2 micron
4. Swing distanc: 0.1 - 0.5m /min
5. Select the grindstone: WA#200 - #600, SIC #200 - #600

Remark:

1. Do not change the lateral side of wheel. Possible to cause "run-out".
2. Do not apply strong load. Possible to cause "run-out" of the lateral side.



Picture - 2

09.2.10

電着ダイヤモンド・CBN工具

Diamond or cubic boron nitride electroplated tools

-1 Type

Electroplated tools are classified as follows:

1. Forming wheel
2. Mounted wheel
3. ID-blade wheel

-2 Feature

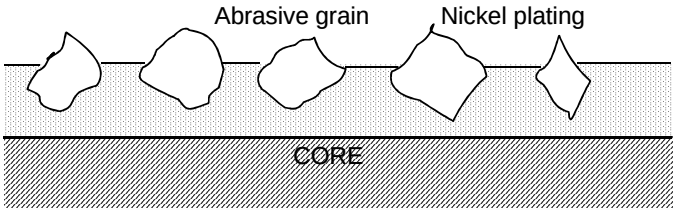
Electroplated tools have the following features compared to other bond. (Resin bond, metal bond, vitrified bond)

1 With better protrusion height of abrasive grains and sharp cutting blade maintained, excellent grinding performance can be made.

2 It is evenly and highly-densely adhered to the surface of core. Superior wearing-resistant. Also best for Forming wheel.

3 Cheaper cost than other bond and able to make complicated shapes. Also good performance in smaller lot machining.

4 If the core of the used tools has no problems, re-electroplate is possible.



Pic-1 Single layer electroplated tool

5 Able to make electroplated tool of ultra-small diameter.

5 Can be used as dresser, such as wheel.

7 With bigger protrusion height and many abrasive grain blades, grinding surface becomes rough, if the same mesh size.

Chart-1 Main usage of electroplated tool

Work material		Diamond	CBN
Cemented carbide		○	
Glass, Ceramic		○	
Ferrite		○	
Rubber, Plastic		○	
Stone, concrete		○	
Semiconductor		○	
Ferro-Tic		○	
Carbon		○	
Hardened steel	Carbon steel		○
	Alloy tool steel		○
	High speed steel		○
	Stainless steel		○
	Bearing steel		○

Precautions in use

1 Run-out

Run-out on abrasive grain surface may cause significant impact on machining accuracy. Also it may shorten the life of electroplated tools. Accuracy of machine, run-out, oscillation may cause bad impact on the finishing surface, such as vibration (bibiri).

When setting up electroplated tools on the machine, please make sure that run-out is less than 0.02mm, if possible, less than 0.01mm.

2 Peripheral speed of electroplated tools

Peripheral speed of electroplated tools varies by work material and working condition and it significantly impacts on grinding efficiency. Appropriate speed is not set but please refer to below (chart 2) which shows minimum and maximum speed as a target.

Optimum factor is rigidity of the machine and maximum stable speed of the machine (chart below) and it varies in each work material, machine and chucking condition. Please find the best setting at each work site.

(Chart 2: Target)

Work material	Peripheral speed (m/min)	
Hardening steel	CBN	500 ~ 1800
Carbide	Diamond	500 ~ 1500
Ferrite	Diamond	1500 ~ 2000
Silicon	Diamond	500 ~ 1500
Glass	Diamond	1500 ~ 2000
Shell	Diamond	1500 ~ 2000

3 Down feed

In line with peripheral speed, down feed can be determined by grain size, work material, finishing surface and working condition. Grinding sound, vibration and heating are also to be considered.

Chart 3 (Target)

Finish surface	Down feed
Rough	0.02 ~ 0.03
Medium	0.01 ~ 0.02
Finishing	0.005 ~ 0.01

Chart 4 (Target)

Work material	Down feed (min)
Hardening steel	2 ~ 15
Carbide	1 ~ 15
Glass	100 ~ 500

4 Grinding pressure

As this tool has excellent grind ability, just slight grinding pressure only is required. Excessive pressure shortens the life of electroplated tools. (2Kg/cm2)

5 Grinding liquid

Dry grinding is possible, but wet grinding has better cutting performance and finishing surface, life can be longer. Please use grinding liquid for cooling and washing. Please directly apply electroplated tools efficiently.

6 Clogging and dressing

There should have not many clogging-up. If clogged up, use the brush or WA stick to remove it.

Before use

The mounted wheels may generate intense horizontal vibration due to rotation speed, protruding height and run-out. It is possible to be inflected or scattered. To avoid such danger, please be sure: *To check that no dirt and dust on the chuck area, *To minimize the protruding height *To adjust that run-out at mounting is below 0.02.

Electroplating Allowance (How-to supply the core)

I. Grain size (JIS B 4140 : -- #325)

Nominal grain size	Size		Average grain diameter	Thickness (mm)
#60	60 / 80	JIS	230	0.27
#80	80 / 100	JIS	180	0.2
#100	100 / 120	JIS	150	0.18
#120	120 / 140	JIS	120	0.16
#140	140 / 170	JIS	105	0.13
#170	170 / 200	JIS	86	0.11
#200	200 / 230	JIS	75	0.1
#230	230 / 270	JIS	66	0.08
#270	270 / 325	JIS	57	0.07
#325	325 / 400	JIS	48	0.06
#400	Corresponding value		37	0.05
#600	Corresponding value		28	0.025
#800	Corresponding value		20	0.02
#1000	Corresponding value		16	0.015

II. Material for the Core

Best	SK, SS, S_C, etc
Appropriate	SHK, SKD, SUS, etc
Acceptable	Carbide, Aluminum
Not acceptable	FC

III. Precautions

1 In providing the core, basically electroplating only.
In the case of troubles due to the core, we are not able to offer you any refund or compensation. Thank you for your understanding and patience.

2 As for the concave electroplating, dimension of the core is the value where the allowance for electroplated is deducted.
As for the convened electroplating, dimension of the core is the value where the allowance for electroplated is added.

3 Dimensional tolerance after electroplating is a quarter of the allowance for electroplated.
[Example 1] #200 >>> ±0.1 / 4 = 0.025
[Example 2] #400 >>> ±0.05 / 4 = 0.01

4 We will do machining required for electroplating process to provided cores. Please instruct to us in advance for important area where machining is not required.
(Mounting standard area, center hole, etc)

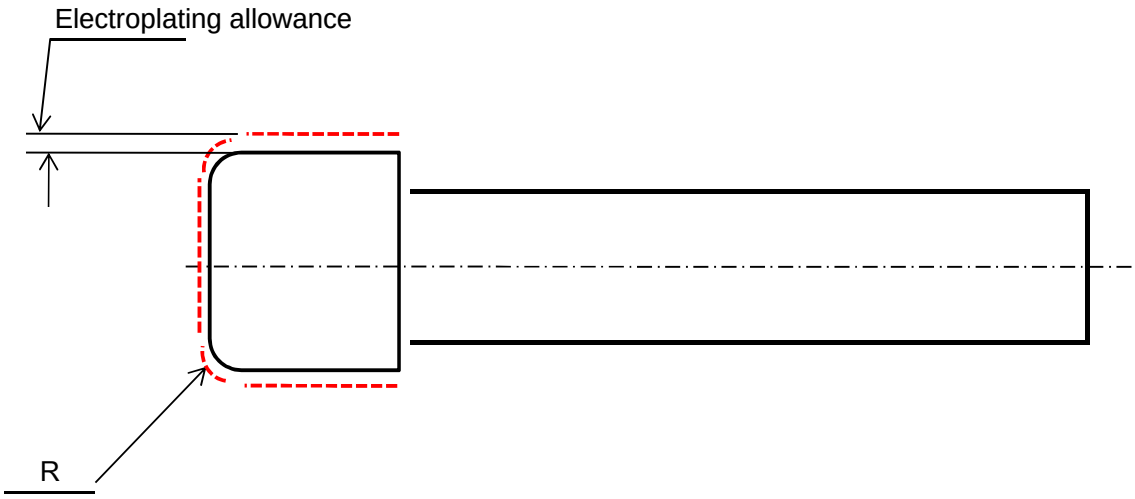
5 In the case of re-electroplating, please check any abnormalities (deformation) in the core. Re-electroplating products may have shorter life or lower accuracy. I would recommend new product for simple shape with smaller diameter.

IV. Others

1 Please let us know your grinding type (Tool grind, inner surface grind, router, machining, outer grinding, etc)

2) If aspect ratio is big for tool grinding and inner surface grinding, please inform us in advance.
[Example] φ3 hole x 30mm machining >> Aspect comparison ratio = 30 / 3 = 10

Electroplating: Reference data



Grain size	Average grain	Electroplating allowance	R limit value of angle area	Remarks
#	(μm)	Thickness (mm)	Target (mm)	
60	230	0.27	R 0.27 ~	
80	180	0.2	R 0.22 ~	
100	150	0.18	R 0.2 ~	
120	120	0.16	R 0.18 ~	
140	105	0.13	R 0.15 ~	
170	86	0.11	R 0.12 ~	
200	75	0.1	R 0.11 ~	
230	66	0.08	R 0.09 ~	
270	57	0.07	R 0.08 ~	
325	48	0.06	R 0.07 ~	
400	37	0.05	R 0.07 ~	
600	28	0.025	R 0.06 ~	
800	20	0.02	R 0.04 ~	
1000	16	0.015	R 0.04 ~	

* These are estimated values. Tolerance may vary by each grain size.

DIAMOND PASTE

ダイヤモンド ペ - スト

Container S = Syringe C = Can

Liquid O = Oiliness W = Soluble

Purpose		Code No.				Micron (μ)	Mesh (#) Corresponding value
		NO-	Capacity (g)	Container	Agent		
Mirror surface		SP2000-	5g or 10g	S or C	O or W	0 ~ 1/2 (0.5)	20000
		SP1500-				0 ~ 1 (1)	15000
		SP1000-				0 ~ 2 (1.5)	10000
Ultra precise		SP0800-				1/2 ~ 3 (2)	8000
		SP0500-				2 ~ 4 (3)	5000
Precise		SP0300-				4 ~ 6 (5)	3000
		SP0250-				4 ~ 8 (6)	2500
		SP0200-				5 ~ 10 (8)	2000
Normal		SP0150-				8 ~ 16 (10)	1500
		SP0120-				8 ~ 20 (14)	1200
		SP0100-				10 ~ 20 (16)	1000
Coarse		SP0080-				12 ~ 25 (20)	800
		SP0060-				20 ~ 30 (28)	600
Rough		SP0040-				30 ~ 40 (37)	400
		SP0032-				40 ~ 60 (44)	325
		SP0023-				60 ~ 80 (70)	230
		SP0017-				80 ~ 100 (90)	170

* Please use Oil-based type for the material that is easy to be rusted.

* Water soluble type can be washed away and is easy to handle.

*Order example = # 5000-5 g - syringe- oiliness

SP0500-5 - S - O

Points in use

1. Please completely clean up abrasive grains and dust at previous process on surface for grinding.
2. Extract appropriate amount of Diamond Past into the container, dilute by dilutive agent for use.
3. In case of using Diamond Paste with different grain size, prepare individual wrapping tools.
4. After wrapping, it is easy to clean up by alcohol, thinner, benzene.
5. Select wrapping tool that is softer than work material. With nearer to finishing process, (to finer grains), please use further softer material.

Reference Material

Cotton wool, Japanese paper, silk, velvet, soft felt, hard felt, leather

Soft wood, hard wood, soft metal, hard metal, plastic, etc.

Size Criteria for diamond of Single point dresser

Score to determine the size of diamond						
Score	Grindstone size mm		Abrasive grain	Grain size	Bonding strength	Bonding liquid
	OD	Thick				
1	~150	25	A,WA	46~80	~K	V, S
2	150~300	50	-	-	L~O	E
3	305~400	-	HA	90~	-	-
4	405~500	75	-	-	-	B
5	510~600	-	-	-	-	-
6	610~750	100	C, GC	12~36	P~S	R
7	760~910	-			-	
8	915~	125			-	
10		150			T~	
12		180				
14		205				
18		255				

[Chart - I]

Total score and diamond size	
Total Score	Carat
6	1.0
9	1.5
12	2.0
15	2.5
18	3.0
21	3.5
24	4.0
27	4.5
30	5.0
36	6.0
42	7.0
48	8.0

[Chart - II]

1) Based on [Chart - I], determine the score of each size and type on OD of grindstone, thickness, abrasive grain, grain size, bonding strength, bonding liquid.

2) Sum all scores and determine the diamond size according to [Chart - II]

(example In the case of 610mm x 100mm WA· 60· K· V

	Grindstone size (mm)		Grain	Grain size	Bonding strength	Bonding liquid	Total score	Carat [Chart-II]
	OD	Thick						
Score	6	6	1	1	1	1	16	2.7

The value calculated from this chart is the "carat" of Grinding diamond.
The carat of "dresser" may be 40 - 50% as standard.

That is, the size can be: 2.7 x (0.4~0.5)= 1.08~1.35≒1.5 carat

(For your company)□□□mm x □□mm □□· □□· □· □□□

	Grindstone size (mm)		Grain	Grain size	Bonding strength	Bonding liquid	Total score	Carat [Chart-II]
	OD	Thick						
Score							0	

	Coefficient	Calculated value	Determined value	
0	0.4			Carat
0	0.5			

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