

Opaque 도재의 도포 방법에 따른 금속-도재의 결합강도에 미치는 영향에 관한 실험적 연구

동우대학 치기공과

= Abstract =

An Experimental Study on Effect on Debonding Strength of Metal-porcelain by Painting Method of Opaque Porcelain

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This study is to know the difference bond strength according to painting method of Opaque porcelain.

Among Porcelain powder for Porcelain, Noritake powder, Bonding agent 1 class and metal are selected as Base metal alloy. And painting method of Opaque porcelain is divided by 4 groups : PG, WG, NG and DG. Also it is to manufacture 24 sheets of Specimen by 6 each every method and to measure Crack-initiation Strength of Metal-porcelain and it is to observe it by Scanning electron microscope. I come to get a conclusion as follows.

1. As for Debonding strength of every experiment groups, it showed that WS group which executed Wash bake had highest value, 44.25MPa and NG group which used Normal powder had value, 42.11MPa and DG group which used Bonding agent had value, 35.88MPa and PG group which used Paste opaque had value, 35.39MPa.
2. In four painting methods of Opaque porcelain, PG group, WG group, NG group and DG group, there is no significant difference statistically in Crack-initiation Strength.
3. As a result of observing fracture surface with Scanning electron microscope, it was showed that PG group remained a lot of particle of porcelain on the surface of metal than WG group, NG group and DG group.

차 례

가

1.

가

2.

1)

2)

3)

4)

5)

roughening

I. 서 론

가

가

1950

(opaque porcelain)

Noritake powder Degussa Bonding agent
ISO 9693:1999

가

sintering

, van der

Waals force

II. 실험재료 및 방법

1. 실험재료

Ni-Cr

Aalba

Dent Co. Vera bond alloy

Noritake (Noritke co. Limited)

metal conditioner Degussa AG

가

(Table 1).

Table 1. Materials used in this study

	Commercial Products	Code
Ceramic alloy	Vera bond alloy	
Body porcelain	Noritake A3	P
Opaque porcelain	Noritake paste opaque	W, N
	Noritake powder opaque	D
Bonding agent	Degussa	

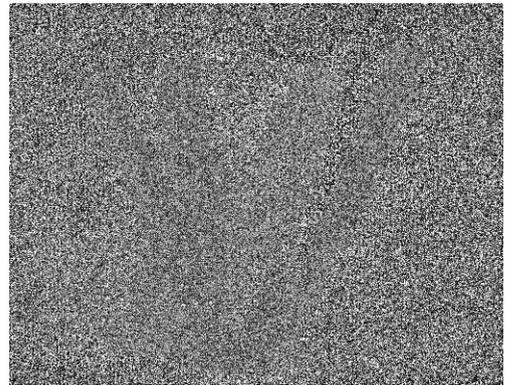


Fig 1. Casting body for bonding porcelain to metal specimen

2. 실험방법

1)

1)mm × (3±0.1)mm × (0.5±0.05)mm
 opaque
 24
 (Hi-Temp, Whip-Mix, U.S.A)

24 6 4
 opaque ceramic
 PG paste opaque 1 980
 2 960

WG powder opaque 1
 wash bake 980 2
 960
 NG powder opaque wash
 opaque firing 960 1,2

DG bonding agent 1 980
 2 powder opaque
 960
 0.5mm

1.1mm
 (Fig. 2,3).

2)

sandblasting steam
 cleaner(Aquaclean 3, Degussa, Germany)
 980 5

opaque ceramic 3mm
 (8±0.1)mm
 ceramic 가 (1.1±
 0.1)mm body ceramic
 ceramic
 disc trimming
 glazing

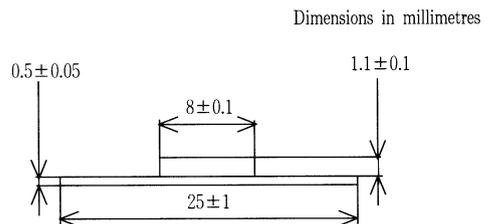


Fig 2. Dimension of specimen

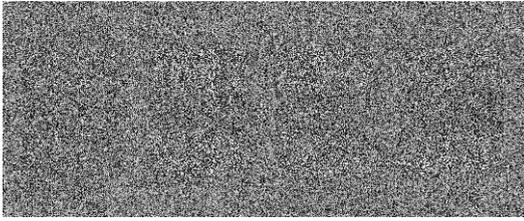


Fig 3. Completed specimens

3)

가 ceramic
 가 (Instron, 가 piston
 20mm, 가
 1mm)(Fig. 4)
 load cell head speed 1mm/min
 1000kg
 가 ,
 가 가 peak가
 - (debonding strength)

Debonding/Crack-initiation Strength, $b = k \cdot F_{fail}$

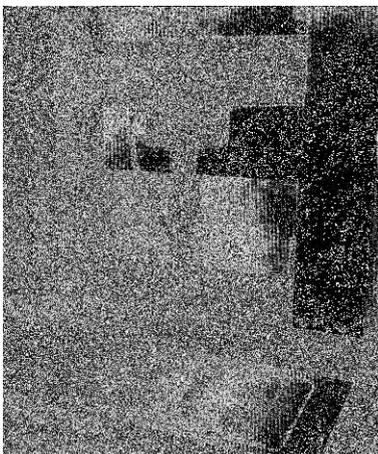


Fig 4. Debonding strength test(Instron, Houns Field Co.)

4)

(debonding strength)

(Scanning Electron
 Miroscopy, S-3000N Hitachi Co. Ltd., Japan)
 .(Fig. 5).

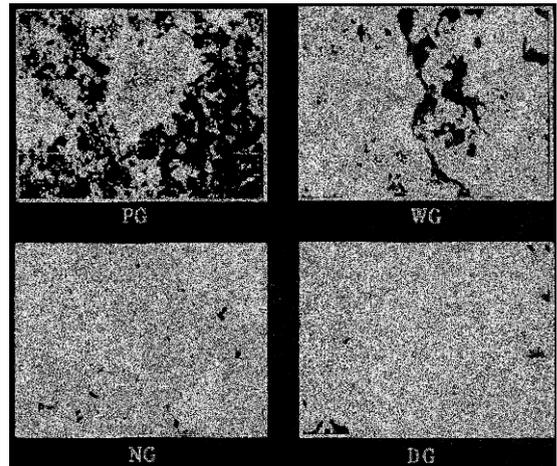


Fig 5. SEM micrographs for fracture surface of porcelain-metal systems

5)

(one-way ANOVA)
 T-test
 SPSS

III. 실험결과

Opaque
 (debonding strength)

<Table 2,3> <Fig 5,6>

<Table 2> wash bake
 WG 44.25 ± 5.20, powder opaque
 wash bake NG 42.11 ± 7.84
 (debonding strength)
 Past opaque PG
 35.39 ± 3.61, bonding agent DG
 35.88 ± 9.82
 <Fig. 5> (debonding strength)

PG WG
 가 , NG DG 가

(one-way analysis of variance) 95%
 가
 (debonding strength)가 가
 가 가

Table 2. Debonding strength of porcelain-metal systems(MPa)

Group	Mean	S.D.
PG	35.39	3.61
WG	44.25	5.20
NG	42.11	7.84
DG	35.88	9.82

Cross head speed = 1mm/min

Table 3. One-way analysis of variance

	Sum of Square	DF	Mean Square	F Value	Pr>F
Between Group (PG,WG,NG,DG)	356.135	3	118.712	2.396	.098
Within Groups	990.776	20	49.539		
Total	1346.910	23			

* P < 0.05

opaque

가 (P>0.05).

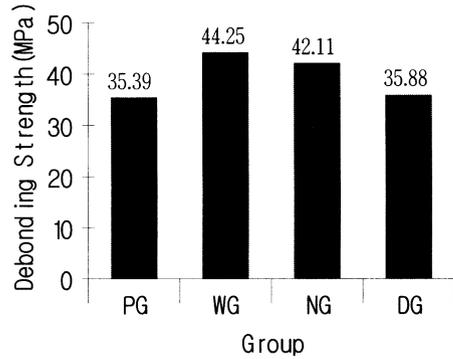


Fig 6. Comparison of debonding strength of porcelain-metal systems

IV. 고찰

der Waals force , Van

opaque powder가 opaque paste 가
 opaque powder가 (color modifier) 가
 Stein Kuwata 가
 opaque 2 opaque 가
 McLean 가
 paste opaque powder opaque 가
 (wetting) 가 20
 opaque bonding agent gold color
 Preston Berger opaque 가 가
 , Hammad powder 65 opaque 980 wash bake WG
 가 가 44.25 ± 5.20 가
 , Wight 80 , powder opaque wash bake NG
 960 1,2 42.11 ± 7.84
 (debonding strength) paste
 opaque 980 wash bake PG
 가 35.39 ± 3.61, bonding agent
 980 2 powder
 opaque DG 35.88 ± 9.82
 WG NG

가 가 wash bake 가 가
 powder opaque
 wash bake
 , 가
 가 opaque bonding agent
 powder opaque 가
 ,
 가
 ,
 PG
 가 가
 paste opaque 가 powder
 opaque

V. 결 론

가 가 가 (ISO 9693:1999)
 (opaque porcelain powder Noritake powder
 bonding agent 1 4
 line) 1, 2 (PG, WG, NG, DG) 6
 24 Instron Test
 bonding agent Machine - (debonding
 Strength)
 가 1. wash
 bake WG 44.25MPa
 가 , normal powder NG
 42.11MPa, bonding agent
 DG 35.88MPa, paste opaque
 가 PG 35.39MPa
 가
 2. 가 PG , WG ,
 NG DG

3.

PG WG , NG DG
 가

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