

국부의치 제작에 사용되는 Chrome Cobalt Alloy 주조 시 매몰방법과 주조방향이 주조성에 미치는 영향에 관한 연구

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= Abstract =

A Study on the Castability of Investing Method and Casting Direction of Chrome-Cobalt Alloy Widely Used in Production of Partial Denture Framework

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When producing partial denture using a Chrome-cobalt alloy being used universally, 45 pattern of them to compare casting characters according to 5 burying methods(special ring method, plastic ring method, general metal ring method) and 5 casting directions(straight, upper, lower, left and right directions) were compared and evaluated. The results were as follows :

1. The comparison of casting characters in accordance with burying type shows that the special ring method to install blind air vent using utility wax was the highest rate of 76.9%, followed by 69.1% of the plastic ring to cast without ring and 61.1% of the metal ring method being used universally respectively. Namely the special ring method was best. The significant level was $P < 0.05$ statistically.
2. The comparison of casting character in accordance with casting directions shows that the straight casting was the highest of 77.9%, and followed by right casting of 74.2%, left casting of 66.7%, upper casting of 63.5%, and lower casting of 62.9% respectively, Namely the straight casting was best.

차 례

- 1.
- 2.

mold
가

, mold

가

framework

가

I. 서 론

investment mold

가

(Impression)

(High polishing)

frame work spruing

pattern

Air Vent가

()

ring

metal ring

plastic ring

pH

setting

Plastic ring

casting

II. 실험재료 및 방법

1. 실험재료

(Plastic screen mesh) 12 gauge 1/2 round casting wax spure

wax 10 gauge round casting wax,(30mm)

Chrome cobalt alloy

Denti-vest investment(partial)

Chrome-Cobalt alloy

.(1, 2, 3)

1. Physical properties of Dent vest investment(Partial)

water / powder ratio	_____	100 g / 14 cc
working time	_____	4~5 minutes
Setting time	_____	8~9 minutes
Setting Expansion	_____	1.10 %
Thermal Expansion	_____	1. 20 %
Compressive Strength - Dry	_____	160 Kg / cm ² (2시간 / 12 cc)

2. Physical properties of Chrome-cobalt alloy

Vickers Hardness	_____	340
Yield Strength	_____	95,000 psi,(6680 Kg / cm ²)
Ultimate Tensile Strength	_____	120,000 psi,(8436 kg / cm ²)
Elongation(%)	_____	3.5
Casting Temperature	_____	2700 ° F, (1482 ° C)
Melting Range	_____	2450 - 2500 ° F, (1343 ~ 1371 ° C)
Modulus of Elasticity	_____	33,00 × 10 ⁶ Psi
Specific Gravity	_____	8.25 gm / cc

3. Physical properties of materials or instruments

-
-
- ① Plastic screen mesh (Korea)
 - ② Casting wax (Han Denk Chemistrys, Korea)
 - ③ Utility wax(Dae Dong Chemical Company, Korea)
 - ④ Crucible former (Rubber, Korea)
 - ⑤ Sprue (wax - Plastic - wood)
 - ⑥ Asbestos (Korea)
 - ⑦ Scales (Kyung In Co., Korea)
 - ⑧ Electric Furnace (Sae Ki Electronics Co., Korea)
 - ⑨ Casting machine (Kerr Co., U.S.A)
 - ⑩ Sand blaster (Sae Ki Co., Korea)
-

2. 실험방법

	U	10gauge round casting
	wax(30mm)	(Spure)
1)	(casting ring)	Wax
	pattern()
	(Plastic Screen mesh)	1/4 inch(dir 6mm)
19mm × 14mm	(Crucible former)	
12 gauge 1/2 Round wax	(Casting shrinkage)	wax
	pattern 1.5mm	spure

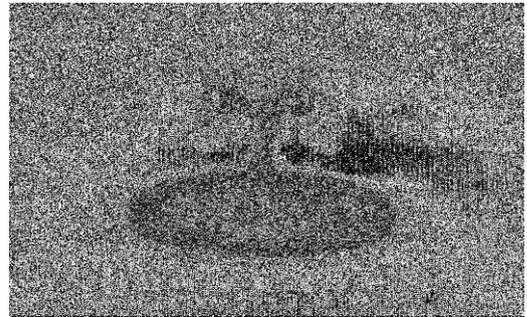
4. Number of wax pattern

Ring types		Special ring			Plastic ring			metal ring			Total
		A	B	C	A	B	C	A	B	C	A.B.C
Numbering of wax pattern	Straight	1	1	1	1	1	1	1	1	1	9
	upper	1	1	1	1	1	1	1	1	1	9
	lower	1	1	1	1	1	1	1	1	1	9
	left	1	1	1	1	1	1	1	1	1	9
	right	1	1	1	1	1	1	1	1	1	9
Total		5	5	5	5	5	5	5	5	5	45

※ A, B, C는 각각의 ring마다 주조체의 평균성적을 내기위해 3개의 ring을 의미함.

※ 시편의 각 방향은 주조하는 사람을 기준으로 직선, 상방향(윗방향), 하방향(아래방향), 좌방향(전방향), 주조기 회전방향쪽을 말하고, 우방향(후방향)은 주조기 회전 반대 방향을 말함.

(reservoir) .(1)
 ring 1 5
 (, , , ,)
 spure 3 ring
 spure ,
 9 ring(45)
 .(4)



1. Wax Pattern

2) (Spruing)

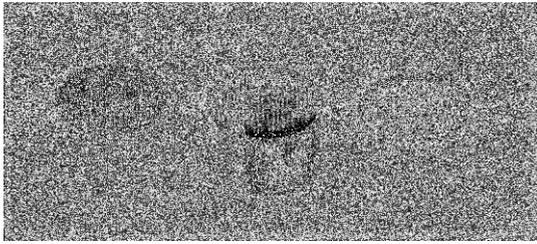
(1)
 sprue 10gauge round wax
 sprue sprue mesh
 pattern ring . . . (90mm, 60mm) former
) sprue Air vent ring
 가 가 ring pattern spruing sprue
 ring reservoir
 1/4 inch(6mm) 1.5mm
 sprue 2 pattern 가 rubber former wax
 3 ring Air vent
 (special ring) (1)
 . . . pattern

90mm, 60mm) former
 Air vent ring
 pattern 1/4inch(6mm)
 spruing sprue
 rubber former wax

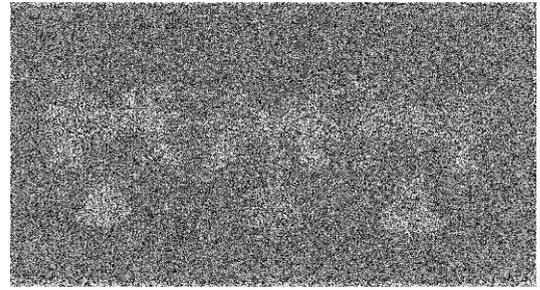
3) (Investing)

6mm ring
 rubber former utility(5mm)wax
 Asbestos ribbon lining ring(

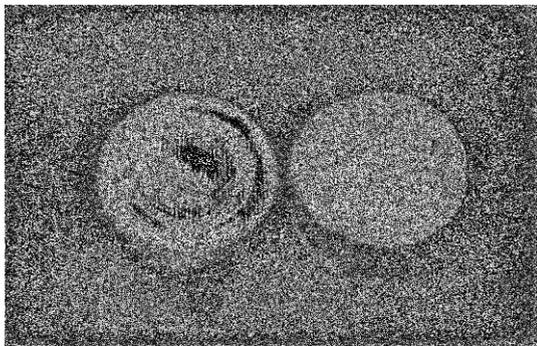
Denti-vest(Sin Ji Co.,
 W/P ratio 0.14
 one stop



I Special ring II Plastic ring III Metal ring
2. Ring



I Special ring II Plastic ring III Metal ring
4. (casting body)



3. Ring

metal chrome cobalt alloys 50g
ring . . .
propane gas/oxygen torch
bench cooling .
Ring casting body
50µm aluminum
oxid sand blasting .(4)

setting ring former 3 Plastic
ring ring .(2, 3)

4) (Burn out)

24 furnace 250 30
가
600 ring 가 가
850
30 (heat soaking)

5) (Casting)

Spring tension
(Centrifugal casting machine)
ring counter weight 3

6)

ring 3가 (special
ring, Plastic ring, metal ring) 5가
(, , , ,) , Cone

Pattern

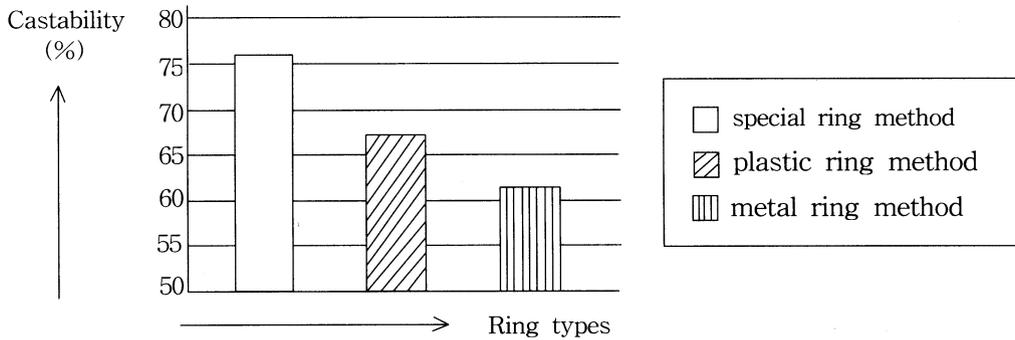
ring 가 가 utility
ring
wax blind vent ring
special ring method(3), plastic ring metal
, plastic ring method
ring(3)
investing ring metal ring method

Mesh screen pattern casting body 1
160 (100%) ring (3)
pattern (, , , ,)
(%)

5. Ring

Ring 종류	Mean	std. Deviation	std. Error	F	P
special ring	76.8680	8.1172	3.6301		
plastic ring	69.1180	6.6516	2.9747	3.954	0.048 *
metal ring	61.1240	11.1802	4.9999		
Total	69.0367	10.5568	2.7258		

* P<0.05



5. Ring

ANOVA SPSS blind sprue

air vent 3 ring 가 88.12% 82.5%, 73.75%,)

(ring 69.37%

plastic ring 가

plastic ring 76.25% 가

ring 3 , (metal ring 1 74.37%,

(mesh pattern 5) , , , 70.6%, 62.50%, 61.87%

(5, 5)

ring 80.6% 가

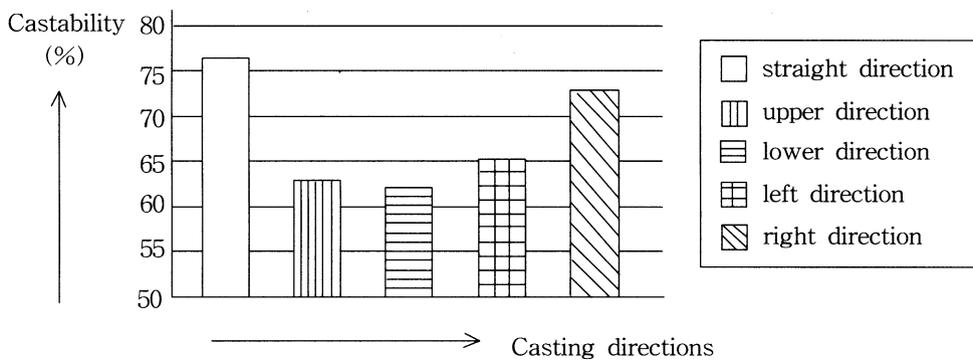
3가 ring 60.0%, 58.75%, 55.0%,

pattern 1 160 53.12%

III. 실험결과

6. Sprue

Casting directions	Mean	std.Deviation	std. Error	F	P
straight direction	77.9000	6.3930	3.6910		
upper direction	63.5400	9.4859	5.4767		
lower direction	62.9233	6.2458	3.6060	1.302	0.333
left direction	66.6567	12.0587	6.9621		
right direction	74.1633	14.0611	8.1182		
Total	69.0367	10.5568	2.7258		



6. Sprue

Investing, Burn out, Casting 가 spruing 가 P<0.05

(6, 6) 77.9% 가
66.7%, 63.5%, 74.2%, 62.9%

IV. 총괄 및 고찰

utility wax blind vent 가
special ring 76.9% 가 가
plastic ring
burn out casting plastic ring
69.1%
metal ring
61.1% 가 (,), , ,

(lost wax), 가 (3) 가 (9)
 가
 가 ()

Rousseau reservoir runner bar 6 () 12 ()
 9 () 3 ()

partial denture 가 framework wax pattern ()
 가 (3), (9)
 가

crucible framework utility wax 6mm wax pattern blind air vent ring
 pattern framework wax ring metal ring asbestos lining 61.1%
 12 () ring 69.1%, metal ring P<0.05
 가

()
 ()
 9 , 3 (), 6 (),
 () 12 ()
 가 (P<0.05)
 ()
 23.80 , 9
 () 15.60, 3 ()
 14.47, 12 () 13.13, 6
 () 12.80

ring
 ring
 ring
 (air vent)
 reservoir
 가

가
 가
 77.9%, (3) 74.2%, (9)
) 66.7%, (12) 63.5%,
 (6) 62.9%
 9
 () 3 ()

V. 결 론

가
 Chrome-cobalt alloy
 3가 (special ring method, plastic ring

method, metal ring method) 57가
 (, , , ,)
 pattern 45

1. utility wax blind air vent
 special ring 76.9%, ring
 (plastic ring) 69.1%,
 metal ring 61.1%
 special ring 가
 P<0.05
2. 77.9%, 74.2%,
 66.7%, 63.5%,
 62.9% 가

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