

# 치과 보철물 제작시 사용되는 Sprue의 재료 및 형태가 비귀금속 합금의 주조성에 미치는 영향에 관한 연구

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= Abstract =

## **A Study on the Castability of Base Metal Alloys Which Sprue Shape and materials used in the Production of Dental Prosdontics**

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In order to examine the influence of sprue(used to make crown supplements) on casting, 3 kinds of sprue materials(wax, wood, plastic) and 3 types of sprue(round, square, triangle) were made and buried and cast, then the comparison and analysis of casting characters among sprue materials and among sprue type show the following results :

1. The comparison of casting characters in accordance with sprue materials shows wax sprue of 83.3%, wood sprue 81.3%, and plastic sprue of 80.7%, Wax sprue was the bast materials for casting, However there was no statistically significant difference of casting characters among was, plastic and wood.
2. The comparison of casting in accordance with sprue types shows square sprue of 94.0%, round sprue of 86.9% and triangle sprue of 84.2%. square sprue had a best casting character.
3. When a ring cast using wood sprue was classified from burying materials. its cutting of casting body and sprue indicated much more than any other sprue material. It seems to be caused by the influence of wood residuals and carbon occurrence.

# 차 례

pattern)

1.

2.

1)

investment (lost wax )

가

2)

3) (Investing)

4) (Burn out)

가

5) (Casting)

6)

# I . 서 론

Inlay wax

Inlay wax,

가

가

가

가

가

가

(Ultimate tensile

strength),

(resistance to permanent deformation)

wax spure

가

가

spure

plastic sprue,

long bridge spruing

wood sprue

sprue

가

sprue

가

(Wax

## II. 실험 재료 및 방법

### 1. 실험재료

Screen mesh 12gauge 1/2 round casting wax  
 , sprue ring 3 (ring 1  
 Pattern 3 ) wax sprue,  
 ring 3 plastic sprue 3 ring  
 wood sprue  
 sprue  
 wax sprue  
 Hi-Temp Investment ring  
 sprue metal partial

denture ring( 90mm x 60mm)  
 , crown &  
 bridge ring( 50mm x 60mm)  
 metal  
 New crown metal( ring 20g,  
 ring 10g)  
 .( 1, 2 )

### 2. 실험방법

1)  
 Sprue

(Plastic screen

#### 1. Physical Properties of Hi-temp investment

Liquid*/Powder ratio	—————	16 L/100 g
Working Time	—————	7~8 minutes
Setting Expansion	—————	0.7%
Thermal Expansion	—————	1.2%
Compressive Strength, Wet	—————	1,500 Psi(10 MPa)

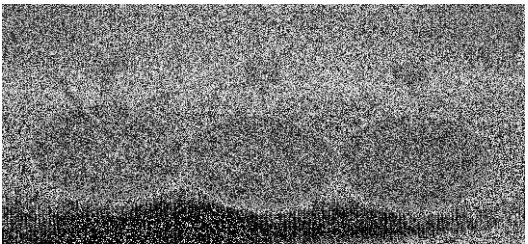
\* Suggested concentration of Special liquid is 75%  
 (3 parts liquid to 1 part water)

#### 2. Physical Properties of materials or instruments

Plastic screen mesh (Korea)  
 Casting wax (Han Denk Chemistrys, Korea)  
 Crucible former (Korea)  
 Plastic sprue (Korea)  
 Wood sprue (Korea)  
 Asbestos liner (Korea)  
 New crown metal (Japan)  
 Electric furnace (Sae Ki Electronics Co, Korea)  
 Casting machine (Kerr Co., U.S.A)  
 Sand blaster (Sae Ki Co., Korea)

mesh) 19mm x 14mm cutting  
 12gauge 1/2 round wax  
 3 U  
 sprue sprue  
 wax sprue, plastic sprue,  
 wood sprue ring 1 3  
 sprue 3 ring  
 sprue  
 10 gauge round casting  
 wax sprue, sprue  
 3 ring 1 sprue  
 Pattern  
 1/4inch( 6mm) (rubber  
 crucible former) .( 1, 2)

2)  
 Plastic screen mesh  
 pattern wax, plastic, wood sprue  
 1 ring pattern 3  
 ring 9 , pattern 27  
 1 ring 1  
 pattern ring  
 pattern 9 , 10  
 gauge wax , ,  
 sprue sprue 3  
 pattern sprue  
 40mm, 30mm  
 .( 1, 2)

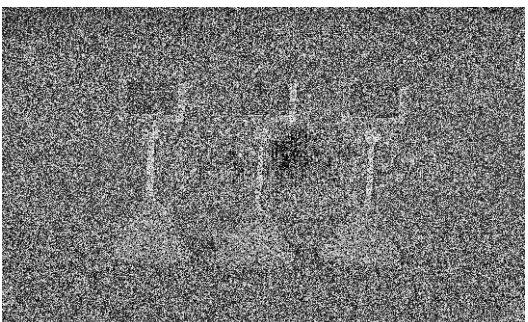


A. wax B. Plastic C. Wood  
 1. Sprue

3. (Sprue )

Materials Number	Wax Sprue	Plastic Sprue	Wood Sprue	Total
A ring	3	3	3	9
B ring	3	3	3	9
C ring	3	3	3	9
Total	9	9	9	27

\* ring A, B, C는 큰 의미는 없고 ring 3개를 표시하기 위해 사용한 명칭임.



A. round B. square C. triangle  
 2. Sprue

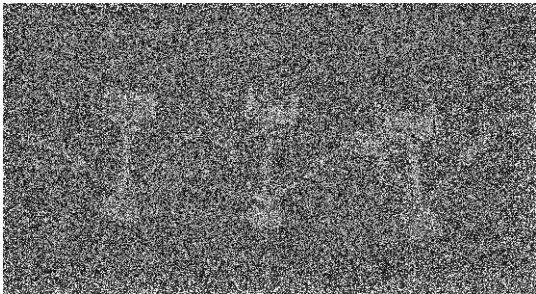
4. (sprue )

Sprue shape Number	Round	Square	Triangle	Total
A ring	1	1	1	3
B ring	1	1	1	3
C ring	1	1	1	3
Total	3	3	3	9

\* ring A, B, C는 큰 의미는 없고 ring 3개를 표시하기 위해 사용한 명칭임.

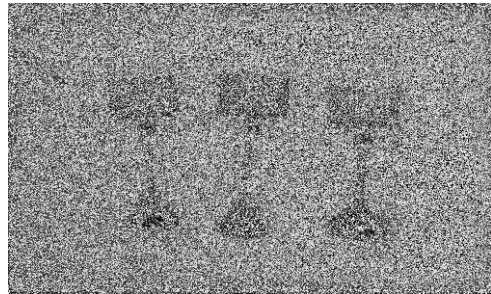
## 5. Conditions of Investment & Casting

Product name(alloy)	_____	New crown alloy
Product name(Investment)	_____	Hi-Temp Investment
Manufacture & Nations(Investment)	_____	Whip-mix Corporation U.S.A
Water powder ratio(W/P)	_____	0.14
Investment materials	_____	Phosphate bonded
Temperatures of burning out	_____	800°C
The melting temperatures for alloys	_____	1330°C



A. round    B. square    C. triangle

3. Casting body of sprue materials.



A. round    B. square    C. triangle

4. Casting body of sprue shape

### 3) (Investing)

(plastic screen mesh)    wetting  
 agent    sprue  
 ring    90mm,    60mm, sprue  
          50mm,    60mm metal ring  
          ,    asbestos ring  
          3mm(1/8 inch)  
 (water)    Hi-Tempo Investment

5

### 4) (Burn out)

ring

가

24

electric furnace    wax    plastic  
 screen mesh    holding    250  
 30    mold    850  
          furnace    가    gas  
 ring    가    가 600  
          furnace    가 850  
 30

### 5) (Casting)

spring tension    Kerr  
 (U.S.A.)    (Centrifugal  
 casting machine)    Oxygen-Propane gas  
          ring 1    20g,  
          10g    New crown metal

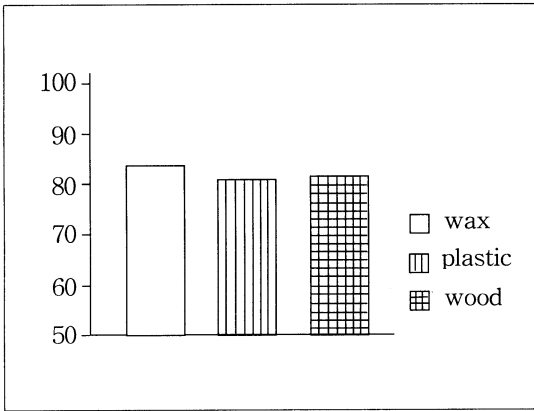
casting ring bench (1 160 )  
cooling 50μm casting body 9 sprue  
aluminum oxid sand sand blasting  
.( 3, 4) 6, 5  
6) sprue wax sprue  
83.3%, wood sprue 81.3%, plastic sprue 80.7%  
wax sprue가 가  
Sprue sprue가  
Sprue sprue가  
Wax sprue, Plastic sprue, Wood sprue  
ring 3 (ring 1 Pattern 3 )  
9 Pattern(1 pattern 160 )  
( 6, casting body  
(casting body 1  
5) Sprue Round, 160 )  
Square, Triangle sprue ring 3 7, 6  
(ring 1 pattern 1 ) Sprue sprue  
sprue 94.0%, 86.9%, 84.2%  
sprue가 가  
SPSS ANOVA  
.( 7, 6)

### III. 실험결과

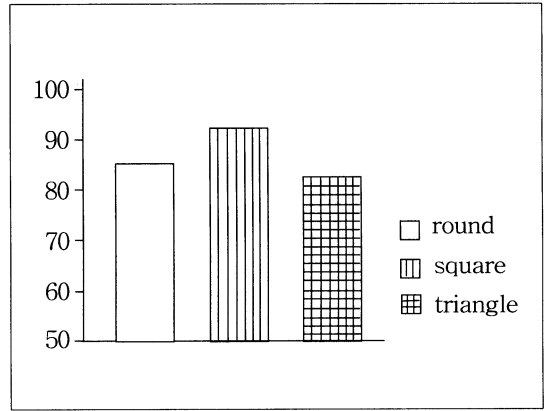
Sprue 가  
sprue setting  
wax sprue  
plastic sprue, 가  
long bridge sprue Plastic  
wood sprue sprue wood sprue  
ring(partial denture ) 3  
sprue Wax sprue  
body sand blasting casting mesh pattern

#### 6. Sprue

Sprue materials	Mean	std. Deviation	std. Error	F	P
Wax sprue	83.2500	6.1572	2.5137		
Plastic sprue	80.7333	7.1743	2.9289	0.203	0.818
Wood sprue	81.2667	8.1422	3.3240		
Total	81.7500	6.8577	1.6164		



5. Castability



6. Castability

7. Sprue

sprue 형태	Mean	std. Deviation	std. Error	F	P
Round sprue	86.9000	12.0462	6.9549		
Square sprue	94.0000	8.8386	5.1029	0.996	0.423
Triangle sprue	84.1667	3.1086	1.7947		
Total	88.3556	8.8060	2.9353		

IV. 총괄 및 고찰

가

가

가  
precious

non-precious

semi-  
가 가

(noble metal) 가  
가

가

가

(acid)

가

가

가

wax pattern

investment

, sprue

, burn out

가

가

, casting

wax pattern

sprue wax pattern venting,  
 investment mold 가 가  
 가 , mold 가 가

sprue 가 가

sprue 가 sprue

sprue wax pattern  
 sprue 가 casting wax ring  
 plastic sprue 가 (blow piper)  
 wood sprue  
 가 sprue  
 sprue 가  
 sprue

sprue 3가 (wax sprue, plastic sprue, wood sprue) ( , , ) 3 가

ring blow piper metal , casting time

ring 가 가

sprue wax sprue 80.7%, wood sprue 81.3%, plastic sprue 80.7% wax sprue 가 가 가

sprue 94.0%, sprue 86.9%, sprue 84.2% sprue가 가 가

sprue

### V. 결 론

sprue가 sprue  
 3 (Wax, wood, plastic) Sprue 3  
 ( , , )  
 , sprue ,

1. Sprue  
 wax sprue 83.3%, wood sprue 81.3%, plastic sprue 80.7%  
 , wax sprue가 가  
 , Sprue  
 Wax, Plastic, Wood

2. sprue  
 sprue가 94.0%, 86.9%, 84.2%,  
 sprue가 가

3. wood sprue casting ring casting body sprue  
 sprue가 cutting sprue



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