Development of Cement-bonded Keeper Used with Carbon Lead-Part3 A Trial for Ready-made Pattern

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Introduction

To fabricate magnetic attachment keeper housings for cementation method, ready-made plastic patterns have been usually used.
But the outer diameters of the plastic patterns often limit the shape of the casting patterns of keeper components.

We have already made presentations on the new method for fabricating keeper component at the previous 18th and 19th meetings.

In the first presentation, we reported a new method for fabricating them with trial graphite patterns made with rod-shaped graphite for writing.
This method was proved to be very useful because of the good casting performance owing to the high thermal stability and mechanical strength of the graphite material and good compatibility of the graphite with investing materials.
In the second presentation, we reported the pattern fabrication with carbon material (#2191) widely used in the industrial field to develop ready-made carbon patterns, which had a problem on the thermal stability of the material.
This time, we are going to present a new trial carbon pattern which improved thermal stability for casting.

Objectives

The purpose of this study was to assess the efficacy of a newly developed carbon material for developing ready-made carbon patterns for fabricating keeper housings.

Materials and Methods

1. Materials

Newly developed carbon material (Aichi Steel Co. Japan) was used in this experiment. This material has higher heat resistance property than the carbon material #2191 (Aichi Steel Co. Japan) used in the previous study.
Carbon patterns for fabricating keeper housings were made with this material.

The keeper without holder (PHYSIO MAGNET Aichi Steel Co. Japan) was used in this study. Carbon patterns were fabricated so as to confirm the position of carbon pattern in the investing material.

2. Experiment 1

Six carbon part of the casting patterns were fabricated with newly developed carbon material.
They were heated and stored under six heat conditions (450℃, 500℃, 550℃, 600℃, 650℃, 700℃, 30 minutes) in the furnace respectively. After heating and storing, the diameters of carbon patterns were measured to assess the thermostabilities of the pattern sizes.
And changes of the surface textures of them were observed by visual comparison. (fig3- 1 ,3-2 fig4)

3. Experiment 2

On the basis of experiment 1, casting patterns of keeper components in which the carbon part were incorporated were fabricated by the usual method in two conditions (stored 690℃ furnace for 30 minute, stored 700℃ furnace for 20 minute) .
After casting, the diameter of keeper space were measured and evaluate

Fig1

Fig2

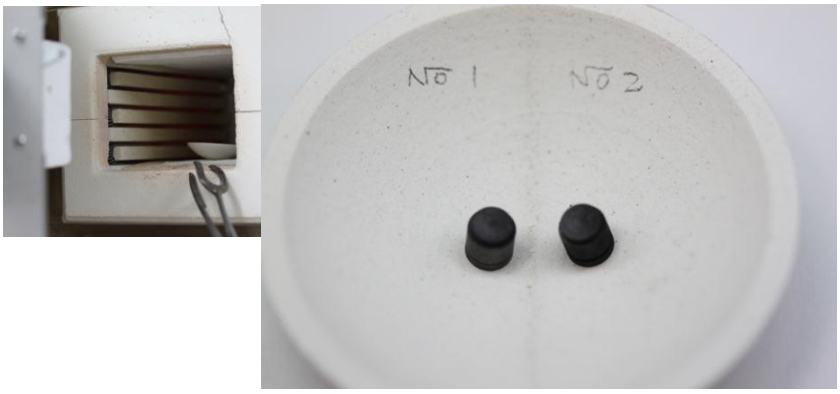

Fig3

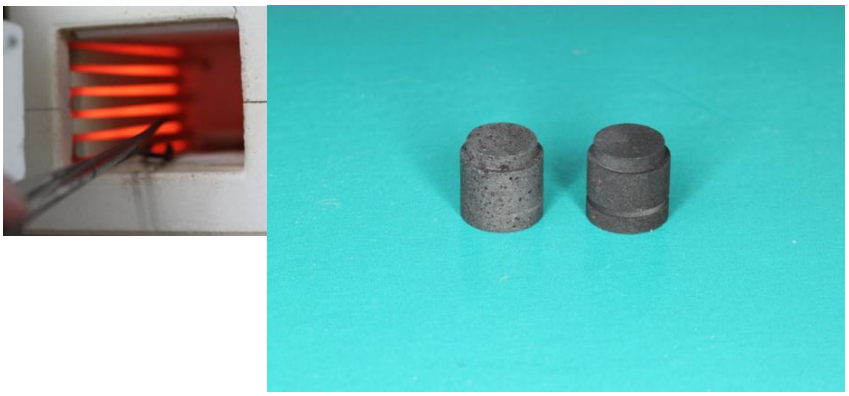

Fig4

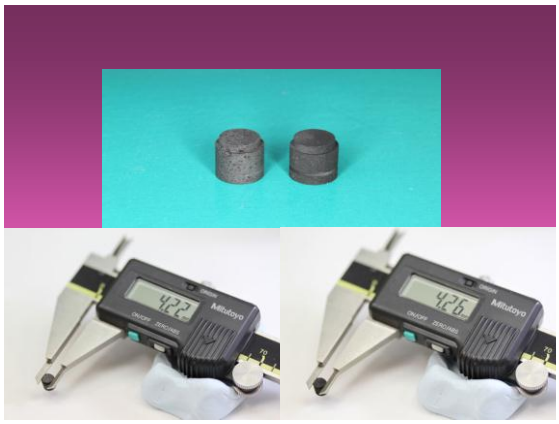

Fig5

Fig6

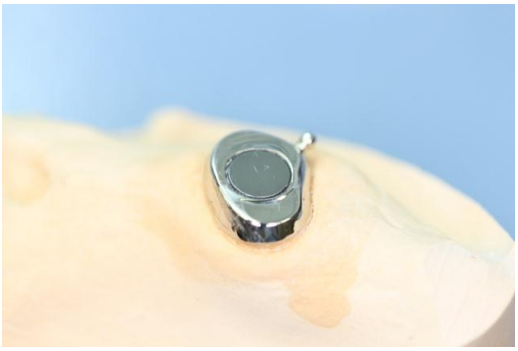

Fig7

Fig.1　Trial graphite pattern made from carbon rod
Fig.2　Improved trial product for ready-made
Fig.3　The state after heating (450℃, 30 minute)
Fig.4　The state after heating (650℃, 30 minute)
Fig.5　The measurement of diameter (650℃, 30 minute)
Fig.6　As cast after heating and storing 700℃, 20 minute
Fig.7　700℃, 20 minute, after casting and then keeper cemented to the root cap

Results and Discussions

There is little difference of the diameter for keeper space among the samples derived from 450℃ to 650℃ of furnace heating conditions, though the surface textures of the carbon patterns showed a little change.

It is concluded that the new carbon material showed great improvement in terms of the thermal stability for fabricating keeper components. However, considering the accuracy of casting or fitness, further improvement of heat resistance of the materials will be needed.