- Graduated from Pusan Catholic University, majored in Dental Engineering
- Awarded Grand Prize at Dentsply Ceramic Contest
- Participated in many clinical studies and tests at the University's hospital
- Speaker at 3D printer CAD/CAM seminar
- Speaker at regular seminar of Korea Ceramic Institute of Technology in 2021

Jin-uk Baek
Senior Researcher in AON Co., Ltd.

- Graduated from Masan University, majored in Dental Engineering
- Lecturer at Department of Dental Engineering, Masan University
- Chairman of Gyeongnam Study Group

In-hwan Jeong
Dental Technician

[Case Study]

This case study is aimed to share with end-users the result of P.F.Z clinical trial by using ceramic 3D printer. AON's ceramic 3D printer, ZIPRO has been used to share with end-users the result of the clinical trial in comparing with dental milling machine.

<Patient's clinical history>

Hyeju Lee at age 36years, Female_ #11,12,21

Shade Taking : A2(Vita Classic Shade Guide)

Currently, patient's anterior teeth arrangement is not fit to the median line
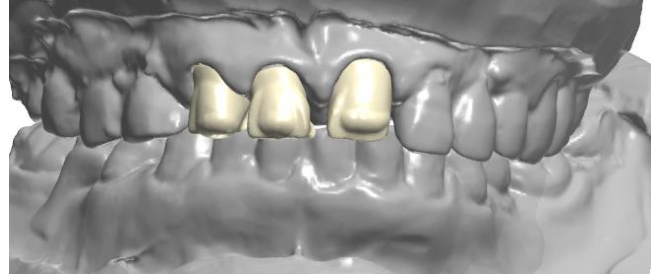

(Figure-1) Before preparation
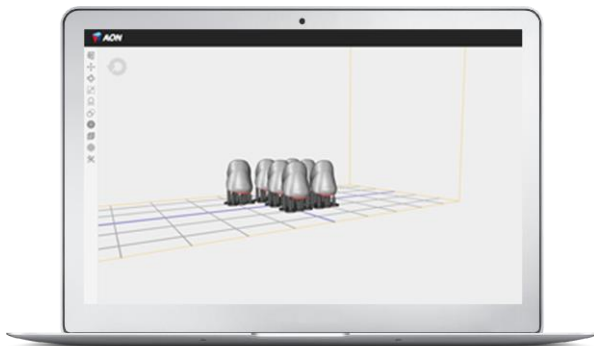

(Figure-2) Shade taking

\<Scanning & Designing\>

(Figure-3) Scan

(Figure-4) Coping design

■Scanner : 3Shape E3 Scanner
■CAD S/W : 3Shape Dental Manager

\<Slicing & Printing\>

(Figure-5) ZIPROS, Slicing S/W for ZIPRO

(Figure-6) ZIPRO Ceramic 3D Printer and INNI-CERA of Zirconia Slurry approved by Korea Mistery of Food and Drug Safety

Since the supporting parts for 3D printing are automatically set up by ZIPROS, end-users can minimize the time and efforts for setting up the parts. When it comes o printing time by ZIPRO 3D printer, a coping takes about 120min and a crown needs 140min. INNI-CERA is the Class-2 aesthetic material approved by Korean Ministry of Food and Drug Safety and its average flexural strength is circa 800Mpa, which is met to the required strength of dental restorations.

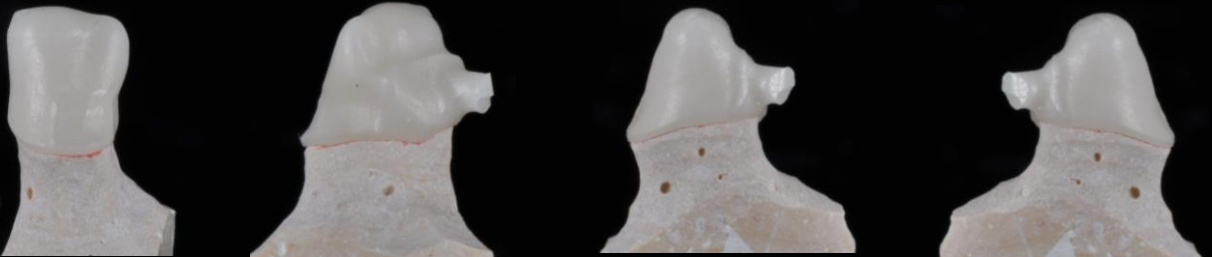## < Comparison between ZIPRO 3DPrinter and 5-Axis Milling machine >

■5-Axis Milling #11

■AON ZIPRO 3D Printer #11
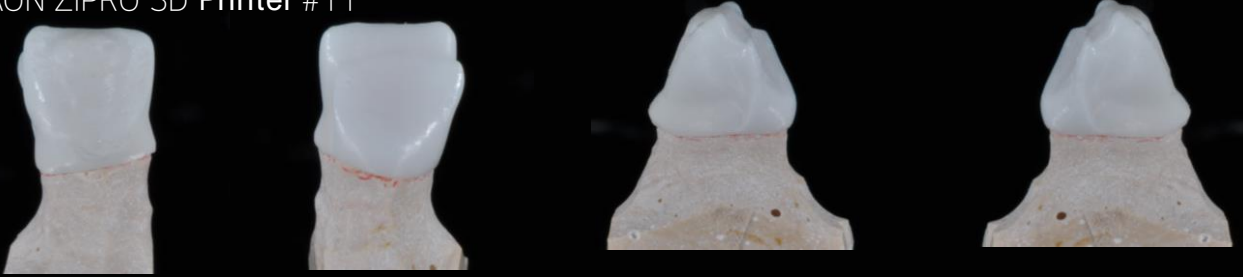
(Figure-7) #11 Result of Comparision

■5-Axis Milling #12

■AON ZIPRO 3D Printer #12

(Figure-8) #12 Result of Comparison

(Figure-9) #21 Result of Comparison

(Figure-10) Milling machine

(Figure-11) ZIPRO 3D printer

Above Figure-9,10,11 are intended not only to intuitively show end-users its margin fit and internal adaptation, but also to help to figure out the current whereabout of ceramic 3D printer for dental restorations in quality comparison with the the 5-axis dental milling machine proved clinically and most widely. When adjusted inner and margin fit of coping 3D-printed, we could not see any differences between ZIPRO's coping and milling machine's coping. As you can see in the above 3 Figures, there are no difference between 2 results in terms of margin fit and internal adaptation.

<Build-up & Contouring>

1. Buildup step

2. Glazing step

3. Staining step

(Figure-12) Images by buildup and contouring steps

Coherence between porcelains and copings 3D-printed by ZIPRO doesn't appear differently from that by milling machine. Moreover, any grayish color on margin area and Mamelon structure which is similarly appearing in P.F.M and P.F.Z process was not found and I could not see any material difference in aesthetic appreciations between by-3D-printing and by-milling-machine because aesthetic color of dental restoraions by 3D-printing is implemented as soft as that of natural teeth.

<Setting Result>

(Figure-13) Before preparation

(Figure-14) Setting A

(Figure-15) Setting B

[Conclusion]

Now that we have successfully done the clinical trial for coping, we will participate in further clinical trials for single crown, bridges, etc later on.

AON R&D center is in the middle of doing research and development activities in order not only to enhance ceramic 3D printer, but also to automate the slicing software, to optimize the cement gap by each CAD software, and to minimize the sintering time.

AON is expected to continuously deliver innovative and best-performing products to global dental device markets because of their restless efforts to enhance the product quality and to expand the user-friendliness.