



# TECHNOLOGICAL ASPECTS REGARDING ALL-CERAMIC PROSTHETIC RESTORATIONS MADE BY PRESS TECHNOLOGY

CAMELIA IONESCU<sup>1</sup>, RADU COSTEA<sup>2</sup>, IULIANA BABIUC<sup>3</sup>, MĂDĂLINA ADRIANA MALIȚA<sup>4</sup>, IRINA ADRIANA BEURAN<sup>5</sup>, MĂDĂLINA VIOLETA PERIEANU<sup>6</sup>, MAGDALENA NATALIA DINA<sup>7</sup>, RALUCA MARIA MANEA<sup>8</sup>, FLORENTINA CĂMINIȘTEANU<sup>9</sup>, MIHAI BURLIBAȘA<sup>10</sup>, SERGIU DRAFTA<sup>11</sup>

<sup>1,2,3,4,5,6,7,10,11</sup> "Carol Davila" University of Medicine and Pharmacy Bucharest, <sup>8,9</sup> Private Office Bucharest

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**Abstract:** Dental technology has advanced considerably, and there are now a number of new, more effective methods that save some of the time and cost of getting the perfect smile. Ceramic restorations obtained by press technology are used in more and more countries, because the technological workflow involve the use of lost wax technique, a technique well known by most dental technicians. All-ceramic restorations are very sensitive prosthetic parts, therefore, the use of very fluid impression materials is also required, as well as materials for making models, which would give the finest details of the prosthetic field. It must be taken into account that the technological flow is very long, and errors can occur at any time.

## INTRODUCTION

In everyday life, the value of a smile is very important, as people are influenced by what they see around them, by the idea of beauty promoted in magazines or on TV. Smile plays an important role in the first impression, being one of the most important communication tools. In addition to the significant role, it plays in terms of aesthetics, the smile also influences facial expression, phonation, and most importantly, masticatory function.

But dental technology has advanced considerably, and there are now a number of new, more effective methods that save some of the time and cost of getting the perfect smile. Specifically, in this material we will address a number of practical aspects (of the laboratory stages) regarding the IPS e.max ® System technology.

Ceramic restorations obtained by press technology are used in more and more countries, because the technological workflow involve the use of lost wax technique, a technique well known by most dental technicians, which does not require expensive laboratory equipment, and because there are currently versatile systems that can cover all types of prosthetic restorations.(1-7)

All systems that use the pressed ceramic technology follow the same technological workflow: first, the framework is created from wax on the model either to the final size of the restoration or to a smaller size (core), then the sprues are attached, investment is carried out with IPS PressVEST Premium a special investment material, the wax is removed from the investment, then the ceramic is pressed in the investment after preheating.

After divesting, the core is exposed and it will be covered with a low-fusing nano-fluorapatite glass-ceramic for morphological and functional individualization. Depending on the aesthetic requirements, the area in which the restorations

will be applied, the way in which their individualization will be done, there are three techniques for all-ceramic restorations: the staining technique, the cut-back technique and the layering technique.(1-7)

## AIM

Next, in this material, we will present some aspects of the technological workflow for the realization of all-ceramic prosthetic restorations made by IPS e.max ® System technology, specific to the dental laboratory.

## MATERIALS AND METHODS

The techniques by which all-ceramic prosthetic restorations can be created are:

### 1. Staining technique

This technique involves making the crown framework to the final size and morphology of the restoration, and after the pressing process the restoration will be completed with the help of Stain and Glaze firing (1-7).

### 2. Cut-back technique

The cut-back technique can be applied at two different times:(1-7)

- A wax framework is made to the final shape of the restoration followed by a wax cut-back. The undersized framework is pressed and on the obtained restoration the ceramic will be layered to obtain the morphological shape of the tooth.

Aspects to be considered in the cut-back technique in the wax framework stage are the following:(2,3,4)

- creating a silicone key to check the space;
- the reduction is made at the level of the incisal third of the framework;
- there must be no sharp corners or edges, they can create cracks in the ceramic mass.

<sup>1</sup>Corresponding author: Iuliana Babiuc, Str. Plevnei Nr. 19, Sector 1, București, România, E-mail: mburlibasa@gmail.com Phone: +40723 472632  
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- A wax framework is made to the final size of the restoration, is invested and the ceramic is pressed. A part of ceramic is removed from the obtained restoration to get the desired space to apply the colour effects.

### 3. Layering technique

The tooth-shape supporting framework wax-up is created. It must have smaller dimensions compared to the volume of the final restoration. The framework must respect the available space and the morphology of the tooth; it is very important to create the cusps, in order to ensure the support and the uniform thickness of the ceramics which will be applied on the coping. In order to obtain the individualization of the dental crown, the ceramic layers are then applied on the obtained ceramic core.(8-19)

The aspects that must be taken into account in creating wax framework for all-ceramic restorations can be described as follows:(1-7)

- the use of suitable tools - special burs - for processing and finishing prosthetic parts, in order to avoid their cracking, overheating or chipping;
- although the appearance of all-ceramic prosthetic parts can be changed by further processing, their minimum processing is indicated;
- overheating of the ceramic must be avoided, it is recommended to use burs at low speed and with a minimum pressure;
- it is very important to smooth the areas where the sprues have been attached;
- the shape of the restoration must not be changed much by further processing;
- the space established from the beginning for the application of ceramics must be respected.(2,3,4)

## RESULTS AND DISCUSSIONS

### Clinical case no. 1

#### *Individual full contour crowns made of pressed ceramic on the upper incisors 1.2 - 2.2*

Patient T.G., 37 years old, presented to the dentist's office, being unhappy with the appearance of her smile. The teeth showed colour changes and differences in shape. It was decided to solve this situation, by making four full contour crowns of pressed ceramic, at the level of the central and lateral incisors, where the chromatics and the shape of the teeth were problematic.

After preparing the teeth, the prosthetic field and the occlusion relationship were recorded. The situation in the laboratory was as follows:

#### Figure no. 1. Arches impressions and occlusion recording



The wax frameworks were made to the shape and size of the final restorations. The cut-back will be made after divesting the restorations, in order to obtain the necessary space to apply the ceramic for the individualization and the aesthetic appearance of the crowns.

#### Figure no. 2. The sectional working model made using Giroform technique, articulated in occlusal simulator



#### Figure no. 3. The wax framework of the crowns



#### Figure no. 4. Preparing the wax framework for investing



The sprues are applied in the area with the maximum thickness of the crown, in such a way as to facilitate the insertion of the ceramic into the investment.

#### Figure no. 5. Applying the sprues on the IPS Investment Ring System



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**Figure no. 6. Placing the loaded investment ring in the press furnace**



**Figure no. 7. Restorations after divesting and sandblasting**



**Figure no. 8. Prosthetic restorations after layering aesthetic ceramic**



### **Clinical case no. 2**

#### ***Pressed ceramic overlay - first mandibular molar***

The P.C. 29-year-old patient, presented to the dentist's office because he has extensive carious lesions at 2.5, 3.5 and 4.6. For premolars, it was decided to restore by making metal-ceramic crowns, and for the first molar, to make a pressed ceramic overlay.

**Figure no. 9. Mandibular and maxillary impressions and occlusal record**



One-step impression technique was used to record maxillary and mandibular arches, using with addition silicone of two consistency (putty and light body).

**Figure no. 10. The sectional working model made using Giroform technique**



**Figure no. 11. Wax framework of the overlay with sprue attached.**



**Figure no. 12. The sprue was attached to the IPS Investment Ring System together with an inlay.**



**Figure no. 13. Placing of the silicone ring on the investment ring base**



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**Figure no. 14. The overlay after divesting and sandblasting**



**Figure no. 15. The overlay after staining and glazing**



All-ceramic prosthetic restorations made by press technology require excellent collaboration between the dental office and the dental laboratory.

Although the effort made by the specialized staff working in both departments (clinical department - dental office; technical department - dental laboratory) is fairly evenly divided, the responsibility for dental treatment belongs entirely to the dentist. Specifically, the dentist is the head of the dental team (dentist, nurse, dental technician): basically, he discusses with the patient all the details, establishes the treatment plan and is responsible for the success and/or failure of treatment.

### CONCLUSIONS

In recent years, the evolution in the field of dental technology is constantly expanding both in terms of materials and techniques used. Prosthetic restorations, such as those of pressed ceramics, are no longer a novelty, and can be used successfully in solving various clinical cases. Unfortunately, these new technologies can be quite expensive, and there are currently patients who cannot afford this type of prosthetic restoration.

When choosing prosthetic restorations made of pressed ceramics, several factors must be taken into account: the patient's clinical conditions (dental destruction, occlusion, edentulous topography, parafunctional activity, etc.), which ceramic system should be used, what type of cementation is required, the durability over time of these types of systems, and especially the endowment of the laboratory and the degree of training of the dental technician.

At present, aesthetics and strength are selectively fulfilled by certain types of ceramic masses.

Another very important aspect for the success of a prosthetic restoration is the communication between the dentist and the patient, but also between the dentist and the dental technician.

All-ceramic restorations are very sensitive prosthetic

parts, therefore, the use of very fluid impression materials is also required, as well as materials for making models, which would give the finest details of the prosthetic field. It must be taken into account that the technological flow is very long, and errors can occur at any time.

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