ARTEGRAL® IMCROWN PREFABRICATED TOOTH-BLANK FOR THE INLAB SYSTEM

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An innovative extension of performance in the area of singl crown production is presented. Prefabricated crown blanks with color layering are inserted in the row of teeth with sp cially developed software and adapted apically to the stump with a CAM milling program.

Keywords: prefabricated crown, semi-finished product, CAD/CAM crown, plastic jacket crown, layering-induced esthetic effect, Cerec, inLab.

Basic principle of the artegral®ImCrown

The artegral® ImCrown developed by Merz Dental (Lütjenburg, Germany) is a prefabricated, anatomically formed, color-layered and characterized acrylic tooth made of PMMA (Fig 1). It is not milled out from the block. It merely requires apical adaptation to the stump.

The crown is inserted and harmoniously aligned digitally in the row of teeth and with the occlusion with the aid of the software for the Cerec 3D and InLab (Sirona Dental Systems, Bensheim, Germany).

The suitable size can be chose from the five predetermined crown sizes, and the dimensional changes made by the user are implemented. The minimum material thickness as well as the esthetic effect induced by layering are taken into account. Virtual modeling is not required, since the form of the crown is already prefabricated.

The artegral ImCrown has a natural labial and palatinal surface design. It can be inserted immediately after polishing. The canine crown blanks for bilateral use as well as different left and right incisal crown blanks make up a small assortment, so that one has at hand the correct solution for the restoration of the maxillary anterior teeth. Because of the prefabricated surface contour, interacting with the polychrome layering, the artegral ImCrown is endowed natural esthetics and refraction of light, which moreover can be modified manually with little effort and can be further individualized.

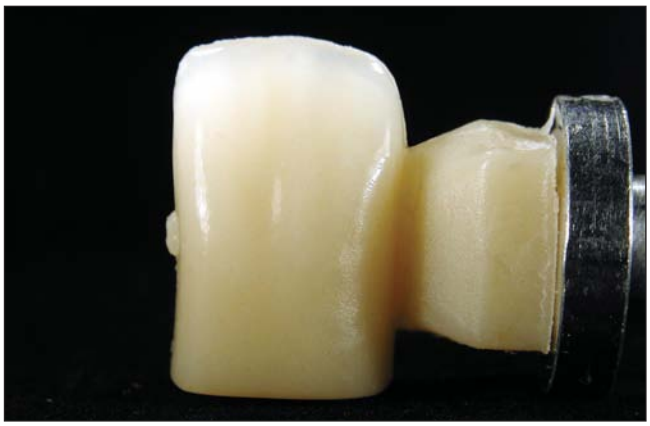


***Fig 1** The anatomical, polychrome crown is dimensioned sufficiently in the marginal region and available in five different sizes for the left and right incisors as well as different sizes for the canines for bilateral use.*

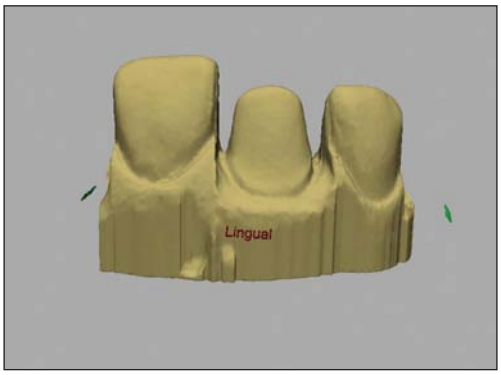


***Fig 2** The scanned model can be turned by 360 degrees.*

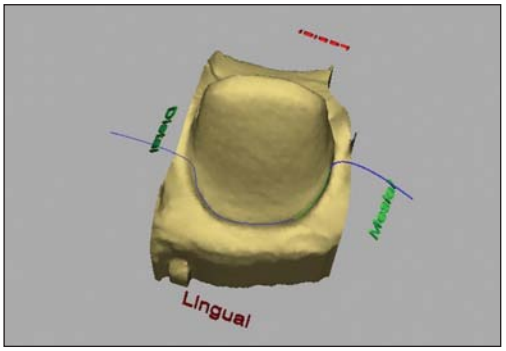


***Fig 3** As is known, the preparation margin is marked semi-automatically.*

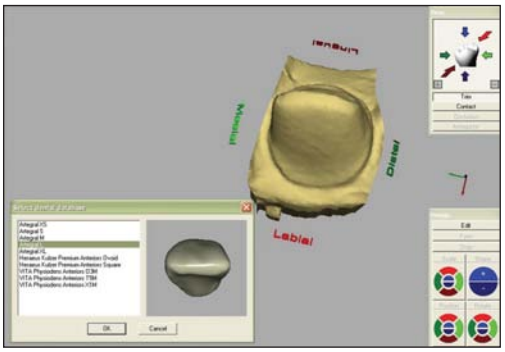


Fig 4 Choosing the crown in the correct size.

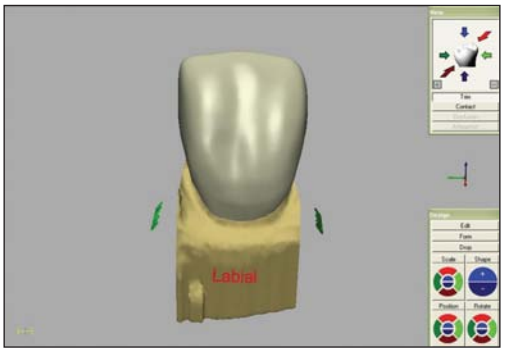


Fig 5 The crown axis is aligned from the labial view.

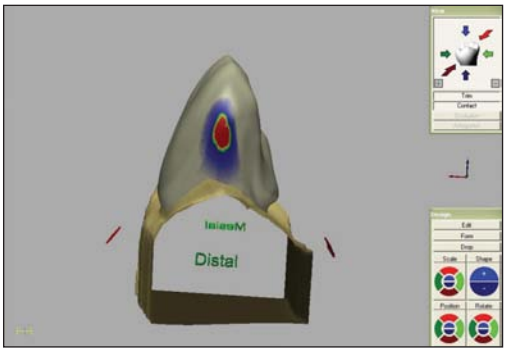


Fig 6 The crown is shifted in the axis to mesial-distal, so that a physiological, proximal contact can be created. After releasing, one can assess whether the proximal contact is sufficient.

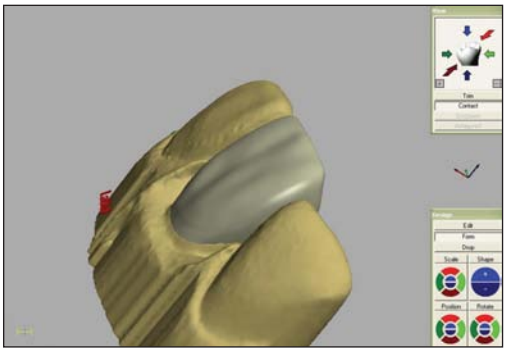


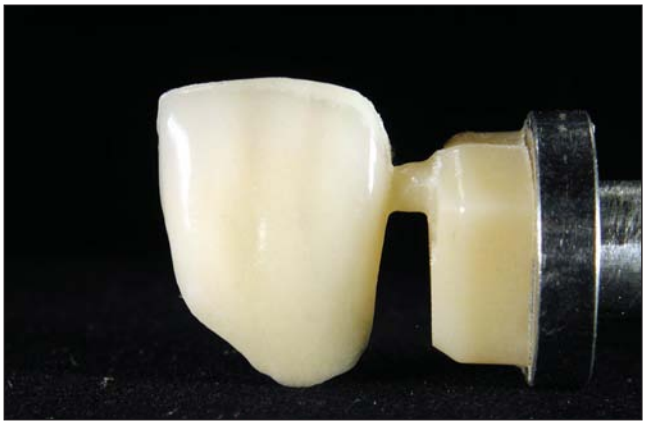
Fig 7 From the lateral aspect, both the correct inclination as well as the correct position of the color layering can be corrected by shifting in incisal or cervical direction.

Step-by-step procedure CAD/CAM methods

The master model should be produced from scannable plaster. It is also possible to use a special scan-spray. The inEOS scanner (Sirona Dental Systems, Bensheim, Germany) can be used. In this case, the master model can be scanned directly.

After scanning, the three-dimensional image of the model segment can be viewed on the monitor (Fig 2). The insertion axis is determined first. This step must be given the greatest attention, because the internal fit of the crown can be influenced by it. The neighboring teeth are then trimmed virtually. In this way, we obtain an unobstructed view of the working stumps.The bottom line is determined semi-automatically on the working stump by tracing it with the cursor (Fig 3).

The best possible artegral® tooth can be chosen from the tooth library, which is integrated in the inLab software, and inserted (Fig 4). A few design steps are then sufficient to integrate the crown in the row of teeth with regard to alignment and size (Figs 5 to 7).



Figs 8 and 9 View of the crown directly after the milling process.

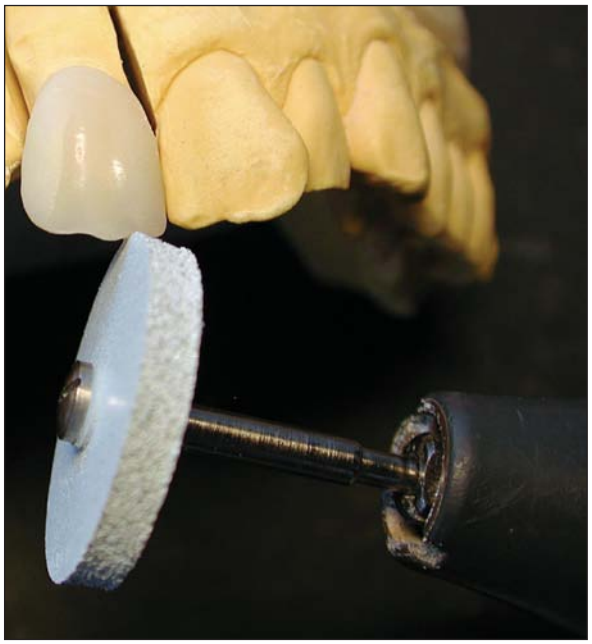


Fig 10 The incisal edge length is corrected with a rubber wheel.

Fitting
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Following the milling process (Figs 8 and 9), the crown is finished manually and purely subtractively with regard to its fit. As a rule, the fit is perfect after finishing. The proximal contacts are adjusted working from the cervical and incisal, and a contact foil should be used for this purpose.

Adapting the functional surface

The incisal edge is best shortened to the approximate length using a silicone rubber wheel (Fig 10). The palatinal functional surface is produced concavely with a large round bur underneath the abrasion surface (Fig 11). The marginal ridges are also created in this way.The occlusion is checked and ground in by centric and excursion movements with a white silicone rubber wheel and using occlusion foil. The ridges are then drawn on the neighboring tooth, and the desired ridges are transferred to the crown. The desired ridges are then ground with a thin diamond conical bur or a correspondingly finely cross-toothed cutter (Fig 12). The labial concavities are then drawn and created with the same tool (Fig 13). The surface texture is individualized with a sharp-edged stone or a diamond grinder.

Surface finish

The surface is leveled with a plastic brush (Fig 14). This is followed by minimally abrasive rubber polishing of the abrasion surfaces and smoothing exposed places (Fig 15). Preliminary and high-gloss polishing is performed best of all with a goat-hair brush and polishing paste (Fig 16). The final result is achieved within a few seconds (Fig 17).

STEP BY STEP
Cementing

The artegral ImCrown can be provisionally cemented with all customary provisional adhesive materials, but preferably with artegral® T-Cem.

Final adhesion is accomplished with the dentin adhesive

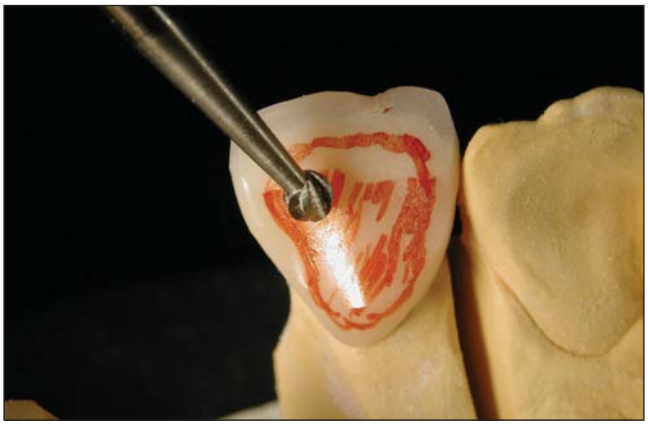


Fig 11 The palatinal functional surface is individualized with a few corrections.

Fig 12 The "face" of the tooth is determined by the correct application of the ridges.

Fig 13 The surface texture aimed for is drawn and "copied".

technique. For this purpose, the one-component product artegral® One is used on the moist tooth surface after light curing as a basis for the dual-curing cement artegral® Cem.

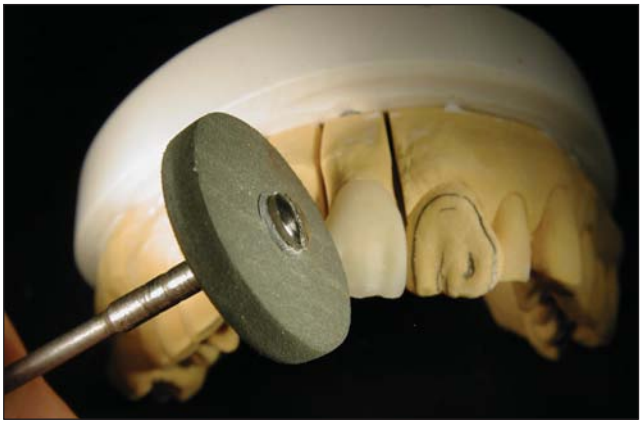
Discussion

Today, the plastic jacket crown produced in the laboratory is scarcely considered the standard restoration because of its material disadvantages – hydrolytic degradation, insufficient abrasion properties etc. The dental material IPN used in the artegral crown is plaque resistant, abrasion proof, and temperature resistant, and is characterized by its ability to be machined very well. In this way, as well as due to quality-assured, industrial processing methods, the relevant physical parameters of the material and the adhesive bond between crown and tooth are clearly improved, which may have a positive influence on the long-term prognosis.

Since the working method for Cerec 3D and especially for Cerec inLab users is very economical, it is possible that any potential disadvantages concerning the dwell period is compensated. Various studies already in progress evaluate the economic advantages (time requirements), material property advantages, and product quality advantages.

Currently, crown blanks are available for teeth 13 to 23. The experiments show that their use in the CAD/CAM production of crowns would bring considerable economic advantages. Crowns produced in such a way would certainly not worsen the average quality standard of crown restorations.

The artegral ImCrown will not available for the South African market at present. Launch is not planned before summer 2006.



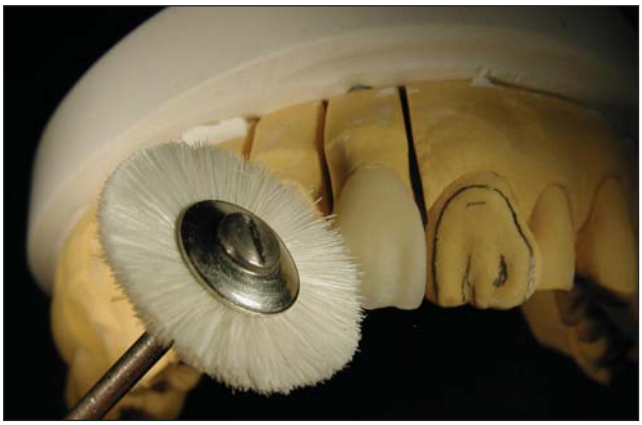


Fig 14, 15, 16 The surface is very quickly given the required microstructure by polishing with a special rubber wheel and different brushes.

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Fig 17 The finished work on the model shows a result which can be achieved with no other method in such a short time.