



# MAGICAL ALL ON FOUR.

Is a story about an “esthetic implant workflow” of screw retained bridges with a PEEK substructure combined with all-ceramic single crowns.

by Dr. Stanko Miletic, Ivan Miletic d.m.d. (dentist), Pavel Metelka, DiS (technician)

Surgeon Stanko Miletic, takes care of an effective implant treatment as a base for the prosthodontic treatment captured by dentist Ivan Miletic. Ivan Miletic needs to register the individual information of the patient for the technician Pavel Metelka, who will digitally produce the final restoration. The digital data is stored in case of future patient services.

We have been doing such full arch or full mouth restorations for the past 8-10 years. Just in the past 3-5 years we did over 400 such cases, most of them using the “All-on-4” technique with immediate loading protocol. As material, we primarily use “CeramiII Peek white” by Juvora for the substructures combined with single zirconia crowns made from Zolid FX Multilayer. The crowns are cemented to the PEEK substructure and for the anterior region we always do a little cutback for the final kick of esthetics. The gingiva is layered with pink composite. In some cases, we use a SLM substructure veneered with composite.

We will shortly present a case which is prosthodontic driven and where you can see the importance of team communication between surgeon, prosthodontist and dental technician. Only good team communications lead to a functional and esthetic result. The case will cover a full mouth upper and lower “All-on-4” rehabilitation with immediate loading. We will present each phase of the process from surgery to prosthodontics and laboratory.

## Initial Situation

The patient came to our office with a denture in the maxilla which he had for more than 30 years. His teeth and an old bridge in the lower jaw are failing due to periodontal disease and massive bone loss. The patient wants to be able to smile again with confidence and to have a fixed, functional and esthetic result. We did initial panoramic images (Fig. 3) and decided to restore both jaws with the “All-on-4” surgical protocol with immediate loading of the dental implants.

The treatment of each “All-on-4” case starts with picture taking (Fig. 4) and the planning of the final restoration. In this phase, we talk very intensely with the patient to see what problems he had in the past and what wishes he has for his future restoration. In this first phase, we also do the initial impressions, the face bow and bite registration of the initial situation, the height registration along with the digital panoramic images and CBCT scans in order to plan the surgery and prosthetic steps of the case.

## Implant Placement

In this case we used the “All-on-4” technique approach to solve his problem with an edentulous upper jaw. On the CT scan we made before the surgery we noticed he had very “thin” bone in the maxilla. Our initial idea was to start with bone augmentation of the maxilla and then proceed later by placing dental

## keywords

- All-on-4
- Zolid FX Multilayer
- CeramiII PEEK



Fig.1: The "Magical All-on-4 Team - Pavel Metelka, Ivan Miletic, Stanko Miletic (from left)



Fig.2: Successful treatments with our "esthetic implant workflow" from the past



Fig.3+4: The patient - photo documentation of the initial situation



Fig. 5: CT Scan after the surgical insertion of the four implants



Fig. 6: Surgical procedure, placement of implants



Fig. 7: Final result after surgery

implants. In our first consultation with the patient he was not willing to go through bone augmentation surgery. He wanted a solution without bone augmentation and with the least possible surgery that can be done. After another review of his bone situation in the maxilla we decided to go with an "All-on-4" approach and use the "Nobel Speedy Groovey" Implant System (4.0 and 3.3) to solve this case. (Fig.5)

Placement of dental implants, choice of implant system, implant surface and how it affects primary stability and stress distribution are key parts of the surgical phase. All these parameters are very important for immediate loading of non osseointegrated dental implants.

The surgery is a very important part of this protocol. There are certain steps that need to be fulfilled to get an ideal situation for the prosthodontist and for the dental technician. It starts from diagnostics over planning, bone and soft tissue remodeling, implant placement, restorative and esthetic space to placement of multi-units and suturing. Only those who consider these steps will receive a fast and easy surgery with great results and a good long-term stability of the dental implants.



Fig. 8: Alpha Bridge - Initial temporary design



Fig. 9: Face bow registration with the Artex facebow

### Prosthodontic Planning

As soon as the surgery is finished, the impression, the height and facebow registration are done immediately. We consider the design we want to do for the final restoration in the so-called alpha bridge, the initial - temporary - design. (Fig.8) This part is very important as we can test the new height, the function and the esthetics of the first design. We use Ceramill Temp Multilayer for the final restorative material for our temporary bridge (alpha bridge), everything is done at the multi-unit level.

After 3-4 months, we do a digital panoramic scan for control and percussion test of the dental implants. Then we start to plan the final restoration. One important thing we consider in the planning is the feedback from the patient regarding the initial temporary bridge.

We take the bite and the facebow registration with the Artex facebow of the alpha bridge (the initial temporary bridge) (Fig.9). Afterwards we send the temporary bridge, the bite and facebow registration to the dental laboratory for articulation and scanning.

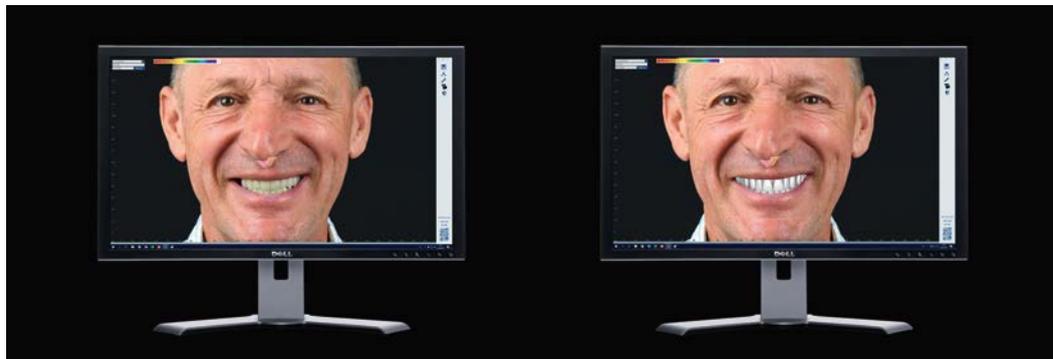


Fig.10: Esthetic check with patient picture

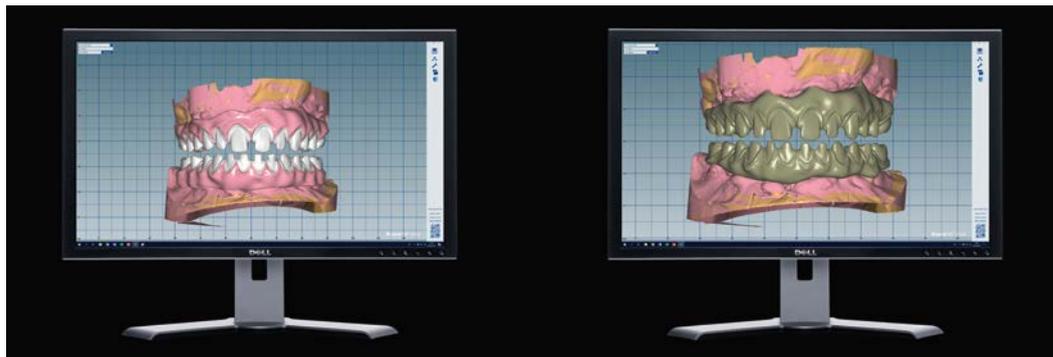


Fig.11: CAD design of the final restorations



Fig.12: Finished milling result of the substructure made from Ceramill Peek White



Fig.13: Finished milling result of the zirconia crowns made from Zolid FX Multilayer



Fig.14: Zolid FX Multilayer crowns ready for the anterior veneering

Making pictures of the patient is a great way to check the final esthetics on the screen (Fig.10). First we go through the esthetic and functional check list with the patient and review the esthetics later in the pictures. Adjustments are made in the design software as needed to get the optimum esthetic result. After the CAD design is done, we proceed to mill the beta-bridge in the Ceramill Motion2 by using Ceramill Temp Multilayer. The beta-bridge is used as a final try-in before we start to design the final restoration. Also, in this process step we take pictures of the patient and ask him about the look and feel of the adjusted restoration. If everything is fine, we start to proceed with the final restoration.

### Final Restoration

After the try-in of the beta-bridge was successful and passed function, esthetics and of course the patient approval we start to design the final substructure using Ceramill PEEK by Juvora as material. When designing the substructure, the basis for the later zirconia crowns is also created at the same time (Fig.11). The construction needs to be designed 1-2mm deeper than we expect the final margin. We will over-cover the cervical margin of the crowns by gingiva in the final step. Minimal height of the construction needs to be 7-10 mm, width 5-8 mm and can contain cantilevers which can be no longer than the length between the two neighboring implants.

Milled result on Ceramill Motion 2 DNA is smooth and precise thanks to the great milling strategies (Fig.12). In this case we use Ceramill PEEK white, which helps us keep the final color of crowns without using any opaquer after luting them on the substructure. Milling strategy can be wet or dry, but only on a 5-axis milling machine. The 5-axis milling strategy on the outside shape is precise without any manual correction, by choosing fine strategy for undercuts. For fitting to implants we decided to use the "Incadcam solution". For multi-units, it is the best choice for a direct fit in combination with PEEK in the Ceramill Match2 CAM software and Ceramill Motion 2/Mikro milling machines.

For the crowns we use the high-esthetic zirconia material Zolid FX ML (Fig.13). Due to the full-mouth rehab and the fact that we do not have to orient ourselves on existing residual teeth we decided to produce the crowns in the shade A2/A3. The Amann Girrbach

material Zolid FX Multilayer brought us lifelike color shades, adequate transparency and acceptable bending strength. For the posterior region we use full-contour crowns and in anterior region we use a little cutback for ceramic veneering (Fig.14). To achieve the highest possible level of details right after milling, we chose the HD milling strategy. With that strategy the fissures are finished with a 0.3mm bur.

The biggest benefit of PEEK-based screw retained bridges is that we can place the crowns directly on model during veneering. Because we used the "Cutback Library of Knut Miller" in the CAD design, it is an easy job to veneer the anterior region and at the same time keep a constant shade for all the crowns. The veneering process gives us the freedom to play with the esthetics, the transparency, the colors and the natural look of patient smile.

Since we know from the interviews with the patient that he was very satisfied with the shape of the anterior teeth and the height of the smile-line from the temporary bridge, we use this shape as the base for the veneering. For that reason, we copy the tooth shapes from the temporary anterior crowns in the CAD software and mill the crowns afterwards using "Ceramill Wax White" (Fig.15). In the second step we produce a silicone key, which makes the veneering process as easy as it could be. It's an efficient and predictable aid we can follow. Digital systems have many benefits corresponding to manual process steps that we can use for our reliable workflow.

After veneering, we need to finally check all the details of the crowns, before we cement them on the construction (Fig.16). All technicians have their own shapes and their own unique results and modern technologies help us to come closer to natural esthetics. I am very satisfied with the Amann Girrbach zirconia which helps me to achieve a natural appearance.

As preparation for the gingiva veneering, the PEEK construction is sandblasted by 50 µm under 2 bar pressure and cleaned afterwards by using dry air. In the second step, we apply the primer "Bredent Visio.Link" and light-cure the layer for five minutes. Afterwards the crowns are cemented by using a resin-based cement on the PEEK substructure and covered in addition by composite opaquer. The gingiva is veneered by using "GC Gradia", which is a composite-based



Fig.15: Milled wax crowns and a silicone key as assistive devices for the later veneering process



Fig.16: Final check of the Zolid FX Multilayer crowns



Fig.17: Veneering of gingiva parts with composite



Fig.18+19: Final result, happy patient

veneering material. We cover the ceramic margin of the crowns with the veneering composite and the visible PEEK parts. The contact points to the patient's gingiva are kept in PEEK and have been high-gloss polished.

Here is the amazing final result! The patient is extremely happy! (Fig.18+19) The final restoration perfectly corresponds to his facial attributes and has great function. Our digital protocol gives us the big advantage to design, see and test the final result in the very early beginning of treatment! This is extremely important in today's dentistry as we can precisely adjust every aspect of the final restoration.

Our protocol also benefits the patient. The patient is involved in the planning at a very early stage and can make esthetic changes

together with the prosthodontist before the final restoration is started. Thanks to this method we can avoid unwanted surprises and stress with the final restoration both for the dentist and patient.

If we think into the future, this type of restoration offers further great advantages. This type of restoration can be easily repaired in comparison e.g. with a monolithic zirconia restoration. If there are chipping or fractures of the crowns, the stored data of the CAD construction can be called up again and the broken part can simply be re-milled. After sintering, the dentist can remove the damaged crown and cement the new one to the PEEK structure.

But in the end, the key to success is good teamwork between all interfaces. In this case between the surgeon, the prosthodontist and

the dental technician. But of course, the selection of the right material is also important. Thank you Amann Girrbach for your good job. ///

DiS Pavel Metelka **AUTHOR**

Dens Technika **LABORATORY**

Brno, Czech Republic **LOCATION**

[www.dentalpremium.cz](http://www.dentalpremium.cz) **WEB**

Ivan Miletic d.m.d & Dr. Stanko Miletic **AUTHOR**

DCM Dental Centar Miletic **LABORATORY**

Zagreb, Croatia **LOCATION**

[www.dental-miletic.com](http://www.dental-miletic.com) **WEB**