

# The Maltese Dental Probe

The Maltese Dental Journal



*Jacques Melius*  
2021

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# Editorial

By Dr David Muscat

Dear colleagues,

It is with great sadness that we have had to bid farewell to Dr Ethel Vento Zahra. Ethel was a legend. I got to know her as she was a member of the Dental Association committee for a while.

I also used to chase her for the slides of the 'Smile For Health' Conference presentations for the Dental Probe – a Conference she successfully organised every year.

Ethel was also an examiner at the Medical Council examinations organised by the Faculty of Dentistry so I would meet her at the oral examinations where I attended as an observer. Notwithstanding her illness, while it was in operation, she also was an active member of the Co-Operative Sunday Emergency Service of which I also formed part, and which she carried out without any complaint. Until very recently I also used to meet her at the Dentists SAC meetings.

Ethel and her sister Yvette would attend most of the DAM lectures and social events as well as the lectures organised by dental companies as well as the Faculty. She was involved in the 'Covid 19 Guidelines for Clinics' as well as the Dental Clinic standards. If you needed something, people would call Ethel for clarification – she was a point of reference.

In the past of course she went to Albania several times as part of the 'Smile for Albania' team doing voluntary work. She recently also received honours by the state for her work in the Public service and for Breast Cancer Patients. She once said "I have cancer, but it does not define who I am." Those stoic words impressed me and will stick in my mind forever.



Dr Ethel Vento Zahra at the ProHealth Kin Lecture, April 2019 (left) and with the DAM Committee in 2011 (right)



This year the DAM committee has organised three small groups of dentists to go to a Zirkonzahn Dental Education Centre in North Italy with a military theme. This is a KA1 course and is funded by Eupa. There was a tremendous amount of work involved in obtaining these funds and this was mainly carried out by Drs Noel Manche and Nicholas Busuttill Dougall and of course the rest of the committee rallied around. The work is ongoing.

The Dental world is now in the digital age with Craftsmanship and modern dental technologies resulting in accuracy, predictability and aesthetics. Having a good digital workflow can reap excellent results.

The DAM is currently helping organise hands on courses with different companies. There will also be further Lifesaving Courses organised for groups practices and individual dentists.

The Mediterranean Dental Conference will be organised next year.

The DAM was also recently involved in making the public aware of the pitfalls of having their dentistry done in Turkey via the media.

Dr Audrey Camilleri has attended a CED meeting abroad this May.

The DAM Christmas Party is booked for Friday 16 December at Madliena Lodge so please book that date in your diaries.

Drs David Muscat and Anthony Charles have been elected uncontested for another three years as from 22 July 2022 as members of The Medical Council of Malta.

The DAM is organising a lecture by Mr Alex Manche on the History of Medicine and Dentistry on 20 October sponsored by Chemimart. The DAM is also organising a lecture on 'Update on Bisphosphonates' – the venue and date to be announced.

The DAM is also involved in a hands on restorative course and is collaborating with a dental company in its organisation.

The cover photo is by artist Jacqui Agius and the picture is entitled 'Mosta Dome during the Santa Marija Feast'.

Best regards,

David

Dr David Muscat B.D.S. (LON)  
Editor / Secretary, P.R.O. D.A.M.

new



# DEEP REPAIR

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**LIFE'S TOO SHORT  
 FOR SENSITIVE TEETH**

# Dr Ethel Vento Zahra

## A TRIBUTE FROM THE FACULTY OF DENTAL SURGERY

Written by Faculty members and friends of Dr Ethel Vento Zahra

The Faculty of Dental Surgery sadly mourns the loss of Dr Ethel Vento Zahra – a dear friend and colleague who served the Department of Oral Rehabilitation and Community Care with great dedication for many years.

Ethel was a wonderful team member who made many great contributions to the teaching of preventive and public health dentistry. She was instrumental in outlining the preventive units in the dental course when undergoing a complete restructuring to a modular format.

She was also an active member of the National Oral Health Survey team, dedicating considerable hours to the laborious process of screening patients and data inputting. Her focus was always on the best interest of the students and the Department rather than on her own benefit, and her valuable input will not soon be forgotten.

While we weep over Ethel's parting, we pay tribute and celebrate a life that was well lived. A life committed to public health and patients' rights, challenging health inequalities and barriers to oral health, founded by a deep-seated passion for dentistry. Indeed, Ethel's loss leaves a void not only in the Faculty of Dental Surgery, but also in the Dental Public Health Unit and the dental profession in general. Everybody knew Ethel as an affable, cooperative, supportive, helpful and dedicated colleague who would tackle all kinds of situations with calmness and professionalism.

Those of us who worked closer to her will treasure the time spent together, the challenges, the laughter and, yes, also the disagreements that we had as active members of this tightly-knit academic family.



Beyond academia, Ethel took on several other commitments seriously, putting her heart and soul into everything she did. She achieved a great deal, not least in establishing and running her own private practice.

Motivated by personal experience, she became an advocate for breast cancer awareness and research.

During the Covid pandemic, whilst dealing with her disease, she became one of the frontliners in the Superintendence of Public Health to the extent of being presented with the Award in Recognition for a High Level of Service in the Public Service in June of 2021. She was further honoured with the Midalja għall-Qadi tar-Repubblika in December 2021 for her commitment and advocacy as a dedicated member of Europa Donna Malta for breast cancer patient rights.

Yet despite all her accomplishments, Ethel was a modest woman – a genuinely warm individual who remained forever humble, completely approachable, high-spirited without compromise and, as a consequence, universally respected.

She faced a challenge to her life by way of a grave illness, with great fortitude. In her typical quiet and calm manner, she showed how to work through trying times and to carry everyone along.

Despite the physical difficulties, the psychological pain and other various challenges she had to face during her seven-year battle with metastatic breast cancer, Ethel continued to do her best to lead a normal life and continue to support anyone in need. She fearlessly fought till the very end.

*Continues on page 7.*

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# Dr Ethel Vento Zahra

## A TRIBUTE FROM THE FACULTY OF DENTAL SURGERY

*Continues from page 5.*

Although fully aware that the end was near, she still maintained her commitment towards the academic process, even maintaining her contribution to the examinations.

Till a few days ago she was still correcting examination scripts and, with much regret, she had to withdraw from some of the oral examinations.

A true definition of determination and courage. An image of strength and perseverance. Truly an inspirational example. This was really her biggest success of all – sharing positivity and spreading an appreciation for life.

The number of individuals who will feel the loss of Ethel is endless because she touched so many people's lives, leaving an impact and a lasting impression in the minds of so many colleagues, friends and acquaintances.

This is evident by the wave of social media posts by individuals from different backgrounds who have at some stage interacted with Ethel.

Life can be fleeting. But a life lived to the fullest stays in fond memories. Ethel, through her decorum and contagious smile, endeared herself to many. She has been taken too soon but her legacy will live on.

Our thoughts are with her husband Lawrence, her daughter Leah, her sister Yvette who is also one of our dental colleagues, her parents and all of her family who have suffered the greatest loss of all.

We extend to them our heartfelt condolences and we wish them courage and strength to bear this irreparable loss. 🕯️



# Digital Workflow for Dental Implants & Restorations using an Intra-Oral Scanner

Presented by Prof. Arthur Cortes and Dr Juliana Cortes  
Organised by PageHealth

In recent years, computer-aided design and computer-aided manufacturing (CAD-CAM) technology has been developed along with artificial intelligence (AI) and its applications in dentistry, including several new techniques to be used in oral rehabilitations.

The most important feature of CAD-CAM workflows is the enhanced predictability from previewing results beforehand on CAD software programs. Among other important advantages of CAD-CAM over conventional workflow are shorter appointments, reduced discomfort for the patient, reduced total treatment time, and no need of using plaster models<sup>1</sup>.

These advantages have all been related to the use of artificial intelligent algorithms implemented on the CAD and CAM software programs. Despite all the above mentioned technological changes, scientific

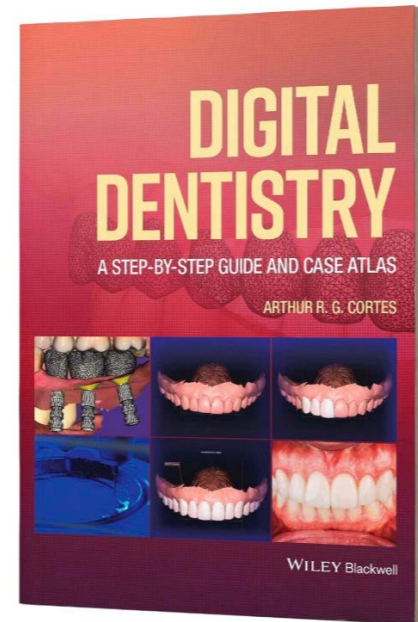
information and clinical step-by-step guidelines are still lacking in the literature.

To address this issue, a new book has been edited by Prof. Arthur R. G. Cortes from University of Malta, and co-authored by several of his colleagues at the Faculty of Dental Surgery, including the Dean, Prof. Nikolai J. Attard. This book therefore comes as a result of a lot of efforts from teamwork, and is now made available by the one of the biggest scientific publishers in the world (Wiley-Blackwell).

The editor and co-authors hope that this publication can benefit all the dental colleagues and consequently, their patients. 📖

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On Tuesday 21st June 2022 at Madliena Lodge, Professor Arthur Cortes and Dr Juliana Cortes presented a lecture on chairside restorative workflows using a digital scanner. There were also clinical case presentations on the restorative and implant digital workflow as well as a workshop with an intraoral scanning demonstration. The event was very well attended and sponsored by Page Health.

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# DIGITAL DENTISTRY UPDATE AT ZIRKONZAHN

By Dr David Muscat

Between 25-29 July 2022 a small group of dentists attended a Digital Dentistry course at the Zirkonzahn Military academy near the beautiful town of Gais, South Tyrol in Northern Italy. We were in what is described as the 'Valley of Knowledge'. 'Zahn' means tooth.

The programme included an introduction to different types of restorations, inlays and laminates all with a minimally invasive preparation technique.

Intraoral scans were demonstrated as well as their use in implant planning.

The name 'Prettau' has been coined for the Zirconium. The word originates from a village from where the Zirkonzahn founder Mr. Enrico Steiger was born. There is a lot made of the relationship between the land and the elements and the art of Dentistry and going back to ones roots for enlightenment and drive.

There was a demonstration of the Face Hunter which is a scanner for photo-realistic 3D digital facial scanning as a working basis for the manufacture of individualised dental prosthesis and as a digital articulation tool. One may adapt a dental restoration to aesthetic requirements.

The Plane System is used to determine the precise position of the maxilla and to transfer it to the articulator. The Plane Finder is a component that is capable of identifying a reference level regardless of any skull asymmetries.

It makes it possible to register the natural position of the maxilla and to measure the angle of inclination of the occlusal plane with reference to the ala-tragus line.

The Plane Finder is also used for the photographic documentation and analysis of the initial clinical situation and its progress.



The maxillary model is placed in a Plane Positioner where the natural position of the maxilla is represented. The Plane Positioner is then transferred to the mechanical PS1 articulator. The Plane Positioner represents the individual position and inclination of the occlusal plane. The PS1-3D CAD Plane tool, data for patient and model analysis can be used to set up the plaster planes.

In Zirkonzahn, with the modifier software the teeth are automatically aligned with the identified occlusal plane. Using the set up aid they can be placed at a suitable distance to the axis of rotation. Teeth may be adjusted according to the aesthetics required.

The S300 Arti Scanner –compact with articulator scan-a fully automated optical structured light scanner with two high speed resolution cameras.

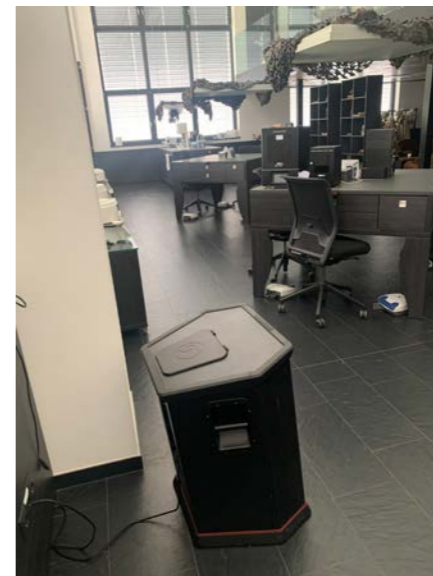
*Continues on page 12.*



Team Positive



Dental Clinic at Zirkonzahn



Dental Laboratory at Zirkonzahn



Mock-up for Dr David Muscat



In the woods



At work in the lab

# DIGITAL DENTISTRY UPDATE AT ZIRKONZAHN

Continues from page 10.

With the Zirkonzahn Digital Workflow there is no loss of precious information.

The occlusal plane is captured with the Plane System (MDT UdoPlaster); 3D virtual reproduction of the patient's face through the Face Hunter 3D Facial Scanner.

With the Zirkonzahn Implant Planner the design of the prosthetic restoration can be carried out during the implant planning phase. Implant planning is possible for all major implant systems. The software contains an extensive library of implant- prosthetic components and drilling sleeves.

Bite registration was explained in great detail. Fitting procedures

were explained as well as cementation technology.

A bruxism splint was made with a software module CAD/ CAM was made as well as a mock up for a worn dentition. The course content as well as the demonstrator Alex were truly excellent.

The academy is located amongst the mountains of Gais in Northern Italy where a German dialect is still spoken. The rivers and greenery as well as the morning mist near the mountains in the morning are truly a sight to behold.

The team got on very well so we called ourselves 'Team Positive'.

At 5 am daily we were awakened by loud music so at 6am we met our personal trainer for exercises and a one-hour bicycle ride.

At 730am we had breakfast followed by a quick shower and an 830am sharp start to the work of the day.

At 530 pm you could play chess or go on another bicycle ride or walk around the maize fields under the shadow of the magnificent mountains.

At the end of the course if you successfully completed it, your name is forever inscribed on the 'Tower of Knowledge.'

A truly wonderful unforgettable experience that we will cherish for the rest of our lives and new friendships that will last forever.

The course was funded by Eupa. There was a vast amount of work done to obtain these funds by the DAM but primarily by Dr Nicholas Busuttill Dougall and Dr Noel Manche. 🙏



3D facial scanner on Dr Simon Muscat



Dr Simon Muscat having dentition scanned



Planning the digital mock-up



Dr Sarah Pace Moore hammering in her name stud in the Tower of Knowledge



On the roof of the compound in the 'Valley of Knowledge'



Team Positive: Mission accomplished

# FABRICATION OF A HARD OCCLUSAL SPLINT

By Dr Andrew Vella BChD



The use of digital technology in the dental practice and in dental laboratories has led to speedier treatment without compromising quality of treatment, if applied correctly.

During a recent visit to the Zirkonzahn facilities in South Tyrol we were shown practical examples of how to apply digital technology when providing treatment to patients and also how technicians use digital software to design and fabricate their work.

What follows is an account of how a laboratory can fabricate a milled flat plane stabilization splint using images captured chairside with an intraoral camera.

The traditional way for fabricating a hard occlusal splint such as a Michigan splint involves taking cast dental models of the patient, mounting them on an articulator in central relation and then manually moulding the splint in wax before converting to resin.

The use of intraoral cameras, digital software and milling machines speeds this process while still generally providing good results. An ideal flat plane stabilization appliance should keep the mandible in a comfortable position with relation to the maxilla, close to centric relation with the posterior teeth in disocclusion during lateral excursions by facilitating canine guidance<sup>1</sup>.

One way of finding this ideal position of the mandible in relation to the maxilla is by using a Hydrostatic appliance as described by Lerman almost 30 years ago<sup>2</sup>. Hydrostatic appliances such as the Aqualizer™ can be bought

prefabricated and come in various sizes and thicknesses to suit all patients. A hydrostatic appliance makes use of bilateral water filled plastic biting platforms.

These biting platforms are made of a soft plastic and are therefore flexible. The appliance should be fit over the molars and the patient should be told to gently bite on the water filled biting platforms without clenching and without exerting too much pressure.

After leaving the appliance in place for at least 20 minutes the mandible would have found a position where the masticatory muscles and the temporomandibular joint are in a state of biomechanical harmony<sup>3,4</sup>.

At this point the patient may start noticing that his TMD symptoms may have started to alleviate.

This relation of mandible to maxilla must now be recorded by applying a small amount of a fast setting hard acrylic bite registration material in between the upper and lower central incisors and allowed to set, thus serving a jig which can be used to reproduce this newfound position.

The Hydrostatic appliance can now be removed and more bite registration material can be injected in between the molars to stabilize the occlusion. This is the jaw relation which shall be used to fabricate the hard splint.

Once the neutral position of mandible in relation to the maxilla has been found and registered with a bite registration jig, digital scans of the dentition can be taken with an intraoral camera. Images of the maxillary and mandibular arches should first be captured separately and then the acrylic jig is inserted

back in between the teeth and the patient told to occlude on the jig.

Images of the teeth in occlusion over the jig should then be taken and all the digital image files can be sent to the dental laboratory. Using digital software, the technician will then design the occlusal splint, manipulating parameters such as engagement of undercuts for retention and thickness of acrylic over canines to favour canine guidance to produce the desired design.

Most software systems come with a virtual articulator which can be used to reproduce movements of the mandible making it possible to detect and correct occlusal interferences resulting in less need for chairside adjustments. Once the desired design has been established, the splint can then be milled, polished and then sent to the dental clinic to be provided to the patient. 🦷

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# ZIRCONIA: APPLICATIONS IN DENTISTRY

By Dr Kristian Vella B.Ch.D., M.Clin.Dent. (Implantology)



A low resistance to fracture of dental ceramics has for a considerable time delayed the routine clinical application of full-ceramic options. The latter part of the 20th century has seen the development of new high-strength ceramics that are less brittle, less limited in their tensile strength and less subject to time-dependent stress failure.

Introducing zirconia to the industry has made the option of full-ceramic applications more attainable. Its main qualities are promising in terms of its mechanical behaviour, biological tolerance and optical character. Nevertheless, zirconia in dentistry has its own limitations and its processing and clinical application is still not completely controlled (Volpato et al., 2011).

The microstructure of this polycrystalline ceramic controls its engineering properties. All is dependent on the processing method employed during the fabrication of the body of the material. Since each processing step has the potential to produce microstructural flaws that can influence the properties, close attention has to be paid to obtain a reliable body.

Organized in three different phases, namely monoclinic, tetragonal and cubic, pure zirconia is stable (up to 1170°C) in the monoclinic phase. It changes to tetragonal once heated above 1170°C and to cubic once molten at 2370°C. On cooling, somewhere between 100 - 1070°C, the tetragonal phase changes back to monoclinic (Madfa et al., 2014).

A crystalline dioxide of zirconium, zirconia was primarily used in orthopaedics for hip head replacement instead of titanium or alumina. For a number of years and a number of reasons, mainly aesthetics and concerns about toxic and allergic reactions to metallic alloys, the use of metals in

dentistry has been on the constant decline. This trend is not restricted solely to the diminished use of amalgam as a restorative material, but also to the replacement of other metals by ceramics in various other aspects of dentistry, for example the fabrication of endodontic posts, orthodontic brackets, crowns, inlays, onlays, bridges, implants, implant components and full arch dental prostheses.

Dark polychromatic substrates, blackened teeth, pins and metal cores can well be masked by the infrastructure of zirconia that provides adequate opacity. A controlled level of translucency after lamination can be achieved resulting in a good aesthetic result.

Zirconia in dentistry was first studied with the aim of improving the biocompatibility of metal implants in the mouth in an assessment of the ceramic surface of metal implants. These studies revealed a higher clinical success than those covered in alumina (Cranin et al., 1975).

Advanced technology has allowed the production of a more stable tetragonal phase at room temperature allowing zirconia to be developed as a structural material.

Several studies have been conducted, some of which to study the remodelling of bone around implants (Miani et al., 1993), the quality of this bone contacting the ceramic surface (Akagawa et al., 1993), the soft tissue architecture around these implants (Akagawa et al., 1993), the use of zirconia intra-radicular posts (Asmussen et al., 1998) and CAD/CAM prostheses (Wang et al., 2008). The results of these studies all strengthened the viability of zirconia and its various applications in dentistry.

Low temperature degradation of zirconia is a spontaneous and

progressive phenomenon that is exaggerated in the presence of moisture. There are many consequences resulting from this process namely, surface deterioration, formation of micro-cracks and reduced resistance. This however does not seem to be slowing down the accelerated routine use of zirconia in CAD/CAM technology for the various types of prosthetic treatment. ■

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# MINIMALLY INVASIVE APPROACH FOR AESTHETIC VENEERS

By Dr Monika Kochaniec

Pictures reproduced with kind permission from Zirkonzahn



A growing demand from patients for minimal or non-preparation treatment on their teeth while at the same time desiring a highly aesthetic and natural look to enhance their smile, creates a great challenge for dental practitioners.

Porcelain veneers are a conservative and highly aesthetic treatment, with a great predictability and good clinical performance over the long term<sup>1</sup>. With technological improvement and the evolution of dental restorative materials, it is currently possible to develop/produce ultra-thin veneers with thicknesses of 0.1–0.3mm, adhesively cemented on the tooth surface with minimal or no preparation, to modify colour, shape and/or positioning of the teeth<sup>2,3,4</sup>.

Several ceramic materials are currently indicated for veneers: lithium disilicate, feldspathic ceramic, feldspathic reinforced with leucite, fluorapatite and lithium silicate reinforced with zirconia<sup>4,5,6,7,8</sup>.

All these ceramics exhibit high translucency characteristics due to the high content of glassy matrix in their composition, thus providing highly satisfactory aesthetics, in addition to excellent adhesion to resin cement through the conditioning with hydrofluoric acid (4–10%) followed by silanization<sup>5</sup>. For these reasons, these ceramics have also been chosen for manufacturing ultra-thin veneers<sup>8</sup>.

In recent years, zirconia ceramics have undergone many changes in their microstructure and composition<sup>10</sup> to increase their translucency without significantly losing their fracture resistance<sup>11</sup>, thereby increasing their clinical indications. Thus, translucent

zirconia is considered an aesthetic material, and indicated for crowns and veneers (minimum 0,2mm).

In vitro studies on veneers have reported a higher resistance to fracture of zirconia compared to lithium disilicate and feldspathic veneers<sup>16</sup>, and this is regarded as a great advantage of this material, as the proof and cementation stages of ultra-thin veneers become much less critical compared to conventional glass-ceramics. The same authors also found that there is a possibility of zirconia veneers debonding due to less effective adhesion to resin cement<sup>16</sup>. However, clinical studies with zirconia veneers and ultra-thin zirconia veneers have hardly been published.

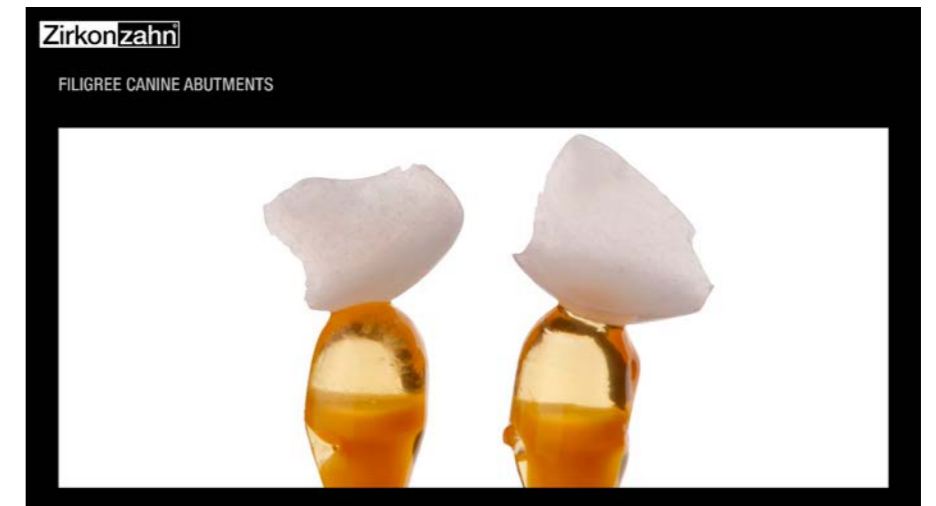
## CASE REPORT

*Prettau® Skin® technique – for creating ultra-thin zirconia veneers*

With the innovative Prettau® Skin® technique for creating ultra-thin Prettau® veneers patients can be given a healthy smile with no or only minimal impairment of tooth substance. The technique is suitable for the aesthetic correction of tooth discolorations, tooth gaps, crooked teeth, conical teeth and abraded teeth. The veneers are preferably made of Prettau® 3 Dispersive® zirconia with Gradual-Triplex-Technology, which is provided with colour, translucency and flexural strength gradients.

Alternatively, they can also be made of Prettau® 2 Dispersive® or Prettau® 4 Anterior® Dispersive® zirconia.

*Continues on page 24.*



# MINIMALLY INVASIVE APPROACH FOR AESTHETIC VENEERS



Continues from page 23.

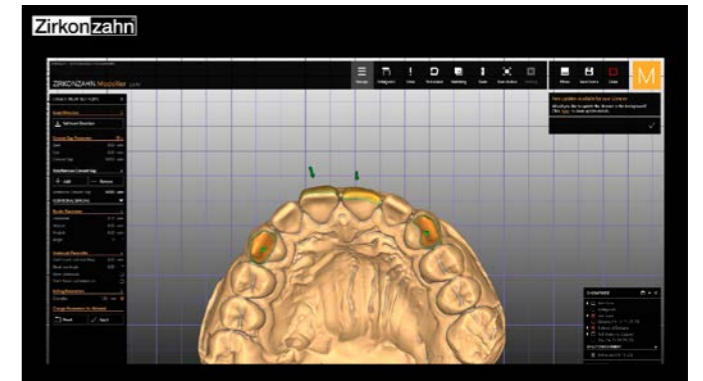
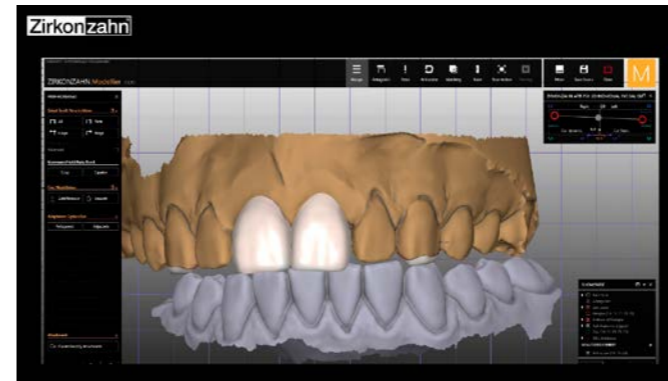
26 year old patient – broken central left incisor, additionally lost canine guidance

### TREATMENT

- 2 ultra-thin Prettau veneers on teeth 11,21(0,1-0,2mm)
- 2 non prep veneers on occlusal surface teeth 13,23, to recover canine guidance
- Luting material: Panavia by Kuraray Noritake Dental Inc.

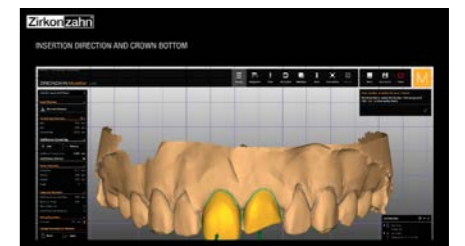
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# Digital workflow to create a final scan and temporary prosthesis for full mouth implant rehabilitation

By Dr Jan Degorgio BChD MSc Dental Implantology  
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This technique was thought up by a team of dental technicians, whose aim was to simplify and make reproducible, with the aid of digital technology, the impression stage for an implant-supported full-mouth prosthesis. The final jig may also be used as a temporary fixed prosthesis.

Many of us may have an array of techniques which we have fine-tuned over the years for the impression stage of a prosthesis supported on multiple implants. Possibly, like myself, many of us still rely on floss and self-curing resin, or flowable composite.

However, has it crossed your mind how we depend on such low-tech methods for something that must be so accurate? Also, even for the restoring dentists, who have an intraoral scanner set up chair-side, sticking on scanning bodies intraorally and waving your magic wand, unfortunately is not sufficiently accurate for the fabrication of a full-arch, fixed, implant-supported prosthesis.

A systematic review showed that due to the flexibility of the large spans of soft tissue being scanned, accuracy could vary greatly, depending on inter-implant distance, scan body type, intraoral scanner type and operator experience<sup>1</sup>.



Similarly, we are also familiar with using the patient's old denture, or a newly fabricated temporary acrylic denture, to give the patient a temporary fixed prosthesis. This often uses up a combination of cold cure acrylic, precious chair time, and large amounts of trimming and polishing.

The following method uses a combination of older techniques, updated using modern-day digital workflow, for the impression taking and temporisation of a full-mouth implant-supported prosthesis in one.

For the lab to start the set up, they will require an initial intraoral scan using abutment-level scan bodies and an old or temporary denture.

If an intraoral scanner is not present, a quick pick-up impression using impression copings will also suffice. The lab will proceed to fabricate a pre-sectioned bar and a hollowed-out prosthesis. The sectioned bar components must contain temporary bridge abutments that will attach to the corresponding implants.

The prosthesis is made to fit freely over the bar, with access holes corresponding to the implants.

The protocol is described as follows (photos taken extra orally on a model for description purposes):

1. Bridge abutments are placed on the implants, correcting any angulations where necessary.



Here an initial intraoral scan using abutment-level scan bodies is carried out. This can be replaced by a pick-up impression using conventional impression copings.

2. From this scan, the technician will mill or print a sectioned bar, and a hollowed-out prosthesis as described earlier. The latter may be made from a scan of the patient's previous dentition, pre-existing denture or a wax-up.
3. The bar sections are fitted into place and fused together with self-curing acrylic. At this stage the hollowed-out prosthesis is tried on to assure a passive fit from the bar, whilst bringing the patient into occlusion. Here occlusion may also be tested and adjusted accordingly.
4. Parts of the prosthesis are filled with light-curing resin and the prosthesis fitted again into place, bringing the patient into occlusion.



The composite is then cured, fusing the prosthesis to the bar. This can then be removed in one piece.

the implants before curing. This will give an accurate adaptation of the fitting surface of the prosthesis.

5. The remaining of the fitting surface of the prosthesis is filled with light-curable resin and fastened back onto

*Continues on page 28.*



# Digital workflow to create a final scan and temporary prosthesis for full mouth implant rehabilitation



Continues from page 27.

- The whole unit is then removed from the mouth, and implant-analogue scan bodies fastened on. This final unit may be scanned in house or sent to the lab for scanning. With this data the lab may design a temporary prosthesis which may be milled or printed in the preferred material.

After adequate healing of soft tissues, a final prosthesis may also be created off this same template, by relining this same prosthesis.

Although there are several steps to the process, the final unit contains all the necessary data in one piece, ready for production of an implant borne prosthesis.

This includes an accurate impression of position and angulation of the implants. Accurate positioning of the

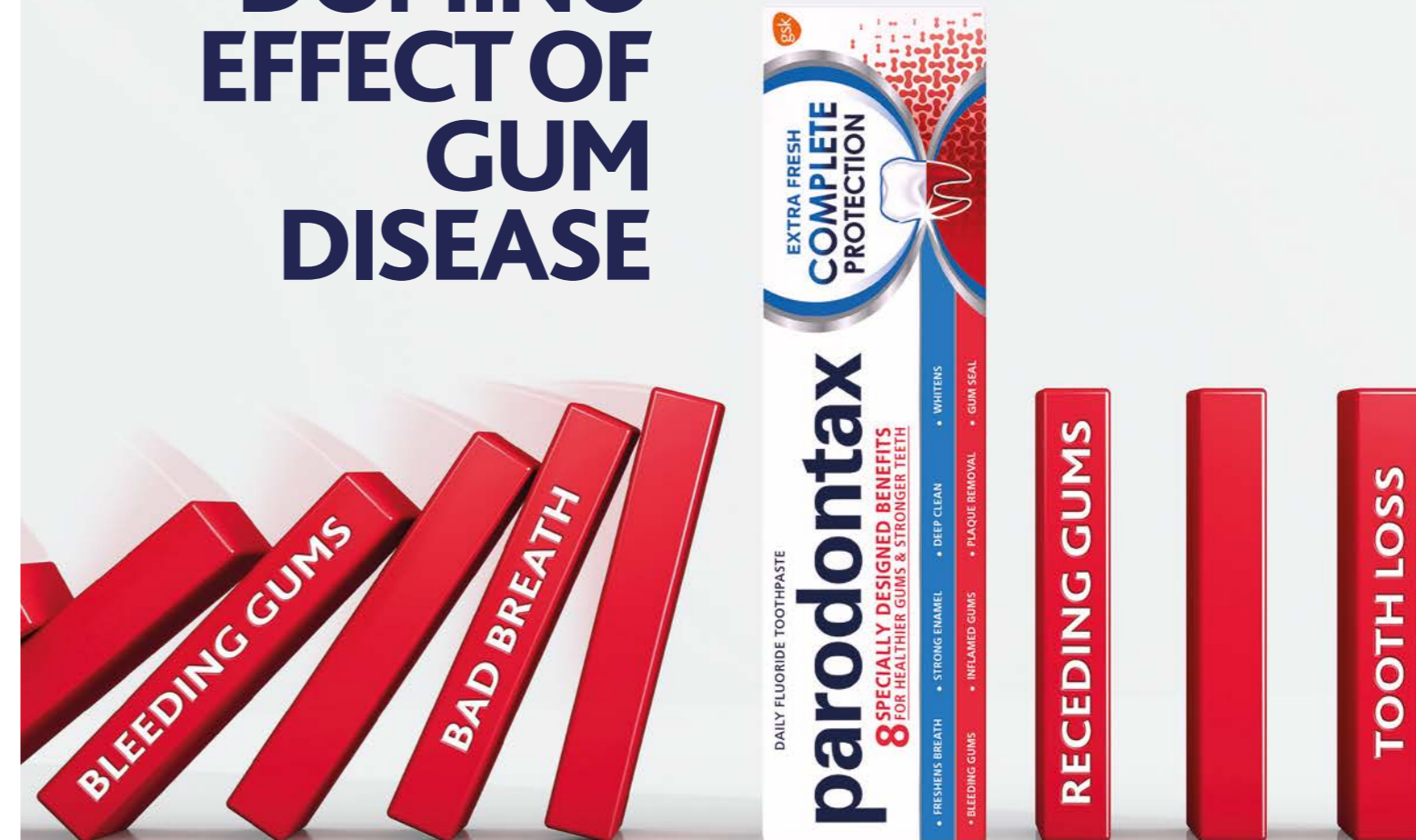


teeth in correct occlusion and relation to the opposing dentition. Also a pick-up impression of the underlying soft tissues, which may be accepted as final or relined again in the future if a temporary prosthesis was placed in an immediate case. ■

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## HELP STOP THE DOMINO EFFECT OF GUM DISEASE



**4x MORE EFFECTIVE VS REGULAR TOOTHPASTE**  
AT REMOVING PLAQUE BACTERIA\*

# Minimal preparation of Fully Anatomical Crowns

Dr Lara Cutajar Cassar

BChD, MSc Imp Dent (Lond), Dip Imp Dent RCS (Eng), FFGDP (UK)

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Teeth do not possess the regenerative potential found in most other tissues so teeth preparations must be based on fundamental principles from which basic criteria can be developed to help predict the success of the prosthodontic treatment.

The scope of this treatment can range from the restoration of a single tooth to the rehabilitation of the entire occlusions. Restorations help in achieving a full function and improved aesthetic outcome.

The objectives of tooth preparation are the following:

1. Reduction of tooth to provide retention
2. Preservation of healthy tooth tissue to secure resistance form
3. Provision of acceptable finish lines
4. Performing pragmatic tooth reduction to encourage favourable tissue response from the artificial crown contour<sup>1</sup>.

The guidelines for tooth preparation are the following:

1. Total occlusal convergence of 10 to 20 degrees
2. Occluso-cervical of 4mm for molars and 3mm for other teeth
3. An occluso-cervical to faciolingual dimension of 0.4 or greater
4. Preservation of facioproximal and linguoproximal line angles whenever possible
5. When the above features are missing, teeth should be modified

with auxiliary resistance features as axial grooves preferably on proximal surfaces.

6. Circumferential form of the prepared tooth
7. Reduction uniformity
8. Finish line location depending on type of crown and aesthetic requirements and tooth condition,
9. Rounded line angles<sup>2</sup>.

The principles of tooth preparation are the following:

1. Preservation of tooth structure: Preserving the adjacent teeth, soft tissue and pulp
2. Retention and resistance form: It depends on taper, preparation length, freedom of displacement, substitution of internal features and path on insertion
3. Structural durability: This is dependent on occlusal reduction, functional cusp bevel and axial reduction
4. Marginal integrity: Marginal integrity is a factor dependent on finish line configuration and bevels
5. Preservation of the periodontium: The supporting structure of the tooth is preserved by good placement of margins and preservation of biological width<sup>3</sup>.

## SO, WHY IS MINIMAL TOOTH PREPARATION DESIRABLE?

To obtain long-term stability, the pulp should be protected, thus the amount of tooth preparation should be reduced.

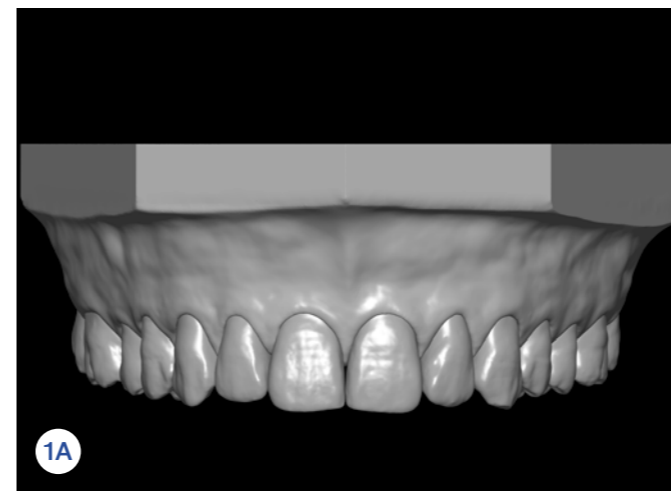
The cutting surface of tooth preparation within tooth enamel should be accurately controlled. This is the prevailing concept of minimally invasive tooth preparation<sup>4</sup>.

The following is a pictorial step-by-step guide for the innovative preparation of fully anatomical crowns taught on the fascinating course held at ZirkonZahn in Tyrol.

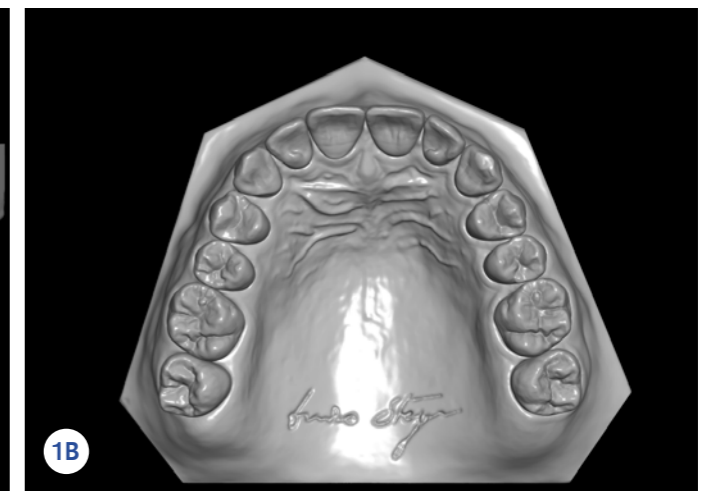
This technique is possible due to the advances in the materials available nowadays. This is beneficial when compared to the conventional preparation technique as it saves on tooth tissue, which as we all know would ultimately avoid several problems in the long term.

1. Pre-op full-anatomical casts
2. Buccal & palatal edges bevelled: The incisal half of the buccal aspect is bevelled at an angle as shown in the photos in occlusal and frontal views below. This is repeated on the incisal half of the palatal aspect of the tooth. The final clearance of the parallel walls is recommended to be 0.852mm.
3. Occluso-buccal edges bevelled: This is followed by bevelling the occluso buccal edges as shown pictorially below.

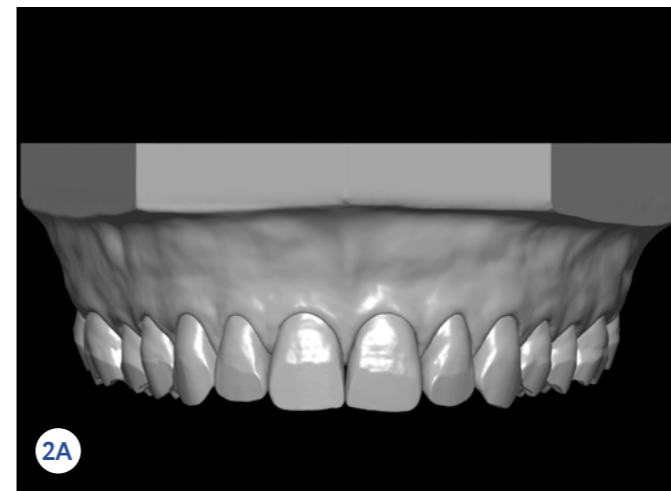
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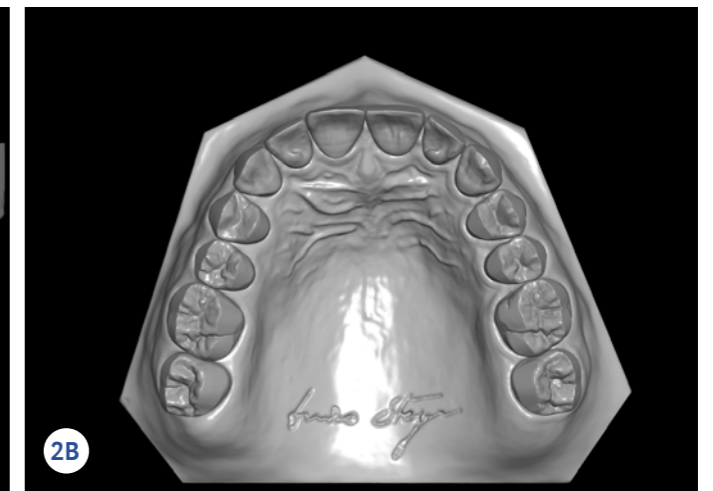
1A



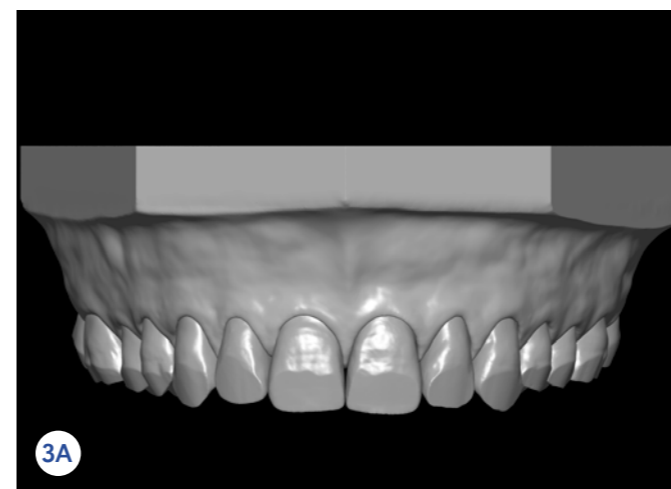
1B



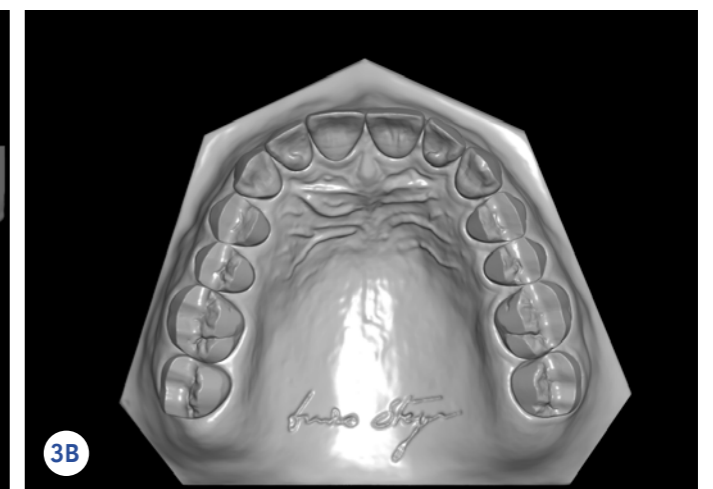
2A



2B



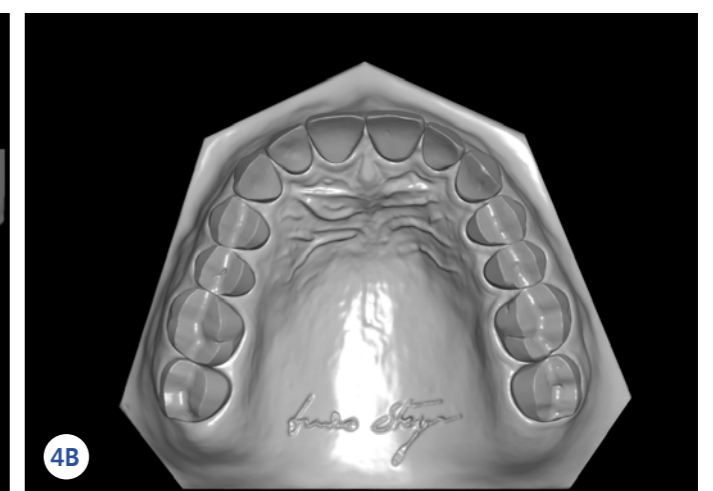
3A



3B



4A



4B

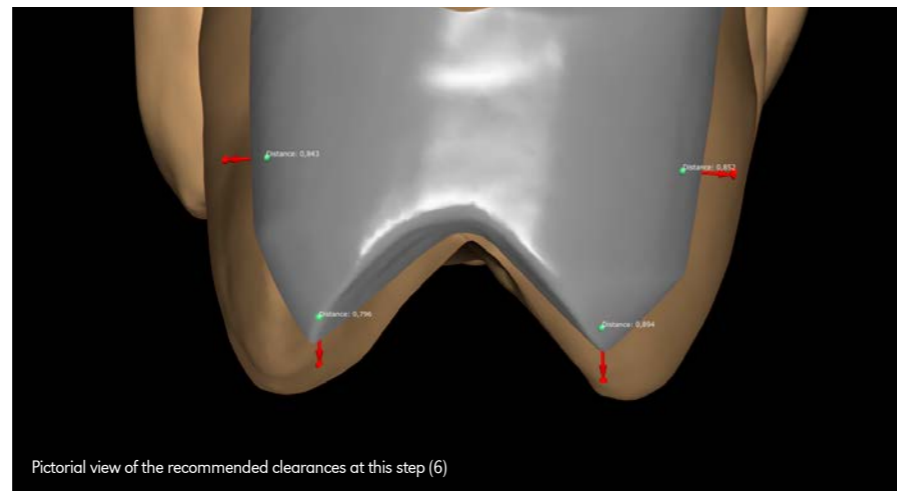


# Minimal preparation of Fully Anatomical Crowns

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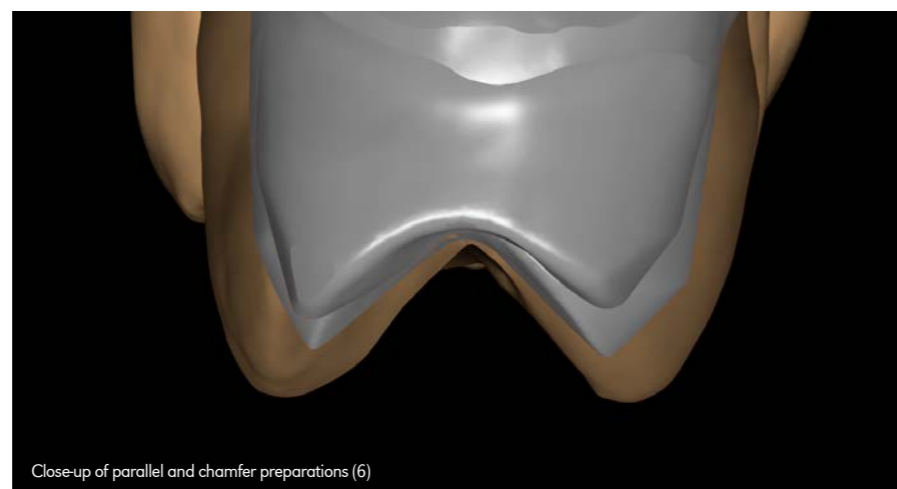
4. Occlusal edges beveled: The occlusal surface is trimmed following the anatomical shape of the surface of the tooth to maintain the original shape of the tooth.

This is pictorially shown in the frontal and occlusal views below. The recommended clearance occlusally at this step should be 0.796mm.



5. Opening of interdental spaces: The interdental space is opened by trimming the mesial and distal walls of the tooth as shown in the photos below.

6. Parallel final preparation: The walls of the preparations are trimmed parallel to each other with a recommended clearance at this step of 0.843mm. Below are the occlusal and frontal view demonstrating this step.

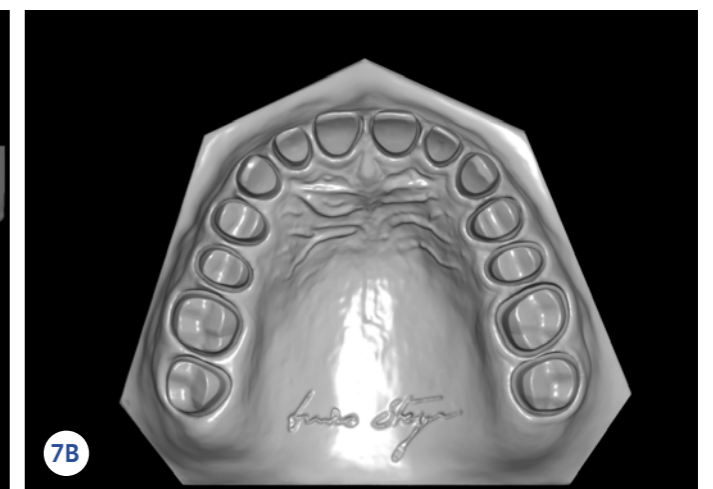
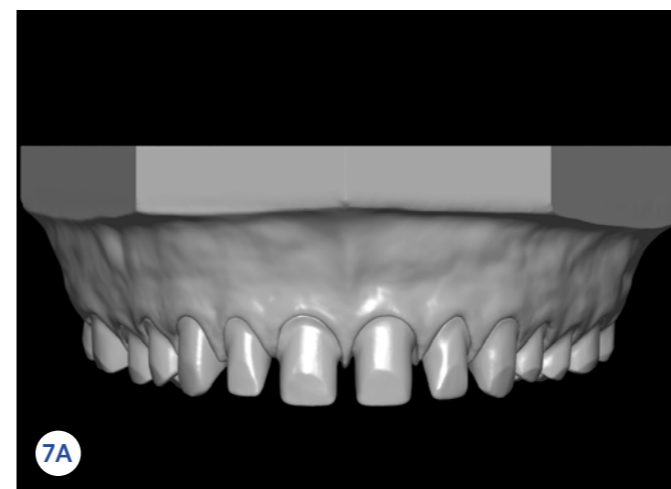
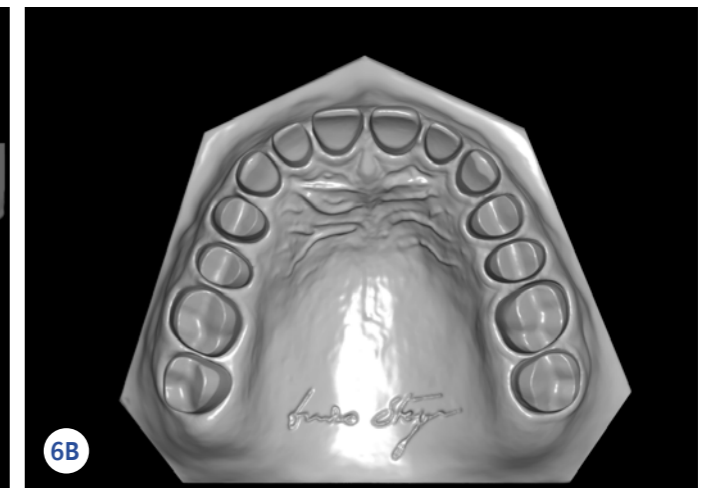
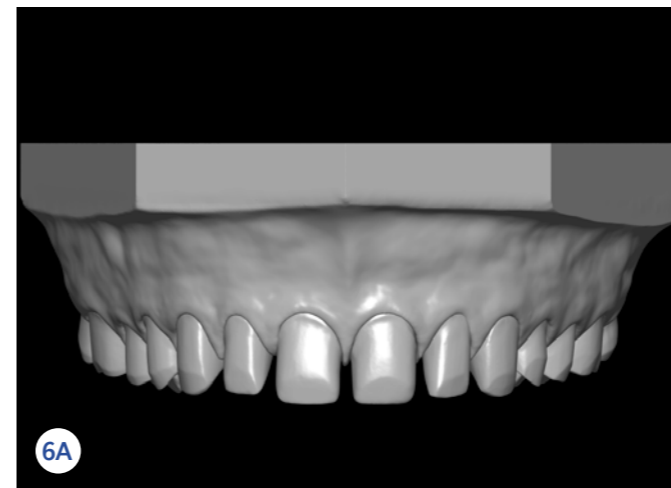
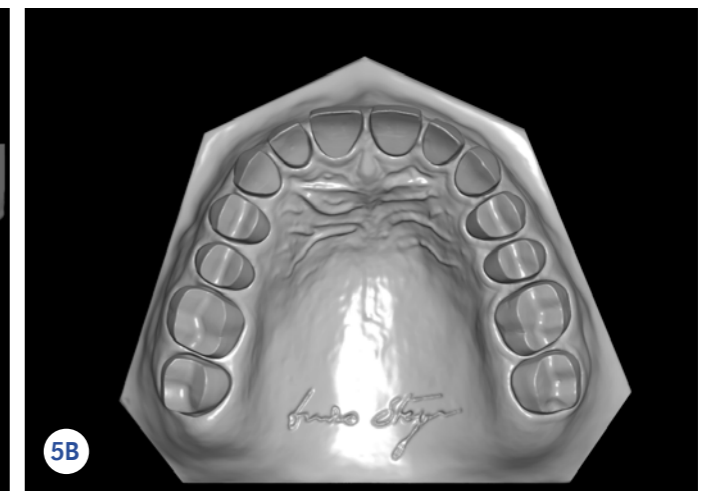
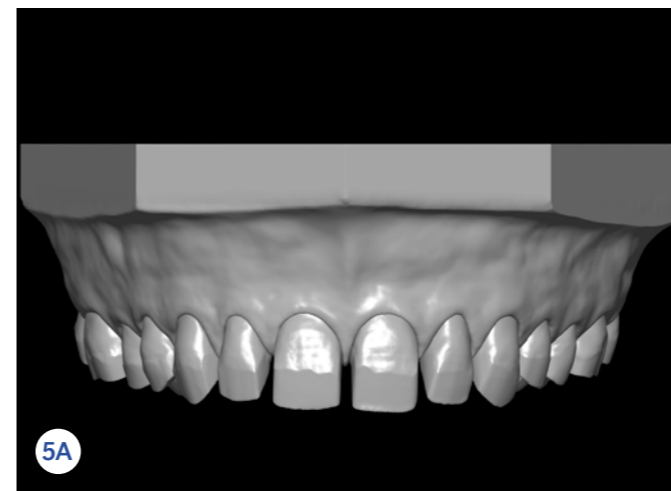
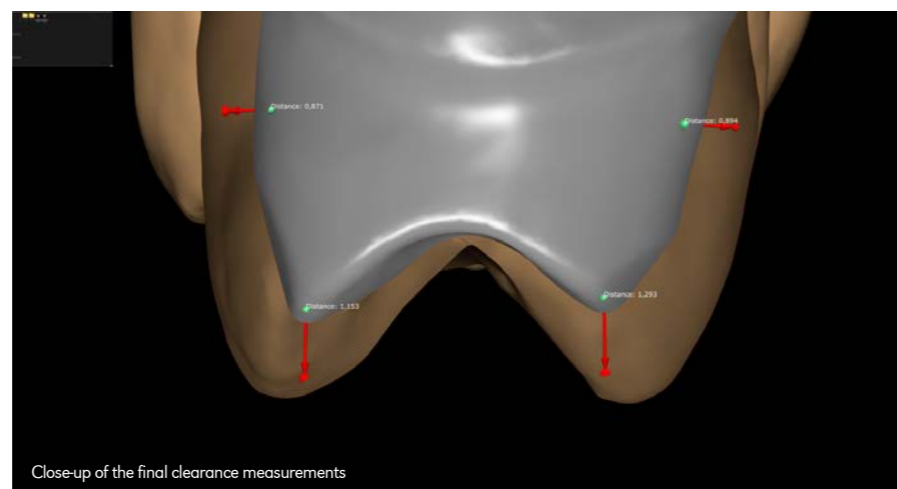


7. Final chamfer preparation: The final chamfer preparation is shown below in frontal and occlusal views.

On the right is a close up of the final clearance measurements after final chamfer preparation with a final recommended occlusal clearance of around 1.153mm buccally and 1.293mm palatally.

On the walls, the final recommended clearances are 0.871mm buccally and 0.894mm palatally.

All steps need to be followed through sequentially to ensure the tooth preparation is exactly as proposed. 📷



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# DISPERSIVE ZIRKONIUM

Dr David Muscat

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Dispersive means 'precoloured.' White Zirkonia is difficult to infiltrate the colour. If the Zirkonia is too light you have to adjust in the patient's mouth and it is difficult to add the stain. One can use pre-coloured Zirkonia.

Zirconia has an opacity that is higher than pressed ceramic.

At Zirkonzahn there are several types.

## PRETTAU

(name derived from Preta – a village)

This has been around for 12-13 years. It has a low translucency and a very high flexural strength. One can use this for a single crown to a full arch. The sintering temperature is 1600 degrees Celsius.

There is individual colouring with liquids. A monolithic design in the posterior area is possible.

There is a colour grading. The backside is protected from chipping.

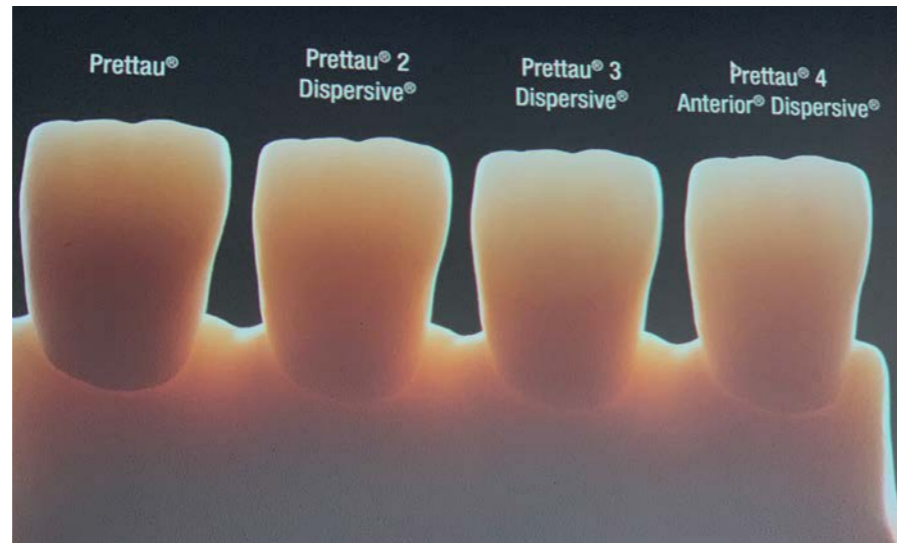
## PRETTAU 2 DISPERSIVE

This was developed about three years ago. It has a greater translucency and also a very strong flexural strength. It has a colour gradient. The sintering temperature is 1600 degrees Celsius. There is individualisation with colour liquid (intensive colour).

A monolithic design in the anterior and posterior areas is possible. A very good fit is obtained. It is not too translucent and a good patient response is usually obtained.

## PRETTAU 3 DISPERSIVE

This is the latest and Zirkonzahn's latest own multilayered Zirconium. It has a colour gradient.



Gradual Triple Technology – between 670 and 1100 megapascals. A sintering temperature of 1500 degrees Celsius. Individualisation with colour liquids (intensive colour). The monolithic design in the anterior and posterior areas. One can have multiple angles in an implant case.

## PRETTAU 4 ANTERIOR DISPERSIVE

For a unit bridge. Lower flexural strength. These are best for the most translucent crowns.

## FRESCO CERAMICS

There are six different enamel shades. Zirkonzahn has its own shade guide.

- A: reddish brown
- B: reddish yellowish
- C: greyish
- D: reddish grey
- OM: bleach shades – light to dark: OM1 OM2 OM3

There is also a premolar shade guide as well as a lower incisor shade guide.

Do not use multilayered Zirconium as it makes it weaker. They have different shrinkages and so give

problems and can break. After 4-5 years the flexural strength decreases a lot and may break. From 3500 megapascals it may reduce to 800 megapascals.

The quality Zirconium is provided during the production process with a Triple 6 of natural colour, translucency and flexural strength. The result is a natural looking restoration with an extremely high flexural strength at the tooth neck and excellent translucency at the incisal angle.

Zirconia is a very bad heat conductor so it takes a lot of time to heat up and cool down so you need a slow heat rate and a slow cooling down time otherwise you will get micro-cracks during the patient try in appointment.

When taking a shade one must always take the shade before as well as the stump shade. Take the shade several times. Monolithic Zirconia looks greyish further back in the mouth. One uses more opaque at the back.

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# Using the Zirkonzahn Planefinder® to detect the natural head position and occlusal plane angle

By Dr Simon Muscat

B.Ch.D MFDS RCSEd MJDF RCS(Lon) MMedSci Dental Implantology



Traditional facebows rely on using the inter-pupillary line, the facial midline and external auditory canals to capture the occlusal plane. These systems carry the risk of inaccuracies, especially when there is an asymmetrical discrepancy in the occlusal plane between the left and right sides. Also, commonly used articulators work on average values which do not represent patient-specific parameters. Therefore, functional contacts in dynamic occlusion cannot be represented realistically.

The Planesystem® enables the registration of the patient's individual maxillary position within the face, the determination of the midline as well as the occlusal plane so that this information can be transferred to the PS1 3D articulator. The advantages of this will translate to more accurate treatment planning and design of restorations. Reproducible references determined from the natural head position of the patient will include the true horizontal and vertical lines as well as the ala-tragus line plotted on both sides. The ala-tragus line usually lies parallel to the occlusal plane.

## USE OF THE PLANEFINDER® (IMAGES 1 AND 2)

1. The stand must be aligned parallel to the ground. This is done with the help of an inbuilt water level.



Image 1

- The mirror is set at the patient's eye level. The patient is asked to place their index fingers on the support device and to look into the mirror with a relaxed lower jaw.
- The lateral orientation angles are set at the level of the zygoma / tragus / external auditory meatus. Two points are marked on the patient's skin parallel to the horizontal lines and preferably not on skin that can be moved by facial muscles.
- The patient is asked to leave and return a couple of times to assess the reproducibility of the measurement.



Image 2

There is an analog and digital way of data transfer:

## REGISTERING THE POSITION OF THE MAXILLA IN THE NATURAL HEAD POSITION (NHP)

- Digital approach with the FaceHunter® (Image 3) by scanning the patient's face whilst positioned within the Planefinder®.

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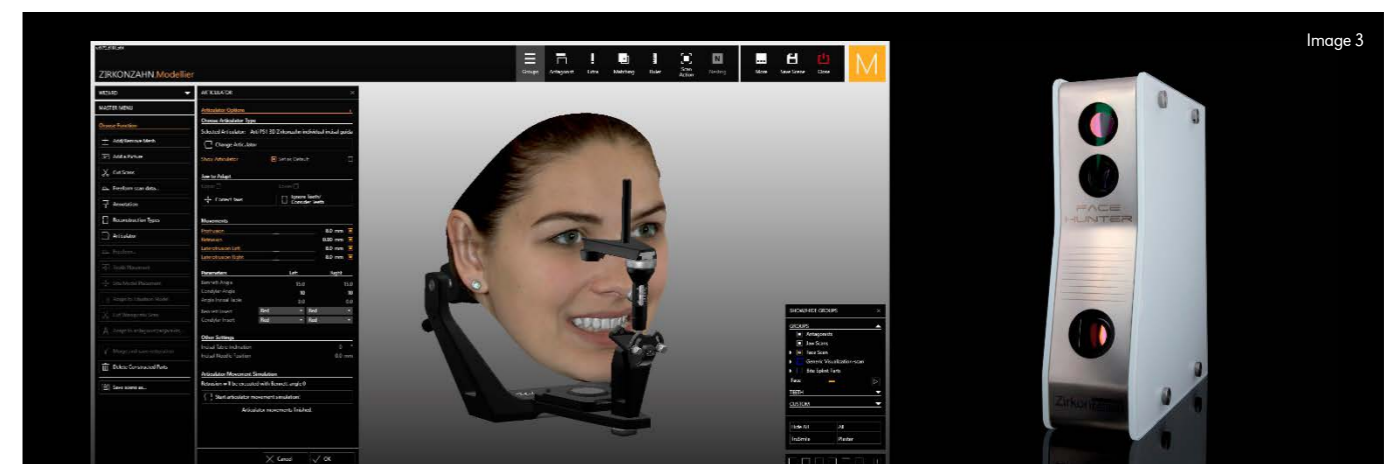


Image 3

# Using the Zirkonzahn Planefinder® to detect the natural head position and occlusal plane angle

Continues from page 37.

- Manual approach with the Bite Tray Planefinder® (Images 4 and 5)

The patient would rest their incisors on the plane tray whilst positioning themselves within the Planefinder® as in stage #2. Without moving the patient, bite registration material is syringed around the teeth to fix the patient position to the tray.

A model of the patient's upper jaw can then be positioned onto the bite registration material. The skeletal midline is marked on the tray and model. More bite registration paste can be used to fill in any voids between the model and the tray.

## REGISTERING THE INCLINATION OF THE ALA-TRAGUS REFERENCE IN THE NHP

- Digital approach: Indication of the relevant anatomical points on the 3D FaceHunter® scan and automatic measuring through the software.
- Manual approach (Image 6): The upper arm of the plane finder, aligned



horizontally, is used to measure the angle between the tip of the ala and the centre of the tragus on both sides. The angle can be inputted into the Zirkonzahn PS1-3D® articulator with the help of the Plane Positioner®.

## DATA TRANSFER TO THE PS1 ARTICULATOR

- Digital approach (Image 7): An intraoral scan is taken and a facial scan is taken of the patient with the help of a bite fork and bite registration material. The fitting surface of the bite registration material is also scanned. Through matching, the digital patient model is located correctly within the facial scan. The Zirkonzahn digital software is required to process the data and move on to designing the necessary treatment.

- Manual approach: The patient model is removed from the Plane Tray® and placed on a transparent square plate (positioner) along with the bite registration paste. The positioner has 2 lines; a midline and an orientation line for the centre of mastication (a line running through the centre of the upper first molar). The patient model is aligned within these 2 lines and fixed with silicone putty. The upper patient model is plastered onto the upper articulator arm (Image 8).

Once the digital models or physical models are positioned correctly within the articulator, the dental technician can start working on the patient's case with increased accuracy and peace of mind.



Image 8



Image 4

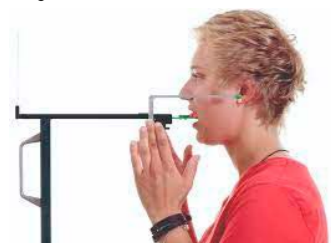


Image 5



A



B

Image 7

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