



British Institute  
of Dental & Surgical  
Technologists

# CPD Article

ISSUE 26

Proud of our History, Looking Forward to the Future

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1 hr



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**Heraeus**

Ref No. 37/09/01

Naturally reduced cusps and greater volume for implant prosthetics

# Teeth in a New Design



▲ Fig. 1

The proportion of implant-supported hybrid dentures in geriatric prosthetics is increasing. This is associated with new demands on working methods and materials.

**Authors:**

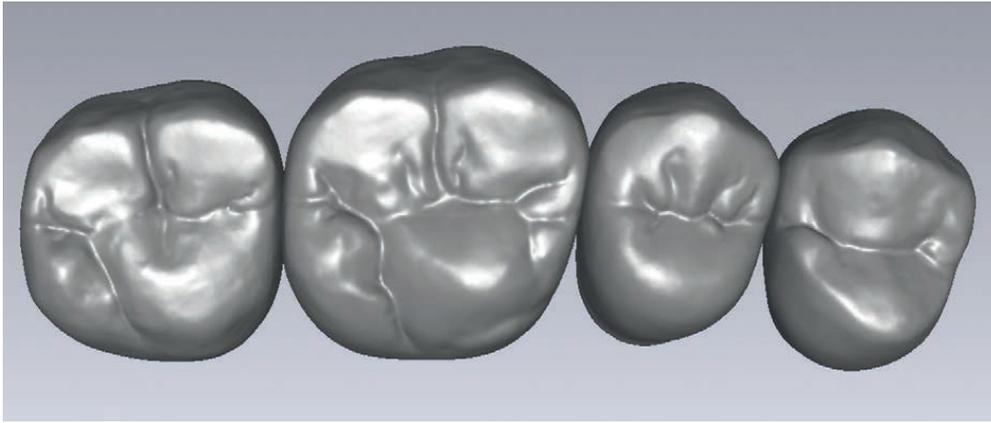
Olaf Mrotzek, dental technician, Wasserburg, and Wolfgang Weisser, master dental technician, Aalen Indices:

Setup  
Geriatric prosthetics  
Hybrid prosthetics  
Implant-supported posterior teeth

New indications in geriatric prosthetics are placing greater demands on the function, aesthetics and stability of prosthetic teeth. Below, Olaf Mrotzek explains why existing tooth lines do not optimally meet current requirements and presents the ideal teeth for a wider range of applications. Wolfgang Weisser then describes his practical experience with the new teeth in his laboratory.

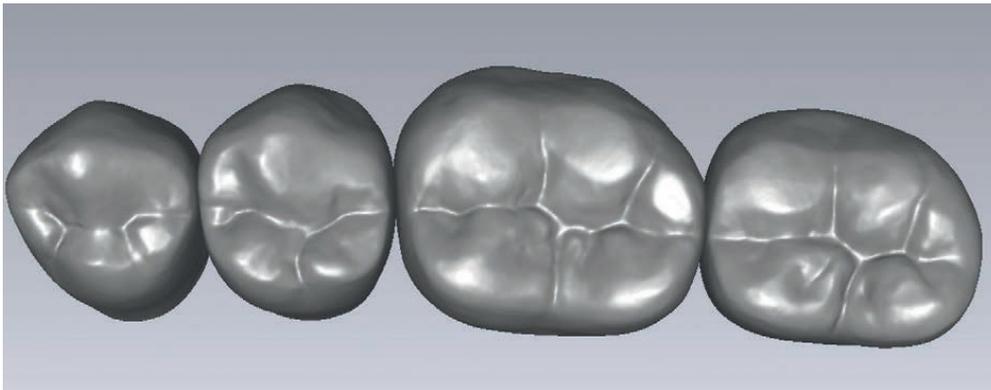
**Prosthetics**

The word prosthetics always calls to mind older denture wearers. prosthetics - full denture!? This idea is no longer accurate. Today's prosthetics involves all types of removable prosthetics, up to implant-supported full dentures. This means that not only dental technicians but also manufacturers of artificial teeth are facing new challenges.



◀ Figs. 2 and 3

CAD design of a new line of posterior teeth especially designed for implant prosthetics: flatter occlusal morphology with naturally reduced cusp angulation reduces shear forces and minimises initial abrasion



▼ Fig. 4

The precise centrics with maximum degrees of freedom in the paths of motion ensures good chewing efficiency and function, even in older patients

### Implant-supported hybrid prosthetics

The continuing advancement of implants, outpatient implantation and the fact that immediate loading is often possible mean that implant-supported hybrid prostheses represent a significant and growing share of prosthetics, increasing by around 10% a year. This is associated with changes in prosthetics with the proportion of full dentures decreasing and primarily becoming the domain of "very old" and "long-lived people" (definition by WHO). As a result, the morphological and material-related requirements for artificial teeth have also changed in recent years. The forces exerted on the denture are quite different for hybrid versus implant-supported prosthetics. At the same time,

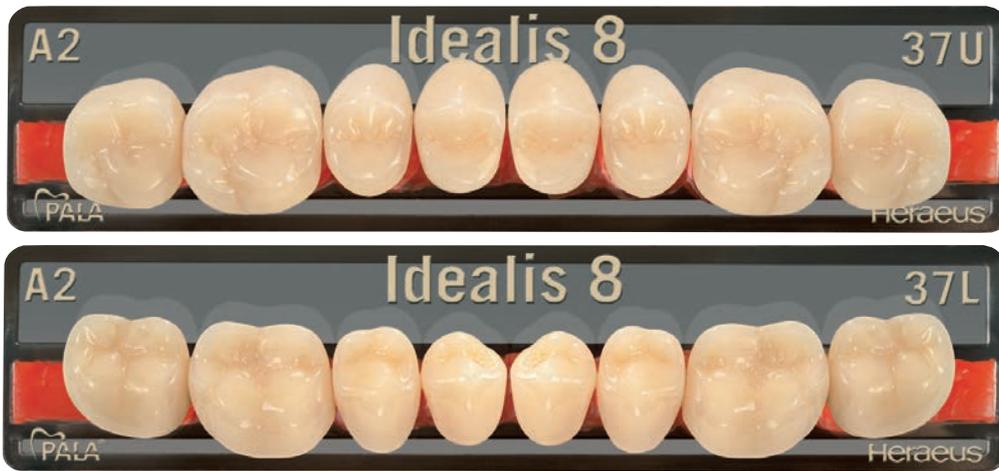
the aesthetic demands are high, and the denture should not be noticed as such by others. This also means that the supporting structure must not be visible.



Dental technicians are finding that existing tooth lines are not ideal for the new applications. Why? Prosthetic teeth are designed either for full dentures for the elderly or for combination dentures in shapes typical for younger people.

### Semi-anatomical shapes for full dentures in old age

The first artificial teeth were generally designed for full-denture setups. Semi-anatomical morphologies make setup easier. However, even though full prosthetics is closely related to hybrid prosthetics, full-denture setup concepts and



◀ Figs. 5 and 6

The new Pala Idealis posterior line is optimised for geriatric implant prosthetics

the associated strict static requirements can very rarely be applied in hybrid prosthetics. Teeth for full dentures are typically smaller in size and have a narrower transverse occlusal field. This is useful for the statics of full dentures. Unfortunately, dental technicians cannot sufficiently cover the primary construction of hybrid dentures with teeth of this type.

### Young, fully anatomical shapes for combination prosthetic teeth

Since the mid-1990s, the development of artificial teeth has increasingly focused on combination prosthetics. This resulted in so-called fully anatomical tooth lines with sizes and morphologies very close to those of natural teeth. The natural occlusal shaping makes many of these teeth multifunctional, which enables implementation of common full-denture setup concepts. On the other hand, studies show that the initial abrasion is greater with these natural-appearing and youthful cusps, regardless of the material. This very quickly causes overloading in the anterior teeth and ultimately leads to failure of the prosthetics. The existing tooth lines still have their place and their areas of indication. However, none of them fully meet the current requirements in the important field of prosthetics.

### Prosthetic teeth for geriatric prosthetics

Heraeus has been working closely with dental technicians and universities to define the requirements for contemporary prosthetic teeth.

The teeth should:

- Reduce shearing forces
- Offer greater tolerances in accurate centrics
- Provide aesthetic coverage of implant and tertiary structures
- Be easy to care for
- Be stable.

On this basis, the developers and product specialists at Heraeus have developed specifications for a new tooth line that is specially tailored to geriatric and implant prosthetics.

### Semi-anatomical shapes for full dentures in old age

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◀ Fig. 7 Anterior tooth view of Premium L19

▼ Figs. 8 and 9 View of posterior teeth in prosthetic case



### Morphology

Flatter occlusal morphology with naturally reduced cusp angulation reduces shearing forces and ensures that chewing pressures are transmitted evenly. This minimises initial abrasion and ensures optimum integration into the abraded residual dentition of older people.

### Occlusal relief

The occlusal relief should offer larger tolerances in the range of motion and easily located centrics because fine muscular coordination is reduced in older people. This also facilitates setup of the teeth.

### Tooth base

A wider tooth base allows maximum coverage of tertiary and implant structures. It also allows shaping of the gums for an aesthetic appearance and easy cleaning.

### Tooth volume

The larger tooth volume generally provides good coverage of the underlying construction and can be ideally integrated

into the residual dentition for combination solutions.

### Approximal surfaces

Larger, tighter approximal surfaces facilitate setup and later cleaning of the prosthesis. For optimum cleaning characteristics, fissures should not be too deep and the buccal surfaces should be appropriately structured.

### Materials

The material of the teeth must be highly resistant to abrasion and fracture to resist the greater forces exerted by implant-supported structures.

### New posterior teeth for contemporary indications

The new Pala Idealis line of posterior teeth with its naturally reduced cusps is optimally designed for the new requirements of prosthetics. The flat occlusal relief ensures precise centrics with maximum degrees of freedom in the paths of motion. For patients, this means maximum chewing efficiency with comfortable, interference-free and accurate function. The flattened

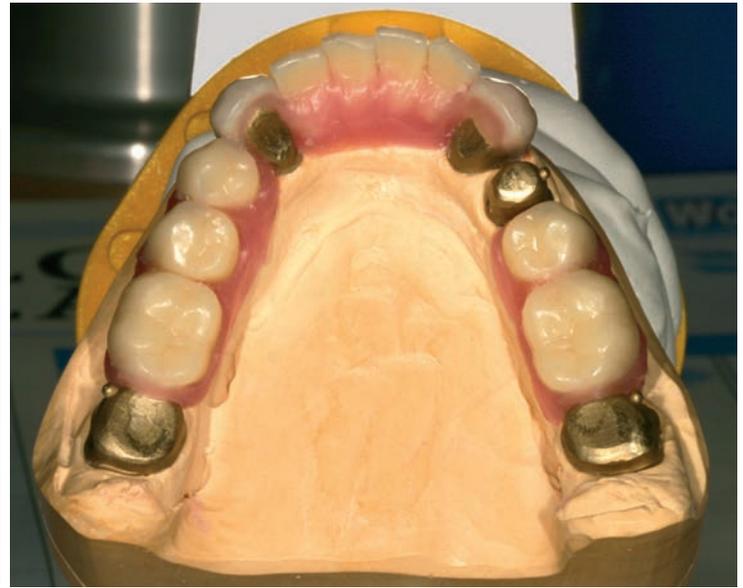
multipoint contact minimises initial abrasion with implant-based dentures. Greater basal width and tooth length provide optimum coverage of supporting structures. Older patients benefit from the smooth, functional and easily cleaned morphology. The precise centric keying and wide range of motion also make the new posterior tooth ideal for treatment of temporomandibular disorders (TMJ).

Since its manufacturing process is identical, the new tooth line can be combined with all Pala Premium and Mondial anterior teeth and the Mondial maxillary posterior teeth from Heraeus. Pala Idealis teeth with the proven NanoPearls filler are also just as colour-stable and resistant to abrasion and plaque.

### A case study

I described the new Pala Premium 19 anterior teeth in *das dental labor* 4/2011 based on my experience with a case in my laboratory that was restored with Premium L19 (Fig. 7). The new Idealis 8 37 L posterior teeth were also used for this case, and I was looking forward to seeing whether the Idealis tooth would live up to its name. It

▼ Figs. 10 and 11  
Harmonious occlusal morphology



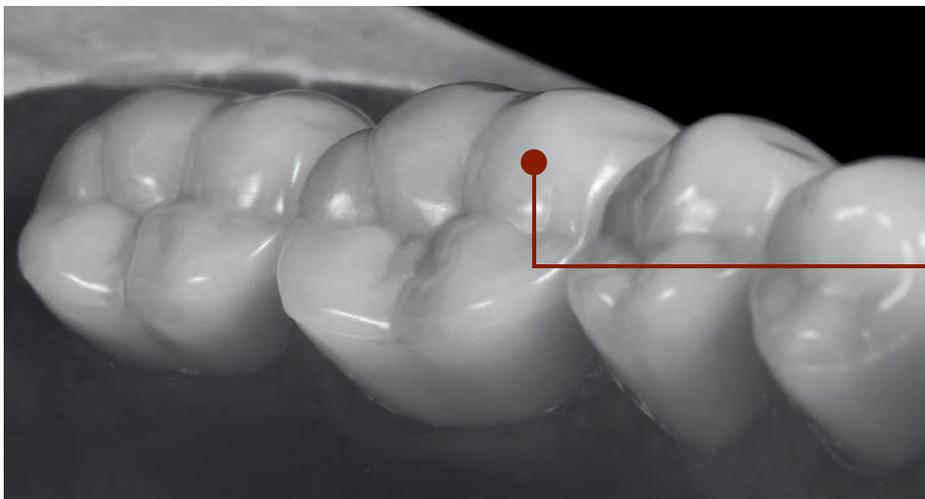
was surprising how well they could be integrated (Figs. 8 and 9) – as if they had been fabricated specially for this restoration. Selecting teeth is not easy for the dental technician; in most cases, the posterior teeth are too small and the cusp angulation is much too high, resulting in fissures that are often too deep. The new shape of posterior teeth can very easily be used in hybrid prostheses to cover the substructure,

regardless of whether implants or other retaining elements are used (in this case, a telescopic solution, Fig. 10, with a model cast framework).

The setup was very easy and efficient, which is now a very important factor for the profitability of a laboratory. The flatter occlusal morphology with naturally reduced cusp angulation has the great advantage

of reducing shearing forces. The greater volume of the new line offers a very harmonious appearance (Fig. 11) with very natural integration into the oral environment.

Only minimum grinding is required for very minor changes to this high-quality tooth line. Differently designed teeth often require a lot of grinding of the occlusion.



Flat occlusal relief for precise centrics with maximum degrees of freedom

◀ Fig. 12 The geriatric occlusion



◀ Fig. 13 From the gingiva to the tooth – perfect transitions

The fissure depth (Fig. 12) and the abrasions of the antagonists are also an ideal fit. Final modelling in wax closes the circle, because black triangles are a thing of the past with these new teeth (Fig. 13). This looks very natural in the oral environment and makes oral hygiene very easy for the patient.



Olaf Mrotzek  
Key Account  
Manager  
Artificial Teeth  
Prosthetics  
Division  
Heraeus Kulzer  
GmbH



Wolfgang  
Weisser  
GÄF-  
Zahntechnik  
GmbH  
Otto-Schott-Str.  
11  
73431 Aalen

All-in-all, an ideal opportunity for making the work in the laboratory a little less stressful without major expense. What more could you ask for?

Schlätterst. 2  
88142 Wasserburg  
Telefon (0 83 82) 98 60-28  
E-Mail [olaf.mrotzek@heraeus.com](mailto:olaf.mrotzek@heraeus.com)

# Heraeus

CPD Questions Ref No. XX/OX/01

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- Q1.) How much is the prosthetics market growing each year?
- Q2.) What should not be visible to meet higher aesthetic demands?
- Q3.) What were the first artificial teeth designed for?
- Q4.) What are typically smaller in size for full dentures
- Q5.) What is useful for the static of full dentures?
- Q6.) When did the development of artificial teeth increase its focus on combination prosthetics?
- Q7.) Name 3 requirements used to define contemporary prosthetic teeth?

Name:

GDC Number:

Address:

Postcode:

Telephone no: (in case of any queries)

Signed:

Date:



British Institute  
of Dental & Surgical  
Technologists

44-46 Wollaton Road, Beeston,  
Nottingham NG9 2NR

Telephone: +44(0)115 968 3181

Fax: +44(0)115 925 4800

Website: [www.bidst.org](http://www.bidst.org)

Email: [secretary@bidst.org](mailto:secretary@bidst.org)